Cape Peninsula University of Technology

Quality Improvement at a University of Technology using Internet Technologies

By

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ABSTRACT

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Advances in internet technologies have created opportunities for facilitating learning and improving performance in education. The applications of these technologies have given rise to the phenomenon widely referred to as *e-Learning*.

E-Learning has been widely adopted by tertiary institutions globally as a strategic initiative to improve the *knowledge delivery* process. This study was carried out at a University of Technology (UoT) in the Western Cape, South Africa, where e-Learning technology is used mainly for distribution of course materials. The study focuses on the impact of a *web-based* e-Learning program on the quality of teaching and learning; with an overall aim of creating awareness of the extent to which the quality of teaching and learning can be improved through a learning environment that engages an e-Learning program for leverage.

The need to maximize the return on investments (ROI) by the institution on an enterprise e-Learning platform (Blackboard), the learning enablement which educational technologies afford, and the dividends promised by a strategic implementation of e–Learning in enhancing and enriching learning environments makes this study relevant and timely.

The research was conducted using the UoT as a case study, and utilised the principles of both qualitative and qualitative research paradigms. The research was based on a review of relevant literature, administration of survey questionnaires to specific faculty and students'

populations, and statistical comparisons of students' test results based on instruction delivery methods.

The findings of this study underline that students' satisfaction with a teaching method can positively influence how they learn and the outcomes they achieve, that instruction methods can greatly affect students' performance, and consequently the quality of learning. The result of this study conforms to the view of many authors that instruction methods can be improved by systematic use of specific internet technologies (or simply, *e-Learning tools*) in the teaching and learning process. It was found that student achieved better results in modules of a subject that were taught using a combination of e-Learning program and face-to-face learning method than in the module taught using the traditional method only.

Other emerging findings from this study suggest that lecturers at the institution are biased against the term e-Learning mainly because of their negative experiences with the e-Learning platform, lack of knowledge of the potentials of an e-Learning program and the challenges it poses. However, some faculty members show some willingness to use this e-Learning approach if conditions for its success are favourable with the necessary support systems in place.

The main conclusion drawn from this research as a consequence of the findings is that powerful learning environments that meet the needs and enhance the learning of students would be in place at the institution if academic staff are duly aware of the benefits of an e-Learning program to them and their students; and if they are well resourced and capacitated.

This study therefore argues for a multipronged approach to facilitate the institution-wide use of e-Learning program in teaching and learning. This includes but is not limited to educating the academic staff on the advantages/benefits of using technology as an effective tool for learner engagement, providing meaningful pedagogical training with the specific aim of preparing them for integrating e-Learning into their teaching, identifying learning objectives and learning processes that can best be supported by either e-Learning components or face-to-face, or by both and adequate support structure.

DECLARATION

I, Joseph Chigbogwu Akwunwa, declare that the contents of this thesis represent my own unaided work, and that the thesis has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.

Signed **Date**

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DEDICATION

For my daughter Virtue, my wife Tibiebiere and my mother Grace.

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GLOSSARY

Authentic Learning Activities

This refers to tasks that correspond to and mirror situations and problems in the real world with the goal of engaging learners in relevant and meaningful inquiry or problem-based activities for lifelong learning (Herrington et al., 2006).

Authentic Learning

This is a concept of learning that typically focuses on real-world, complex problems and their solutions, using role-playing exercises, problem-based activities, case studies, and participation in virtual communities of practice. The learning environments are inherently multidisciplinary (Lombardi, 2007).

Behaviourism

Behaviourism is perspective of learning with the idea that learning consists of a change in behaviour due to the acquisition, reinforcement and application of associations between stimuli from the environment and observable responses of the individual. Behaviourists are interested in measurable changes in behaviour (UNESCO, 2013).

Blackboard

Blackboard is a Web-based Virtual Learning Environment designed and developed for educational instruction, communication, and assessment.

Cognitivism

Cognitivism is a learning theory that recognises the learning capability of the individual learners, their cognitive skills, as an important component of learning and behavioural change; the cognitivist theorist being most interested in the way that the brain transfers knowledge from short-term memory to long-term knowledge (UNESCO, 2013).

Constructivism

Constructivism is the idea that learners are not passive recipients of information, but that they actively construct their knowledge in interaction with the environment and through the reorganization of their mental structures. Learners are therefore viewed as sense-makers, not simply recording given information but interpreting it (UNESCO, 2013). This view of learning led to the shift from the “knowledge-acquisition” to “knowledge-construction” metaphor (UNESCO, 2013).

Education Quality

Education quality is defined as the "character of the set of elements in the input, process, and output of the education system that provides services that completely satisfy both internal and external strategic constituencies by meeting their explicit and implicit expectations (Cheng, 1995, cited in Cheng & Tam, 1997).

Educational Technology

Educational technology concerns the technology that is used to facilitate the teaching/learning process" (Newhouse 2002).

E-Learning Platform

This is a database-driven web-based system used by institutions of learning to facilitate the management of course and learning activities and tasks. It is often referred to as, VLE, CMS, LMS etc.; and enables the instructor to design online courses that include textual, audio, and video learning material, discussion forums, polls, surveys, and other activities. Students can interact with the content, peers, and the instructor, submit assignments, and take tests (Garrison & Vaughan, 2008 cited in Schmidt, 2012).

E-Learning Program

In the context of this study, e-Learning program refers to structured plan and events surrounding the effective use of internet technologies with the aim of improving knowledge delivery process(es), and successfully implementing the plans to achieve desired goals. In this study, e-Learning program and educational technologies are used interchangeably.

E-Learning

E-Learning is a short term for electronic learning, and is defined within the context of this study, as the use of internet and internet-related technologies in instructional development and distribution of educational resources (Kekkonen–Moneta & Moneta, 2002). E-Learning uses network technologies to create, foster, deliver, and facilitate learning, anytime and anywhere (Liaw, 2008).

Face-To-Face Education

This refers to the traditional means of instruction in which an instructor delivers lectures face-to-face to students who are required to attend (Schmidt, 2012).

Learning Environment

A learning environment is the totality of the surroundings and conditions and sets of organizational principles that affect and/or influences learning (Warge & Dobbin, 2009).

Online Education

Online education is the type of education that separates teachers and learners (which distinguishes it from face-to-face education), influences an educational organization (which distinguishes it from self-study and private tutoring), uses computer network to present or distribute some educational content, and provides two-way communication via a computer network so that students may benefit from communication with each other, teachers, and staff. (Paulsen, 2002 cited in Yang & Cornelious, 2004)

Online learning

Online learning is “learning that takes place partially or entirely over the Internet” (U.S. Department of Education, 2010). Online learning can either refer to learning available completely via the Internet at a distance or a combination of online with face-to-face instruction to enhance learning.

Pedagogy

Pedagogy is the practice of teaching framed and informed by a shared and structured body of knowledge (Thiessen et al., 2013), according to Hinchliffe (2001) it is connected with the ideas of training and discipline with the purpose of developing a well-formed person.

Student Engagement

Student engagement can be defined by two key components: first, what students do (the time and energy they devote to educationally purposive activities) and second, what institutions do (the extent to which they employ effective educational practices to induce students to do the right things) (Strydom & Mentz, 2010).

LIST OF ACRONYMS

CHE	Council on Higher Education
DoE	Department of Education (South Africa)
DSL:	Distributed Learning Systems
HE	Higher Education
HEI	Higher Educational Institution
HEQC	Higher Education Quality Committee
ICT	Information and communication technology
IT	Information Technology
IEASA	International Education Association of South Africa
LMS	Learning Management System
PC	Personal Computer
SAM	Skills Assessment Manager
SLI	Student Laptop Initiative
UNESCO	United Nations Educational, Scientific and Cultural Organization
UoT	University of Technology
VLE	Virtual Learning Environment

CHAPTER 1: INTRODUCTION AND MOTIVATION

"Education is the key to success in life, and teachers make a lasting impact in the lives of their students." - Solomon Ortiz

1.1 INTRODUCTION

Maintaining competitiveness and relevance in any field is critical to any organisation or institution, and involves a process of continual innovation and improvement of systems and strategies. These innovative approaches often include the use of technology to simplify, improve and consolidate operational techniques that result in the achievement of set goals and objectives, with greater ease and effectiveness.

In the academic sector, the introduction and use of technologies have resulted in rapid shift in the way knowledge is delivered, with the focus on improvement of the effectiveness and efficiency of the teaching and learning processes. This use of technology for education and training gave rise to the phenomenon popularly referred to as *e-Learning*.

Educational technologies have witnessed exceptional levels of growth in recent years, and e-Learning is now an integral part of most educational institutions with many schools, colleges and universities investing heavily in up-to-date technology (Connolly, Gould, Baxter & Hainey, 2012). This technology revolution in education has led to management of higher education institutions rethinking ways in which to reposition their organizations to meet the connectivity demands of prospective students; and demands for higher quality learning experiences and outcomes (Garrison & Kanuka, 2004)

This technology which has many references such as Learning Management System (LMS), Virtual Learning Environments (VLEs), 'learning platforms', 'distributed learning systems', 'course management systems' and 'instructional management systems' combine a range of course/subject management and pedagogical tools to provide a means of designing, building and delivering online learning (Connolly et al., 2012).

Based on the numerous opportunities and possibilities provided by technologies for leveraging knowledge and education resources, a University of Technology (UoT) in South Africa introduced the use of an LMS for e-Learning purposes; as a strategy to enhance its learning environment and prepare students in advance for technologically based industrial and commercial environments.

Reports (Akwunwa, 2011) have shown that many faculty members at this UoT are yet to fully embrace the implementation of e-Learning as strategy for improving learning, against the backdrop of the possibilities and opportunities it offers. This gives the indication that many faculty members do not fully understand the potentials of an e-Learning approach to teaching and learning.

This study seeks to assess how the implementation of an e-Learning program at the UoT can impact the quality of teaching and learning. In addition, this research is to determine the extent to which faculty members associate method of teaching/instruction with the quality of students learning, to explore views on the capacity of an e-Learning program to enrich a learning environment for utmost results, to explore the extent to which the implementation of an e-Leaning program in the curriculum will affect the way lecturers deliver instructions, to solicit lecturer's opinion on strategies that can be employed by which desired learning outcomes can be achieved through an e-Learning program at the UoT and to confirm that supplementing traditional methods of instruction with e-Learning can enhance student's learning; improve outcome, and increase the level of students' satisfaction with the method of instruction.

1.2 MOTIVATION FOR CHOICE OF FIELD AND TOPIC

Technology is an enabler (Piedad & Hawkins, 2001, p.10). In today's business environment, advanced technology is being used in new ways to solve problems, and improve performance and speed at which services are delivered in order to maximizing the return on their investment (ROI) and seize opportunities. The world is ever changing and as a result there is great demand for new ways of doing everything and teaching and learning play a significant role.

The UoT under review has invested so much to acquire and maintain the technology for teaching and learning, and its implementation. It is indicative of the institution's desire to achieve its mission and vision. Its intent is to support and increase the efficiency of the teaching-learning activities. Jacobsen (1998) taking into account research reports attests to the fact that formal evidence exits to show that higher productivity in education can be linked to this investment.

Reference is also made by, Jacobsen (1998) to cases where the introduction of technology into teaching-learning transactions has transformed the role of a teacher to being a "guide by the side", in addition to the customary "sage on the stage". Likewise, the role of students' has

also changed from being inactive recipients of information to being more active participants and partners in the process of learning.

This study was embarked upon because of a need for faculty members to fully understand the potentials of e-Learning in enhancing teaching and learning, and take measures to involve an e-Learning strategy in the curriculum in other to improve education performance at the university.

The current implementation of e-Learning at the university simply repeats the social administration of traditional education and training in which course materials are only converted to digital formats. According to Connolly et al., (2012), such practices "miss the potential benefits of e-Learning – the potential of personalised and accessible learning experiences.

The study is relevant and would be of benefit for the following reasons:

- No research has been conducted in the institution on the impact of e-Learning on teaching and learning within the institution.
- Revelations on how the e-Learning platform has been under-utilized and its full potential untapped.
- The theoretical contributions of the research report would attempt to bring about solutions to real world problems relating to the integration of e-Learning and web-based technologies in academic activities to improve teaching and learning at UoT.
- The findings of this research would bring about organisational transformation with regards to institutional policies and strategies for effective implementation of an e-Learning program.
- The impact this research may make would result in the creation of suitable frameworks by organisations to solve resistance-to-change issues when it concerns the introduction of new strategies for teaching and learning quality improvement.
- This study could provide a foundation for research on e-Learning, with focus on needs and expectation of faculty managers, faculty members and students, input from whom is required for evaluations and development of a continuous improvement plan for an e-Learning program.
- Most importantly, the application of the recommendations of this study could result in an increase of the graduate throughput rate and student success rate.

1.3 RESEARCH PROBLEM STATEMENT

The problem being researched within the ambient of the report reads as follows:

"Teaching technology is not being effectively incorporated into the teaching and learning process at a University of technology, resulting in no improvement in the quality of its education which is essential in meeting the socio-economic challenges of this dispensation."

1.4 PRIMARY RESEARCH OBJECTIVE

The overall objective of this study is to create an awareness of the extent to which the quality of teaching and learning can be improved through a learning environment that engages an e-Learning program for leverage. The specific objectives within the context of the UoT are:

- To determine the extent to which faculty members associate methods of teaching/instruction with the quality of students learning.
- To explore faculty members' views on the capacity of an e-Learning program to enrich a learning environment for utmost results.
- To explore the extent to which the implementation of an e-Learning program in the curriculum will affect the way lecturers deliver instructions.
- To solicit lecturer's opinion on strategies that can be employed by which desired learning outcomes can be achieved through an e-Learning program at the UoT.
- To confirm that supplementing traditional methods of instruction with e-Learning can enhance student's learning; improve outcome, and increase the level of students' satisfaction with the method of instruction.

1.5 ASSOCIATED RESEARCH QUESTIONS

1.5.1 Research Question

The research question within the ambient of this research reads as follows:

"Can an effective e-Learning program implementation result in the transformation of teaching and learning at a University of Technology towards greater quality and quality management of teaching and learning imperatives?"

1.5.2 Investigative Questions

The investigative questions that this research attempts to answer within the ambient of this research read as follows:

- To what extent do faculty members associate methods of teaching/instruction with the quality of students' learning?
- What views do faculty members have on the capacity of an e-Learning program to enrich a learning environment for improved learning quality?
- To what extent will the implementation of an e-Leaning program in the curriculum affect the way lecturers deliver instructions that lead to quality learning?
- What strategies can be employed by which desired learning outcomes can be achieved through an e-Learning program at the UoT?
- Will supplementing traditional method of instruction with an e-Learning approach enhance student's learning, improve outcome, and increase the level of students' satisfaction with the method of instruction?

1.6 THE RESEARCH PROCESS

Leedy and Ormrod (2001, p.4) describe research as the systematic process of collecting and analysing information in order to understand the phenomenon about which the researcher is concerned. This systematic process is described by Mouton (2001, p.46) as a logic by which the research project is completed, and advocates the application of a framework as the logic for executing the research project. This framework according to Mouton (2001, p.46) refers to the four elements that are standard in all forms of empirical research: a research problem (Pro), research design (D), empirical evidence (E) and conclusions (C). This framework referred to as ProDEC gives the direction for presentation of this research.

The process of how this research is conducted follows the fundamental stages in the research process common to all scientific based investigations, as outlined by Collis & Hussey (2009, p.38-40).

This study therefore is completed in the following sequence:

1. The identification of the research topic: The topic of this research was generated based on the researcher's interest in education technology and management of quality of education and training in Africa. The researcher believes that being mindful of quality education and ways of achieving it in higher education in Africa will bring about transformed graduates who are well equipped to tackle the continent's economic, social and political problems.

2. Definition of the research problem: A definite and complex research problem is identified; unique to the environment the research is being conducted. The problem centres on the use of the LMS for content distribution rather than as an asset for teaching and learning.
3. Reviewing the literature. The review of existing literature on education quality and how e-Learning is being adopted to enhance learning at higher education levels.
4. Formalizing a research question: Following the identification of the problem to be researched, the problem is worded in form of a question to set the tone for solving the problem. Furthermore, several other research questions are formulated as sub-questions.
5. Establishing the methodology: In order to provide answers to the proposed questions, a research strategy needed to be implemented. Due to the exploratory nature of the study, case study research was deemed most suitable.
6. Collection of the research data: Data required to make inferences is collected through questionnaires.
7. Analysing the evidence and interpretation of the research data: Using SPSS and other statistical tools, the data is captured, analysed and interpreted.
8. Developing conclusions and recommendations: Linking the outcome of the investigation to the research problem, questions, and objectives, and proffering solution that would mitigate the problem
9. Writing up of the thesis: This write up is done in 6 stages, which make up the chapters as outlined in Section 14 (Chapters Outline).

1.7 RESEARCH DESIGN AND METHODOLOGY

Research design and methodology includes critical aspects pertaining to “data collection design and methodology” (Malatji, 2010).

Yin (2009, p.24) defines research design as, “… the logic that links the data to be collected (and the conclusions to be drawn) to the initial questions of the study”, and is described by Coldwell & Herbst (2004, p.36) as the strategy for the study and the plan by which the strategy is to be carried out. In the words of Punch (2006, pp.47-47), “design sits between the research question and the data, showing how the research questions will be connected to the data, and what tools and procedures to use in answering then”.

The research is conducted using a University of Technology as a case study, and utilises the principles of both qualitative and qualitative research paradigms. A *case study* is defined by Collis and Hussey (2009, p.82), as methodology that is used to explore a single phenomenon (the case) in a natural setting using a variety of methods to obtain an in-depth knowledge,

and it is considered the most appropriate research approach for this study. Case study is deemed appropriate because the focus is on a contemporary phenomenon within a real life context, and the researcher has little or no control over events (Yin, 2009, p.2).

Different types of case studies have been identified, and one type can be combined with another or more (Collis and Hussey, 2009, pp.82-83). This study combined the following case study types in its attempt to explore, and understand the phenomenon under investigation:

- Illustrative case study: Where the research will attempt to demonstrate new and possible creative practices adopted by some universities.
- Experimental case study: Where the research looks at the possibilities in implementing new learning procedures and techniques in the institution and evaluating the benefits.

For a successful case study research, Yin (2009, p.27) stresses the importance of the presence of the following five components in the research design:

1. A study question;
2. Its proposition if any;
3. Its units of analysis;
4. The logic linking the data to the proposition and
5. The criteria for interpreting the findings.

The above components are fully represented in this study.

1.8 DATA COLLECTION DESIGN AND METHODOLOGY

Data needs to be collected to answer the research question earlier outlined in section 1.5 above. As a requirement, the research methodology is expanded upon in terms the “unit of analysis”. A unit of analysis is the sort of case to which the variables or the phenomena under investigation and the research problem allude, and about which the data is gathered (Collis & Hussey 2009, p.115). In other words, it is the major entity that the study intends to analyse.

The unit of analysis within the ambit of this research is classified ‘an object’, and it is the *impact* of web technologies for teaching.

Data required for this study will be collected using two primary sources: interviews and survey questionnaires.

1.9 DATA COLLECTION USING INTERVIEWS

Interviews are required to collect qualitative data. Interviews are considered as a method for collecting data in which persons being interviewed are asked questions about a matter to get in-depth knowledge of their experiences, opinions, perceptions or thought patterns.

Researchers have identified three types of interview (Collis & Hussey, 2009, pp.144-45):

- Structured interview: Questions are planned and prepared beforehand and it is characterised by standardisation, where all respondents are asked the same question in same order (Borg, 2006, p.189). This style of interview is most useful when looking for very specific information (Santiago, 2009). This is useful for collecting qualitative data.
- Unstructured interview: In this type of interview, questions have not been prepared in advance, but evolve during course of the conversations. It allows for deeper probe of the interviewee.
- Semi-structured interview: Open-ended questions that are prepared and arranged in advance determine the organization of this type of interview (DiCicco-Bloom & Crabtree, 2006). Further questions may arise as the conversation gets deeper between interviewer and interviewee/s. Semi-structured in-depth interviews can take place with an individual or in groups, and are extensively employed interviewing format for qualitative research (DiCicco-Bloom & Crabtree, 2006).

This research utilises an open-ended question interview type for data collection. This type of interview is incorporated in the survey questionnaire. Respondents were asked to give expression to and air their opinion on the salient issues associated with e-Learning at the institution. They were required to reflect on the statements of each section of the questionnaire.

The participants (respondents) for the interviews consist of faculty members who are actively involved in the use of the e-Learning platform for teaching and learning. This group will be identified based on responses to the administered questionnaires.

1.10 DATA COLLECTION USING QUESTIONNAIRES

Collis & Hussey (2009, p.191) describe a questionnaire as a list of carefully written questions and suppose that it falls within the scope of a wider range of ‘survey research’ or ‘descriptive survey’.

It is essential to establish the reliability of the questionnaire which guarantees that responses from the chosen sample are reliable; correctly capturing their true perceptions and/or feelings

in order to effectively address the research question. Collis & Hussey (2009, pp.191-192) suggest that this can be achieved by a careful selection of questions after substantial testing with a chosen sample.

Within the context of this research, structured 'closed' questions and unstructured 'open-ended' questions types of questionnaires will be employed for the collection primary data. This makes it possible to collect different types of data.

The closed-end questionnaire employs the 5 division Likert scale with predetermined responses from which the respondent could choose. The questionnaires are categorised into two sets with different set of questions for faculty members and students.

1.11 ETHICS

Ethics are moral principles that govern or shape the conducts or behaviours of an individual. In the context of research, since people will be involved, it is the responsibility of the researcher to ensure that their dignity, privacy, and confidence are respected (Quinton & Smallbone, 2006, pp.55)

The following checklist originated by Kervin (1992) and cited in Collis & Hussey (2009, p.47) is implemented to ensure ethical conduct of this research:

- Will the research process harm participants or those about whom the information is gathered (indirect participants)?
- Are the findings of the research likely to cause harm to others not involved in the research?
- Are accepted research practices violated in conducting the research, the data analysis, and drawing conclusions?
- Are community standards of conduct violated?

Based on the above checklist it is ensured that:

- The privacy and anonymity of the respondents are preserved.
- The statistical data was not distorted in any form to satisfy any interested party.
- The findings are accurately reported.
- All secondary sources of data and literature consulted were duly credited to the authors.

1.12 RESEARCH ASSUMPTIONS

Quoting Leedy & Ormrod (2001, pp.6), “assumptions are what the researcher takes for granted. Severe misunderstanding may arise if things are taken for granted. The assertion is made by Leedy & Ormrod (2001, pp.63) that nothing should be left to chance in a research with the hope of preventing misunderstanding because “what we have tactically assumed, others may have never considered.”

The following are the assumptions made in terms of this research project:

- All people within the sample frame will be willing to participate and complete questionnaires.
- The necessary information such as procedures and policies will be made available from the institution.
- There will be a good interaction between the researcher and the various staff members of the institution.
- Students and staff members will give honest information during interviews and questionnaire administration.

1.13 RESEARCH CONSTRAINTS

Research constraints are commonly referred to as limitations and delimitations. These are concerned with restrictive factors that may influence the way the research is conducted; causing the study to deviate from the normal process (Watkins, 2008, pp72-73). Collis & Hussey (2009, pp.123-124) indicate that a limitation identifies potential weaknesses in the research, while a de-limitation explains how the scope of the study is focuses only one particular area.

Limitations:

- Based on the organizational structure of UoT and the uniqueness of the e-Learning system, the findings of this research may not be applicable to other institutions or organisations owing to the fact that the data to be collected will be unique to the UoT under review.

De-limitations:

- This research is limited to the use of web-based enterprise e-Learning platforms for Web-based instruction. It does not include the use of other forms of media such as CDs for teaching and learning.

- This research acknowledges the different approaches to e-Learning which includes fully online courses, partially online courses, and courses that are essentially face-to-face but which incorporate some resources online; and therefore limits itself to hybrid approach to e-Learning which involves supplementing the face-to-face teaching with on-line (internet) tools.
- Data collection will involve questionnaires distributed to selected faculty members and students' population of the UoT.

1.14 BENEFITS FROM THE PROPOSED RESEARCH

The benefits to be derived from the proposed research study are as follows:

- This study provides the researcher with an opportunity to demonstrate his ability to apply theoretical knowledge acquired into solving real world problems.
- No research has been conducted in the institution on the impact of e-Learning on teaching and learning within the institution or on how the quality of teaching and learning can be improved using internet technologies.
- Disclosures on how the e-Learning platform has been underutilised and its potential untapped.
- The theoretical contributions of the research report attempts to bring about solutions to real world problems relating to the integration of e-Learning and web-based technologies in academic activities to improve the quality of teaching and learning at a UoT.
- The findings of this research would bring about organisational transformation with regards to institutional policies and strategies for effective implementation of e-Learning program with a view of improving quality in teaching and learning.
- The impact this research may make would result in the creation of suitable frameworks by organizations to solve resistance-to-change issues.
- Introduce a framework for effective use of the e-Learning platform.
- This study could provide a foundation for research on e-Learning, with focus on needs and expectation of faculty managers, faculty members and students' input which is required for evaluations and development of a continuous improvement plan for e-Learning.

1.15 CHAPTER OUTLINE

Chapter 1: Introduction and Background

This chapter sets the scene for this research. It provides an overview and background of the research problems.

Chapter 2: Holistic Overview of the Research Environment

This chapter provides a holistic overview of the research environment and an informed perspective on the current approach to and interpretation of e-Learning at the institution.

Chapter 3: Literature Review

In this chapter, an in-depth review of the literature is provided in order to explain why and how e-Learning is being used in higher education to enhance teaching and learning, the potentials of e-Learning in creating a lifelong learning culture and best practices for effective implementation of e-Learning to enhance teaching and learning.

Chapter 4: Research Design and Methodology

This chapter provides an elaborate view of the research design and methodology to be employed in the conduct of this study.

Chapter 5: Data Analysis and Interpretation

This chapter deals with and provides the analysis and interpretation of data collected in the cause of the research.

Chapter 6: Conclusion and Recommendations

This chapter concludes the research and where applicable makes some recommendations. Key issues highlighted in Chapter 1 are revisited, with intent to recommend measures that can mitigate the research problem. The chapter will also attempt to provide answers to the research question and associated investigative questions.

1.16 CONCLUSION

In this chapter, the approach for completion of this research project was outlined. The research problem was clearly stated, followed by formulation of research questions and identifying the research objectives. Detailed background to the research environment and problem was provided. The completion of this research follows a systematic logic which appears as a synopsis in this chapter, with the intent of greater elaboration in subsequent chapters.

The next chapter provides a holistic overview of the research environment and informed perspective of the current approach to and interpretation of e-Learning at the institution.

CHAPTER 2: HOLISTIC OVERVIEW OF THE RESEARCH ENVIRONMENT

"There are two kinds of teachers: the kind that fills you with so much quail shot that you can't move, and the kind that just gives you a little prod behind and you jump to the skies." - Robert Frost

2.1 INTRODUCTION

In the previous chapter, the framework for the completion of this research was established. The key points were the motivation behind the choice of topic, the definition of a problem statement, formulation of research questions and the presentation of a logical process for a successful completion of the research.

In this chapter, a holistic overview of the research environment and an informed perspective of the current approach to e-Learning and its interpretation at the institution will be discussed. In addition, a backdrop of the Higher Education landscape in South Africa is provided for contextual understanding.

2.2 HIGHER EDUCATION IN SOUTH AFRICAN CONTEXT

Higher education (HE) plays a pivotal role in the social, cultural and economic growth of modern societies (DoE, 1997), and governments across the globe are consistently taking steps to ensure that HE meets critical needs of their nations and also respond to rising realities and opportunities. This is achieved by formulating policies and setting up structures geared towards the production of graduates both in quantity and quality.

In the context of South Africa, the challenge in the higher education sector is to redress past inequalities of the apartheid regime and to transform the higher education system to serve a new social order, to meet the nations pressing needs, as well as responding to new realities and opportunities (DoE, 1997). This goal will only be realised by establishing the frameworks for the advancement of a learning society which can "stimulate, direct and mobilise the creative and intellectual energies of all the people towards meeting the challenge of reconstruction and development" (DoE, 1997).

According the white paper on education (DoE, 1997), higher education in South Africa is expected to "contribute to and support the process of societal transformation with a compelling vision of people-driven development leading to the building of a better quality of life for all".

The following are the purposes of higher education in South Africa taken verbatim from the white paper on education (DoE, 1997):

- To meet the learning needs and aspirations of individuals through the development of their intellectual abilities and aptitudes throughout their lives. HE equips individuals to make the best use of their talents and the opportunities offered by society for self-fulfilment. It is thus a key allocator of life chances, an important vehicle for achieving equity in the distribution of opportunity and achievement among South African citizens. .
- To address the development needs of society and provide the labour market, in a knowledge-driven and knowledge-dependent society, with the ever-changing high-level competencies and expertise necessary for the growth and prosperity of a modern economy. Higher education teaches and trains people to fulfil specialised social functions, enter the learned professions, or pursue vocations in administration, trade, industry, science and technology and the arts.
- To contribute to the socialisation of enlightened, responsible and constructively critical citizens. Higher education encourages the development of a reflective capacity and a willingness to review and renew prevailing ideas, policies and practices based on a commitment to the common good.
- To contribute to the creation, sharing and evaluation of knowledge. Higher education engages in the pursuit of academic scholarship and intellectual inquiry in all fields of human understanding, through research, learning and teaching.

The above reiterates the value of higher education and the importance the government of South Africa attaches to it. It is expected that all stakeholders in the HE sector would play their roles adequately for the realisation of these objectives.

2.2.1 The Higher Education Landscape of South Africa

South Africa's university division has been acknowledged as the strongest and most diverse in Africa. It comprises of a number of students of all races, with more than half of all students being women, and some 8% being international students from other African countries, Europe, Asia and the Americas (IEASA, 2009).

There are three types of universities in South Africa: ‘traditional’ research-focused universities, universities of technology, and ‘comprehensive’ universities that combine academic and vocationally oriented education. These universities together, offer a full range of courses which produce graduates with internally recognised qualifications. All state-funded universities conduct research, which supports teaching and is frequently aimed at dealing with the challenges that face South Africa in particular and the developing world in general.

World-class researches are generated in many fields, which are concentrated in the country's top research universities (IEASA, 2009). The new university system comprises three types of institutions:

- Eleven universities: 'traditional universities that offer Bachelor degrees and have strong research capacity and high proportions of postgraduate students.
- Six universities of technology: vocationally oriented institutions that award higher certificates, diplomas and degrees in technology; and have some postgraduate and research capacity.
- Six comprehensive universities: offering both Bachelor and technology qualifications, and focusing on teaching but also conducting research and postgraduate study.

2.2.2 Quality Assurance of Higher Education in South Africa

The higher education institutions have the primary responsibility for assuring quality of their activities. Quality assurance across all institutions is being coordinated by the statutory advisory body, the Council on Higher education (CHE). The Higher Education Quality Committee (HEQC) is a CHE committee which conducts audits of universities. The audits are based on self-evaluation by institutions of their performance against a range of criteria, and external peer assessment. Amongst the responsibilities of the HEQC is the accreditation of courses and conducting national reviews, quality promotion and capacity development.

The following are the main functions of the CHE which were retrieved from the organisations website (Counsel for Higher Education, 2010):

- To provide advice to the Minister of Higher Education and Training on request or on its own initiative, on all aspects of higher education policy.
- To develop and implement a system of quality assurance for higher education, including programme accreditation, institutional audits, quality promotion and capacity development, standards development and the implementation of the Higher Education Qualifications Sub-Framework (HEQSF).
- To monitor and report on the state of the higher education system, including assessing whether, how, to what extent and with what consequences the vision, policy goals and objectives for higher education are being realised.
- To contribute to the development of higher education through intellectual engagement with key national and systemic issues, including international trends, producing publications, holding conferences and conducting research to inform and contribute to addressing the short and long-term challenges facing higher education.

The CHE has executive responsibility for quality assurance and promotion and discharges this responsibility through the establishment of a permanent committee (as required by the Higher Education Act), the Higher Education Quality Committee (Counsel for Higher Education, 2010).

Furthermore, the organisation also engages in research projects into higher education issues in other to strengthen the monitoring and quality development functions of the CHE. Relevant issues are identified through activities such as on-going monitoring, or from policy debates that have arisen in the sector, or from requests for advice from the Minister or other relevant stakeholders. The emphasis in this set of activities is the proactive undertaking of relevant projects within a theoretical framework that defines the higher education landscape and the issues within it (Counsel for Higher Education, 2010).

2.2.3 An overview of Universities of Technology

It is an established fact that technical universities around the globe are established purposely for economic advancement of societies. The impact made by universities of technology in the economic development of the countries and regions in which they are established has been achieved through the preparation of graduates for "the world of work" (du Pré, 2010). According to du Pré (2010) , these graduates apply their research skills to identify problems and needs of society and industry, and together find solutions to these problems.

Universities of technology offer education that is broad and critical. This kind of education according to Winberg (2004) is "one that enables students to engage with the consequences of science and its applications and to question scientific ways of knowing, especially in the context of environmental sustainability and human health". Universities of technology develop students' scientific and technological literacy in a broad, rather than a narrow sense (Winberg, 2004).

In answer to the question: "what makes a university of technology different from any other university (as compared to the classical concept of a university)", du Pré (2010) summarises the uniqueness of a UoT as follows:

"It is not the use of technology within a university which classifies it as a technological university, but rather the interweaving, focus and interrelation between technology and the nature of a university, which constitutes a technological university. At a technological university the focus is therefore on the study of technology from the viewpoint of various fields of study, rather than a particular field of study. By "technology" is meant the human arrangement of nature with the help of tools for human purposes. Technology refers to the effective and efficient application of the accumulated know-how, knowledge, skills and

expertise that, when applied, will result in the output of value-added products, processes and services."

UoTs have a compulsory task of delivering appropriately qualified graduates to the labour market, and this keeps more closely allied to the business sector to ensure relevant curricula. As a result this entails a continual revision of educational programmes at under- and postgraduate levels to better address the needs of industry, business and communities. This includes curriculum and course design linked to an outcomes-based type of education as well as to more flexible modes of delivery (du Pré, 2010).

2.2.4 The Making of Universities of Technology in South Africa

Universities of technology (UoT) came into being as part of the major reconfiguration of the higher education landscape, which took place from 2004 onwards (du Pré: 2010) as a result of the change in political landscape of the country after the first democratic election in 1994.

Universities of technology have as their foundation the former technikons which built a solid reputation in providing career-oriented programmes (du Pré, 2010). They were created in order to gain academic legitimacy and the right to deliver postgraduate outputs (Mentz, Kotzé and van der Merwe, 2008).

These technikons prepared graduates for the world of work. Their research was of an applied nature and their links with industry ensured that technikon programmes remained relevant, up-to-date, and that their graduates were familiar, through work-integrated learning, with the way industry functioned (du Pré, 2010)

The programmes offered by these technikons were outcomes-based, that is, technikons first established what was required to prepare a graduate for a particular job, and then put together a suite of modules/courses which provided the candidate with the necessary skills, information, ability, training and wherewithal to "do the job" (du Pré, 2010).

On that backdrop of their importance in national development, universities of technology are tasked with the delivery of appropriately qualified graduates to the labour market. And as a result, they are therefore more closely allied to the business sector to ensure relevant curricula.

2.3 BACKGROUND ON THE UNIVERSITY OF TECHNOLOGY UNDER REVIEW

The University of Technology that is being researched is one of the five universities of technology in South Africa created/established from a merger of technikons. It is a multi-campus university with five campuses located in the Western Province of South Africa.

The UoTs vision is to be at the heart of technology education and innovation in Africa, with a mission to be known for the high quality of its teaching and learning and the relevance of its curriculum. Enshrined in its core values is promoting innovation in all aspects of staff work, and striving for efficiency in all operations.

The institution is synonymous with modern facilities, well equipped infrastructure with promises of innovative teaching and learning approaches. It offers a variety of career-based undergraduate and post-graduate courses across an ever increasing spectrum of subjects. It has been involved in world class projects (such as launching nano-satellites), and has produced top class citizens.

The institution maintains a reputation as an organisation that takes into account the holistic wellbeing of its students. Its interest in its students goes beyond classroom activities; efforts are being made to ensure that out-of-classroom activities within various campuses re-enforce and support students' learning. To this end, there exists a good structure and functional relationship between academic and students affairs in the institution.

In addition to this relationship, certain functional departments have been setup to assist students beyond the classroom. This includes student development centres which offer counselling, career development advice and self-improvement training and seminars. .

The profile of students is quite diverse in terms of race, cultural background, first language and nationalities. The UoT, being the least expensive university in South Africa, attracts majority of students from previously disadvantaged demographics, and the middle class families. Students from other countries, mostly Sub-Saharan Africa, have found the UoT as alternative to attain world-class education and qualifications. Students from other continents, majority of which are from Asia make up the student populace.

2.3.1 Academic challenges faced by the University

The majority of the students admitted to the institution come from an inadequate school system. This is reflective of the DoE policy to increase participation in higher education to 20% for the 18 - 24 age cohort in other to expand student numbers and improve access to higher education for disadvantaged black people; which is seen as key to overcoming apartheid inequalities, creating a stable society, and producing the high level skills needed to drive economic growth (IEASA, 2009).

This expansion of student numbers creates a complex phenomenon of student success (CHE: 2010). This places enormous responsibility on university to create an environment that improves students' experience that will enable them to overcome poor schooling and to cope with more advanced learning. The notion of expansion of student numbers requires the

university to produce substantial number and quality of graduates needed in the 21st century (IEASA, 2009)

The graduate throughput data of this university reveals otherwise. The graduation rate is low and it is a cause for concern.

As a result, this study is relevant, in that it views an effective e-Learning program as a means to solve some of the reasons responsible for low student success rates.

2.3.2 Teaching and learning at the University

Teaching and learning at the UoT is governed by policy statements and documents, and also serve as quality policy guidelines to some extent. These documents which also serve as quality policy guidelines outline the institutions visions, expectations and strategies by which its goals can be achieved. These documents are claimed to have been produced based on best practices informed by research. Such policies include but not limited to the following:

1. Teaching and Learning Plan
2. Teaching and Learning Policy
3. E-Learning policy

As a way of emphasis and summary, attention will be given to the Teaching and Learning Plan.

The Teaching and Learning Plan follows a procedural requirement in the UoTs *Teaching and Learning Policy* which requires that the Senate Teaching and Learning Committee facilitate the implementation of an institutional Teaching and Learning Strategy in collaboration with relevant stakeholders and to promote good practice across faculties and central units concerned with teaching and learning. In addition to the Teaching and Learning Policy, the Plan is informed by and intended to be read and used in conjunction with all other relevant documents that have been produced to guide UoTs operations.

2.4 USE OF ICT AT THE UNIVERSITY OF TECHNOLOGY

Information and Communication Technology (ICT) is a large part of the operations of the UoT. ICT is an encompassing term (Gyambrah, 2007, p.14) that covers wide range of technologies for gathering, storing, retrieving, processing, analysing and transmitting or presenting information. The institution employs ICT to enhance information distribution, learning, teaching and managing of educational services and support service.

Offices, libraries, classroom, workstations and laboratories are equipped with state-of-the-art facilities such as iPads, interactive whiteboards powered by computers and projectors, learning management systems. All of the campuses are networked, thereby by making flow of information easy.

The institution is focussed on enhancing the ICT end-users' experience on campus, by making it easy to access information from every point on all campuses. To this end the institution has increased its wireless hotspot footprints at the respective campuses. Students and staff are therefore able to use laptops and other mobile devices more widely across the campuses.

Additional computing facilities are being constructed in the e-Learning Centre and library in one of the campuses, and a new open access classroom and laboratories have been built in other campuses.

2.4.1 ICT for Learning at the University

With regards to the use of technology in teaching, the teaching plan has the following as its objective which deemed fit for measurement:

- Apply developments in educational technology to improve curriculum design, delivery and evaluation.
- Ensure provision of lecture halls with adequate educational technology.
- Learner Management system to be used to support academics to adapt to a changed pedagogical approach to teaching and learning.

In pursuant of these objectives, many forms of technologies were introduced to enhance the teaching and learning experience. Among these is the acquisition of an enterprise web-based learning platform known as Blackboard Learning System (or simply referred to as Blackboard) which was engaged as the Learning Management System (LMS).

Blackboard was first adopted as the LMS platform at one of the campuses while it was a Technikon in 1999 with the aim of improving the effectiveness of teaching and learning (Ivala, 2011). Consequently, with the introduction of Blackboard came along policies, objectives and plans to ensure full implementation by all faculty members.

For ease of access for student to computer mediated learning and bridge the digital divide, investments were made in the establishment of e-Learning centres across all campuses. These e-Learning facilities are easily accessible and operate on a twenty-four-hour bases, with trained personnel who assists students with trouble-shoot and technical support.

Massive efforts have also resulted in the improvement of access to the network and internet from any location within the campuses and the student residences through wireless network connection. This makes it easy for students with laptops, their personal computers, tablets and handheld devices to access the internet and effectively participate in e-Learning from their rooms, classrooms and the library, or any point within the institution.

Other initiatives taken by the institution to ensure that more students and staff become technology compliant includes its participation in a national project called the Student Laptop Initiative (SLI), where students and staff can purchase laptops and certain software at reduced pricing.

The university has also been set up as an EDUROAM university. This allows staff and students visiting similar universities locally or internationally to use their laptops or other mobile devices to access the internet, as if they were on their own campus.

2.4.2 Integration of e-Learning at the university

A preliminary study on the use of LMS at the UoT indicated that the processes of integrating technology into teaching and learning were evolutionary and top management driven (Ivala, 2011). The research further revealed that the general uptake of the technology was not very high, with considerable resistance amongst the university teachers to integrate Blackboard into their teaching and learning partly because of the unstable information technology infrastructure in the university, lack of on-going support after the initiation training, lack of motivation and incentives, and lack of awareness of the potential of Blackboard for teaching and learning amongst other factors.

The top management's role in ensuring the take-off and success of the e-Learning integration was in the establishment of a strategic plan, teaching and learning plan, e-Learning policy, assessment policy and most of the faculty and departmental plans.

Despite the efforts of the university's top management, there were concerns by faculty member and staff of the Centre for e-Learning that the institution's IT infrastructure was not capable of supporting the e-Learning initiative. The following verbatim citation provides the bases for such concern:

"Due to the fact that the computer and telecommunications system division (CTS), which provides information technology support for e-Learning at the UoT, has been unable to provide adequate support and institutional systems are blamed for not attending to this problem. Secondly, although most faculties and departments have the 'integration of technology in teaching and learning' in their plans, findings showed that in some of the

departments these plans were not being implemented. Thirdly, the UoT has a computer to student ratio of 6:1 which can be considered to be fairly good. However, it is felt that the infrastructure does not fully support the use of technology in teaching and learning as it is underutilised, there is no open access to the computer laboratories and there is no system for faculty members to book laboratories for their classes. Lastly, sufficient technical support is not provided to the centre for e-Learning. More often than not e-Learning staff has to either plead for assistance or log-in calls at the CTS help desk where the calls are not usually prioritised" (Ivala, 2011).

The top management of the institution did not relent in its effort to surmount these challenges facing the implementation of e-Learning at the institution. Certain steps were taken to improve the infrastructural capabilities of the information of systems and the IT network of the institution. Such steps include the establishment of an IT committee consisting of Faculty heads with a responsibility of ensuring uptime capabilities of the system, and the upgrading of some key e-Learning support equipment. Other improvement actions taken are the replacement of all computers in the IT Centres of the campuses to the current technologies, and increasing their numbers in order to reduce the ratio of PCs to students.

Despite such improvements made to meet requirement of the end-users of the LMS, some faculty members have not taken steps to implement its integration in teaching and learning. The e-Learning system is operated by faculty members based on individual interests, curiosity and convenience.

According to the Director of Centre for e-Learning (Akwunwa, 2011), the perceived low availability of the system cannot be used as an excuse by a lecturer not to implement the minimum online presence for a subject as stipulated by the e-Learning policy. The policy requires that the subject guides, course calendar, test marks/results, main subject information and course notes should be online for easy accesses to students.

Though the CTS department has admitted that the system is not yet optimized for high availability, the director of Centre for e-Learning maintains that the system uptime is not critical for the above requirements, as students can gain access to them at any time. These requirements are far less than actual capabilities of the learning platform to deliver learning.

Based on the researcher's conversation with some faculty members, they still insist that the system is yet to be viable. It was observed that their conclusions were drawn from unpalatable experiences with their workstations and not the network. They encountered problems with the internet browsers, as some browsers are not compatible with the Blackboard's application interface. It was not necessarily a network problem. This is viewed as an excuse to resist changes in learning delivery methods while sticking to the most convenient method of teaching.

This attitude of faculty members strongly opposes the new approaches to learning that emphasises on learner-centeredness rather than teacher-centeredness and can be attributed to the limiting prescriptions of the e-Learning policy. The new approach to education advocates the active participation of learners in their own learning which ultimately requires a new approach to teaching.

The shallowness of the institutions e-Learning policy highlights the institution's management ignorance of or indifference to the potentials of the e-Learning platform beyond the administrative processes, and reveals a lack of vision and foresight for the acquisition of the platform. It is expected that recognizing the full benefits of an e-Learning platform by top academic management would result in a better formulated policy that ensures a successful and institution-wide implementation for teaching and learning, with a focus in transforming the students into key participants in their learning process.

2.5 CURRENT ISSUES FACED BY FACULTY MEMBERS

The following are difficulties that some faculty members outlined as inhibitors to the use of Blackboard. These are inferences from a previous study by the researcher (Akwunwa, 2011):

- Network problems: The network of the institution is very unstable and breaks down intermittently. There are times when faculty members are unable to access the system when it is crucial to use it.
- The interface of the e-Learning platform Blackboard is not user-friendly. There are claims that the user-interface of Blackboard makes its use difficult and frustrating. Some users maintain that the system is clumsy and time consuming.
- Blackboard is not tailored to their needs (or teaching culture), and they do not have idea on how to adapt the features of Blackboard to meet their needs and that of the learners.
- They claim that many of the students are not resident on campus and as a result do not have access to computers or internet after hours.
- Some faculty members maintained that they are saddled with so many responsibilities, and therefore introducing e-Learning is an extra burden.
- Faculty members also claim that the training provided is not well structured and does not provide the necessary ingredients that could arouse their interest. They maintain that the one-week gap between the levels of training is not enough for them to practice and develop skills before the next level.
- Others say that the support framework is flawed as there is no clear indication of who to contact for solutions to the different types of problems encountered while using Blackboard

- Some faculty members claim that they are not aware of any consultations with them before deciding on the e-Learning platform to use. They maintained that their needs should have been the basis of a choice of learning platform.
- The older faculty members who may not have been tech-savvy claim that their needs are not taken into account.

Consequently, systems have been put in place to alleviate some of the outlined grievances of the faculty members. Though the use or engagement of the e-Learning system has been left as an activity of choice for the persons concerned, only very few who show interest in teaching innovation do take advantage.

2.5.1 Faculty approach to e-Learning at the university

At the institution, the optional innovation-decision approach is used in its e-Learning integration since it provides maximum flexibility to its users and accommodates individuality in that it allows faculty members to use the e-Learning platform according to their individual needs (Ivala, 2011). The down side of this approach however, is that there is no uniformity and standardization of e-Learning processes across the institution. This leaves the focus on the faculty members rather than focus on the students and their needs.

This approach allows implementation based on faculty members interest and/or convenience and is viewed as limiting since it does not reflect the needs of the university as a whole, and supportive of the institution's vision and mission. This has resulted in faculty members perceiving, interpreting and implementing e-Learning in different ways and across various platforms including those external to the institution, and which are not within its control.

The level of application of the centralised e-Learning platform is predominantly set on administrative processes as outlined by the institutions e-Learning policy. The policy requires that the subject guides, course calendar, test marks/results, main subject information and course notes should be online for easy accesses to students. And this is as far as most faculty members go, while some have not even taken a step.

In another development, some departments have taken the initiative to identify viable e-Learning options (or inclusions) specifically for skills training in specific subjects. An example is the use of Skills Assessment Manager (SAM) for instructions in Computer Skills (and End User Computing). SAM is a Web-based software application that measures users' proficiency in the Microsoft Office applications suite (Cengage, 2010). SAM will be discussed in detail in Chapter 4; as it is the e-Learning platform used as the case in this study.

2.5.2 Various interpretations of e-Learning at the university

Another development, which some known authorities view as undesirable is the use of social network websites by lecturers as their own e-Learning platform. Many lecturers have adopted the use of social networks such as Google docs, Facebook, Blog websites and chat applications (e.g. WhatsApp) as their own platform for e-Learning; thus undermining the efforts of the institution to streamline its e-Learning program. Such adoptions of external platforms have raised questions on the rights of the institution's ownership of Copyright of materials uploaded to such platforms. Policy statements of these external services state that as a condition for use of their applications, the user is required to give up right of ownership of the materials.

Blackboard in its current form provides these essential tools and more advanced application as it was strictly designed for academic purposes; unlike these websites whose predominant aims are for social interaction. Blackboard incorporates all the web 2.0 tools which are often associated with "… the social use of the Web which allow[s] people to collaborate, to get actively involved in creating content, to generate knowledge and to share information online" (Grosseck, 2009, cited in Connolly, et al., 2012).

In order to tackle this issue, a working committee has been set up to draw up best practices guidelines for the use of social media for educational purposes by faculty members.

2.6 CONCLUSIONS

This chapter presents a holistic overview of the environment on the backdrop of Higher Education in the South African context. It reveals the history and issues around the use of technology for teaching and learning at the university.

The next chapter discusses scholarly literature on quality theories with regards to education quality, learning theories and e-Learning practices.

CHAPTER 3: LITERATURE REVIEW

"Those people who develop the ability to continuously acquire new and better forms of knowledge that they can apply to their work and to their lives will be the movers and shakers in our society for the indefinite future." - Brian Tracy

3.1 INTRODUCTION

This chapter discusses some literatures in the context of this study. This literature review discusses the quality theory as it relates to education and learning. It will also try to define e-Learning and present the practicalities around the concept of e-Learning including learning theories that advocate its potentials to improve learning.

3.2 QUALITY THEORY

3.2.1 The Concept of Quality

Quality, as a word was more associated with businesses during the 1980s and early 1990s (Evans 2005, p.3). It is a basic business principle embraced by companies to improve productivity and fend off competition, and it is expressed by Kolarik (1991, p.5) as a complicated concept. According to Oakland (1999, p.47) quality is often used to connote excellence of a service. Oakland (1999, p.47) believes that quality creates a common language for people in different functions of an organisation for improvement.

Neila & Latifa, (2011) describe *quality* as “a multi-perspective construct, varying from one context to another and difficult to define in a general way”. Quality has been defined in many ways (Evans, 2005, p.3), depending on the context and has different aspects in every institution (Poll & te Boekhorst, 2007, p.13). As a result of these various definitions, Cheng and Tam, (1997) infer that even though most of these definitions are highly correlated there still seems to be no consensus definition.

The most frequently cited definition of quality according to Poll & te Boekhorst, (2007, p.13), is: “Quality is fitness for purpose.” Bogue (1998) highlights the following as some of the definitions of quality common to the business and corporate sector:

- *Conforms to specifications:* A product or service that conforms to design specifications is a quality product or service (citing Crosby, 1984).
- *Is fit for use:* A product or service that provides satisfaction to the customer or client is a quality product or service (citing Guaspari, 1985).

- *Achieves its mission and goals* (program or institutional effectiveness): An individual or organization that achieves its goals is a quality program or institution (Green, 1994).
- *Improves continuously:* An organization that creates a climate for constant improvement is a quality organization (citing Deming, 1986).
- *Considers multiple factors:* Quality is a multifactor concept involving not only fitness for use but also reliability, durability, aesthetics, and so on (citing Garvin, 1988).

In addition to the foregone definitions, Poll & te Boekhorst, (2007, p.13) declare that in most definitions, quality is defined in relation to the customer or user. These definitions according to Kolarik (1999, p.5) are based on both costomer benefits as well as customer burdens. Citing Brophy and Coulling (1996) he wrote: "…the key issue is that quality becomes a meaningful concept only when it is indissolubly linked to the aim of the total customer satisfaction".

Juran (1999, p.2.1) in the context of managing quality extracted two meanings of quality. He defined quality as "those features of a product which meet customer needs and thereby provide customer satisfaction". And the second definition presents quality as *freedom from deficiencies*.

In line with most definitions of quality that encourage viewing quality from the customer's eyes, Kolarik (1999, p.5) summarises this concept in these words:
"True quality characteristics echo the customer needs and set up subjective customer expectations. We translate these expectations into substitute quality characteristics that are defined in technical terms sufficient to design and produce products. Ultimately, customer satisfaction results from the degree of correspondence between customer's true quality characteristics and our substitute characteristics."

3.2.2 Quality in Education

Education has taken a new form which is being discussed in items of lifelong learning.

The review of literature suggests that quality in higher education (HE) has been on the focus in recent years. This focus according to Nicholson (2011) is due to the quest by governments and industry to increase productivity and maintain a competitive edge in the global knowledge economy; thereby leading to the advocate for a well-educated workforce. The quest has led to an increase in public funding for higher education and a drive to increase the accessibility of post-secondary for under-represented populations in particularly. (Nicholson, 2011).

Every country that aims to survive relies heavily on its higher education system. Education is an investment that pays itself back, both principal and interest in every generation (Soresen et al., 2005, p.xiv).

It is imperative that every HEI engage in proven practices which focus on how students can be best served (Soresen et al., 2005, p.xv). Stamatis (2012, p.21) suggests that the educational system can be made an excellent one by using the principles and methodologies of established quality in such as character education, TQM, lean, six sigma amongst other proven quality systems.

3.2.3 Defining quality in education

As in business and the corporate world, there is no consensus on the definition of education quality. Researchers and policy makers' view on education quality is a rather ambiguous and contentious concept (Cheng & Tam, 1997). As already stated in previous section, quality means different things to different people, and as such there may be differences in the parameters used to describe education quality (Cheng & Tam, 1997, citing Fuller, 1986; Hughes, 1988).

Cheng & Tam (1997) reach the conclusion that no matter what criteria is used, "the definition of education quality may often be associated with fitness for use, the satisfaction of the needs of strategic constituencies (e.g. policy makers, parents, school management committee, teachers, students, etc.) or conformance to strategic constituencies' requirements and expectations."

Cheng (1995, cited in Cheng & Tam, 1997) attempts to define education quality as the "character of the set of elements in the input, process, and output of the education system that provides services that completely satisfy both internal and external strategic constituencies by meeting their explicit and implicit expectations." This definition according to Cheng & Tam (1997) is based on the multi-dimensional nature of education quality and its inability to be easily assessed by only one indicator; but by many indicators (Neila & Latifa, 2011). These factors include: students, curricula, infrastructure, internal and external environment, teaching methods and teachers.

The following meanings which were identified by Harvey and Knight (1996, cited in Nicholson, 2011) have been attributed to education quality:

- *Quality as exceptional*, i.e., exceptionally high standards of academic achievement;

- *Quality as perfection* (or consistency), which focuses on processes and their specifications and is related to zero defects and quality culture;
- *Quality as fitness for purpose*, which judges the quality of a product or service in terms of the extent to which its stated purpose—defined either as meeting customer specifications or conformity with the institutional mission—is met;
- *Quality as value for money*, which assesses quality in terms of return on investment or expenditure and is related to accountability; and
- *Quality as transformation*, which defines quality as a process of qualitative change with emphasis on adding value to students and empowering them.

Furthermore, transformation aspect of quality is described by Harvey & Knight, (1996) as "critical transformation" and as a "meta-quality concept": The transformative notion of quality is believed to be a fundamental objective of higher education. Its assumption is that transforming the life experiences of students, by enhancing and empowering them must be the primary concern of higher education. Harvey & Knight, (1996) conclude that "the transformative conception is, in effect, a meta-quality concept. Other concepts, such as perfection, high standards, fitness for purpose and value for money, are possible operationalisations of the transformative process rather than ends in themselves".

The discussion of education quality continues with Bogue (1998) outlining three perspectives on quality synonymous to institutions of higher education. These are:

- *Quality is in limited supply*: This perspective is used for institutional ranking and exposes the competitive affair in which there are a few truly excellent institutions,
- *Quality with mission/goals*: This fulfils the definition of quality as *fitness of purpose.* It dictates that quality should be present in each and every institution in accordance with its mission and goals. and
- *Quality is "value added" or quality results*: This presupposes that quality is to be found in results and not in resources and reputations; in the "value added" by the institution. Astin (1985, cited in Bogue, 1998) defines this perspective on educational quality (*value added* as "the impact on the student's knowledge and personal development and on the faculty member's scholarly and pedagogical ability and productivity."

"Value added" is being expounded upon by Harvey & Knight (1996, p.7) by interpreting it as a measure of quality determined by the extents to which the educational experience enriches the knowledge, abilities and skills of students. This view suggests that rolling out *first class* graduates from a set of high achievers may not constitute high added value. However, how much value added depends on the approach and what is defined as being of value in the first place (Harvey & Knight, 1996, p.8).

3.2.4 Exploring the concept of the customer in education

It was mentioned earlier that “true quality characteristics echo the customer needs and set up subjective customer expectations”. It’s been established that quality is not only associated with measurement of tangible satisfaction, but that it is also concerned with customers’ expectations and perceptions (Yeo, 2008). “Service quality” is being perceived as greater importance (Yeo 2008:, citing Brysland & Curry, 2001; Cronin & Taylor, 1992).

In the context of education quality, some commentators view education as a participative process. They make the assertion that students are participants and not products, customers, consumers, service users or clients (Harvey and Knight, 1996, p. 7). Education ought not to be viewed as a service to a customer, but an on-going process of transformation of the participant.

Others such as Yeo (2008) suggest that higher education could be considered a part of service industry since tertiary institutions primarily focus on providing quality learning experiences to students. He explains that the need to capture the market share in the education sector as a result of the rife completion in the sector (such as evidenced in the service industry) has put tertiary institutions worldwide under pressure to provide unique learning experiences to students. Therefore in order to retain student numbers and to capture the educational market, service quality has become the means for many institutions (Yeo, 2008).

3.2.5 Measuring learning and teaching quality

Teaching is defined by (Harvey & Knight, 1996) as “planned effort to bring about learning in others”. The definition encapsulates the notion that teaching may or may not result to learning. It emphasises the importance of planning, which would include programme and course design, the design of the assessment procedures and modes of delivery (Harvey & Knight, 1996, p.147). According to Boyer (1990, cited in Harvey & Knight, 1996, p.147) teaching at its best is beyond transmitting knowledge and invloves transforming and extending it.

Differing opinions exist on measuring of teaching quality. One school of thought highlights the negligence of certain literature in inferring teaching quality from the quality of student learning (Hay, Kehoe, Miquel, Hatzipanagos, Kinchin, Keevil & Lygo-Baker 2008). These authors indefatigably suggest that learning is the only authentic measure of teaching because “all evaluation depends on measures of ‘fitness for purpose’, and because teaching has purpose only where it supports learning.”

Hay *et al* (2008) do not side-line that assertion of some quarters that the learning process is normally considered too complex for empirical evaluation, and that learning is not a necessary consequence of teaching even though teaching can lead to learning. This conclusion is drawn from a series of persistent thread of literature which opines that "learning is ultimately a consequence of student behaviour rather than any direct consequence of the teaching they experience" (Hay et al., 2008).

In order to improve quality in education (or in learning) there arises the need to assess learning and teaching processes and to find criteria that affect the success of a given learning situation and hence increase learner's satisfaction (Neila & Latifa, 2011). Learning is seen as the only authentic measure for teaching because it has purpose only where it supports learning, and because all evaluation depends on measures of 'fitness for purpose' (Hay et al., 2008). Therefore, it is imperative that every HEI engage in proven practices which focus on how students can be best served (Soresen et al., 2005, p.xv)

3.2.6 Quality improvement in Teaching and Learning

Quality improvement in a university requires every student, teacher, faculty, and administrative staff to think in new ways, to be open up to new ideas and to work together to enhance students' learning (Soresen *et al*, 2005, p.xiv).

Teaching involves more than the events that take place in a physical or virtual classroom. Trigwell (2011) suggests that teaching is "…oriented towards, and is related to, high quality student learning, and includes planning, compatibility with the context, content knowledge, being a learner, and above all, a way of thinking about teaching and learning." It is obvious that improving teaching would involve an improvement in all these elements (Harvey & Knight, 1996).

Hunt (2003, citing Marzano, 2003 & Hattie, 2009) reiterates the conclusion of research on education that the most important variable in the achievement of students is the quality of instruction they receive on a daily basis. Therefore to ensure students learn at higher levels, it simply requires that teaching be improved. Quality learning is the result of learning by doing, which require the active involvement of students in constructing their own knowledge (Hunt, 2003). This approach to learning according to Hunt (2003), positions the lecturer as the 'guide on the side', not the 'sage on the stage'. Furthermore Hunt concludes that "good lecturers resource students and facilitate the skills needed to complete their assignments - the vehicle for student learning", thus supporting empirical finding of Entwisfle & Ramsden,

(1983, cited in Ramsden, 1991), which concludes that there is indeed a functional relation between teaching quality and student learning.

Entwisfle & Ramsden's study (1983 cited in Ramsden, 1991) investigated the aggregate-level connections between students' perceptions of teaching and the quality of student learning. The findings showed that, when students view academic departments as a provider of certain characteristics such as "good teaching (clarity of explanation, level at which material pitched, enthusiasm and help with study problems), openness to students, freedom in learning, clear goals and standards, and suitable workload," they are likely to learn more effectively from courses run within such departments. In addition, the study revealed that when students perceive the instruction to be clearly organized and accommodating, they are more likely to attempt to structure and understand the content of the curriculum; and when under conditions of high workload and restricted choice over methods and content of learning exist, they are more likely to adopt minimalist approaches narrowly focused on assessment (i.e. rote-learning primarily aimed at passing examinations only).

Furthermore, Ramsden (1991) was able to reach the conclusion based on various studies that, "that there are real differences in teaching quality and that these variations can be measured". He reiterates based on the empirical evidence that "…concern for and availability to students; enthusiasm and interest of teachers; clear organisation and goals; feedback on learning; the encouragement of student independence and active learning; an appropriate workload and relevant assessment methods; the provision of a suitably challenging academic environment: these are among the key factors defining "good teaching" in higher education on which students are able validly to comment."

These results clearly confirm the unequivocal and critical importance of instruction methods that are student-centred to quality learning. The onus therefore lies on instructors to find ways and systems that best encourage deep learning. As a matter of fact, the focus of academics should be on the establishment of effective teaching and learning techniques which emphasise student enterprise, student autonomy and co-operative endeavour (Ramsden, 1991).

3.3 LEARNING THEORY AND E-LEARNING

Certain propositions have been used as principles to explain how learning takes place. These are generally referred to as theories of learning. It is being argued that theory allows and sometimes forces practitioners to see the 'big picture' and makes it possible for them to view their practice and their "research from a broader perspective than that envisioned from

the murky trenches" of their practice (Anderson, 2004). Knowledge of these principles of learning and how learners learn guide educators in designing effective instructional systems. Therefore, proven and sound learning theories should be the basis for the development of effective learning materials intended for online instruction (Ally, 2004).

Ally (2004) draws attention to the multitude of schools of thought on learning, and specifies that no one school of learning is used exclusively for online instruction design. He further suggests that more than one theory can be combined to reach desired goal; while laying emphasis on the importance of developers of e-Learning content knowing the different approaches to learning in order to select the most appropriate instructional strategies. Furthermore, he recommends that "learning strategies should be selected to motivate learners, facilitate deep processing, build the whole person, cater for individual differences, promote meaningful learning, encourage interaction, provide feedback, facilitate contextual learning, and provide support during the learning process".

The first school of thought is the behaviourist school of thought which formed the bases for design of early computer learning systems. According to Skinner (1974, cited in Ally 2004) the behaviourist school of thought assumes that "learning is a change in observable behaviour caused by external stimuli in the learner". Behaviourists' claim that it is not what is going on in the learner's head that indicates that learning has occurred but the observable behaviour that indicates whether or not the learner has learned something (Skinner 1974, cited in Ally 2004).

Another school of thought counters the claim of the behaviourists. This counter claim suggests that not all learning can be observed and change in behaviour is not all there is to learning (Ally, 2004). This caused a shift away from behaviourist to cognitive learning theories. According to Ally (2004) cognitive psychology makes the assertion that the use of memory, motivation, and thinking is involved in learning, and that an important aspect of learning is reflection. Learning is perceived by these theorists as an internal process, presenting the argument that the amount of learning achieved depends on the learner's processing capacity, the amount of effort expended during the process of learning, the depth of the processing (Ally 2004, citing Craik & Lockhart, 1972; Craik & Tulving, 1975), and the existing knowledge structure of the learner (Ally 2004, citing Ausubel, 1974).

The most recent approach to learning is the move towards constructivism. Constructivist theorists make the assertion that "… learners interpret information and the world according to their personal reality, and that they learn by observation, processing, and interpretation, and then personalize the information into personal knowledge" (Ally 2004, citing Cooper, 1993;

Wilson, 1997). According to constructivists contextualisation of what is learnt by students is the best way to learn for immediate application and acquisition of personal meaning (Ally, 2004). Newhouse (2002) and Ally (2004) note that most research on learning philosophy support the constructivist belief about learning; to which most' Western' educational leaders and researchers subscribe for their pedagogical philosophy.

The need for students to develop higher order thinking skills is one of the constructivist concepts that have often formed the foundation for arguments which press for reforms in schools since such opportunity have not been provided by current schooling methodologies (Ally, 2004). The reason for this lack of opportunity is obviously due to the non-existence of the contemporary view of learning that individuals build new knowledge and understandings based on what they already know when the present-day schooling structures were established in the previous century (Newhouse, 2002).

Constructivism has now been applied in today's higher education as a phenomenon generally referred to social constructivism which advances the idea that learning and knowledge are delivered through social interactions between individuals (Schmidt, 2012). Schmidt (2012) reiterates the view of Driver *et al*. (1994) that "the social process of interacting through communication and engaging in shared activities results in permanent knowledge and learning" and that social constructivists maintain that knowledge is transferred to learners by skilled members of society.

3.3.1 Learning styles and implications for teaching and learning

Learning is said to be complicated (Harvey and Knight, 1996, p.120). Theories in psychology acknowledge the importance of individual differences. Various studies do indicate that there are some interactions between students' learning styles with instruction, and this kind of interaction will influence students' learning outcome especially on cognitive outcome (Tuan et al., 2005).

A study by Tuan *et al*. (2005), which provides comprehensive research findings on the impact of learning styles on students' achievement is presented herewith:

- Relationships exist between students' learning styles with their achievement and reaction toward instruction (citing Conwell, Helgenson & Wachowiak, 1987; Melear, 1990).
- Research evidence has suggested that if instruction matched students' learning style their achievement increased (citing Douglass, 1979; Dunn & Giannitti, 1990; Kuerbis, 1985; Melear, 1990).

- There is a finding that students' motivation would be increased, if instruction is harmonized with students' learning styles (Claxton & Murrell, 1987; Dunn, 1980, 1984; Uzuntiryaki, Bilgin & Geban, 2003 cited in Tuan *et al*. 2005).
- It was found by Uzuntiryaki *et al*. (2003, cited in Tuan *et al*. 2005) that students who are independent thinkers like to work with others, and eager to learn; and these showed significant difference in achievement scores and positive attitude toward the subject under review than other types of students.
- Shaw and Marlow (1999, cited in Tuan *et al*. 2005) found that students' attitude toward the course under review was influenced by their learning styles.
- It was discovered by Conwell *et al*. (1987, cited in Tuan *et al*. 2005) that no significant difference exists between students' achievement irrespective of the match or mismatch between their cognitive learning styles and the employed teaching strategies. Nevertheless, they arrived at a "conclusion that students do show more preference for the learning activities and teaching strategies that matched their own learning styles."
- Researchers (Collison, 2000; Synder, 2000, cited in Tuan *et al*. 2005) realised that there is a preference for different learning styles and possession of different expectations from their teachers by students with different academic achievements. This conclusion is reached collaborated by the fact that "high achievers tended to have high motivation, and like to work alone while low achievers have low motivation, and need to work with other students and need more help from teachers" (Tuan *et al*. 2005)..
- The result of the study on the relationship between students' learning styles with science inquiry skills by Nakayama (1988, cited in Tuan *et al*. 2005) showed that "students' cognitive-style preferences were significantly correlated with their performance of integrated science process skills. Students' cognitive preferences as perception (abstract/concrete) were significantly related to science process skills."
- Holden and York (1996 cited in Tuan *et al*. 2005) found that students'' thinking and meta-cognitive processes influenced their learning styles. According to them, the way students conduct inquiry activities is influenced by these kinds of thinking processes.
- Zoller (1991 cited in Tuan *et al*. 2005) came to a conclusion that "not all students like new activity-oriented teaching. In fact, students' perceptions of cognitive demands and their appreciation of the new teaching model reflect the level of dissonance between their cognitive and affective styles with the new teaching model."
- Watson, Prieto, and Dillon (1995 cited in Tuan *et al*. 2005) found "that teachers used more extensive practical work in teaching science, while it had only a marginal effect on students' understanding of combustion."

Therefore, having an understanding of learning styles goes a long way to help educators and instructional designers identify the learning style preferences in a group of learners (Allen,

2007, p.50). The knowledge of learners' preferred styles is beneficial in creating those learning experiences which can be tailored to maximise their impact. It is almost impossible for instructors to meet the needs of their students without an informed understanding of their students' approaches to learning (McInnis, 2003).

Hunt (2003) emphasises the importance of every learning activity being learner-centred, irrespective of learning styles. This involves designing the learning experience to accord with students' needs. Students recognise and value instructional designs that start from their positions. (Hunt, 2003).

3.3.2 Constructivists theory and the e-Learning environment

For many researchers and education stakeholders, their opinion for major reforms of schooling is said to have been informed by constructivists views on learning. These reforms are particularly inclined towards the use of technology by those who hold the opinion that learning needs are to be more informed by constructivism (Newhouse, 2002).

One of the assumptions by constructivist theory is that learning is more effective due to student engagement and motivation that results from the active participation of the students in the learning process than when learners are passive during learning activities. Leidner & Jarvenpaa, (1995 cited in Newhouse 2002) explained that when Individuals discover things by themselves and control the pace of their learning they are assumed to learn better. Newhouse (2002) articulates that some pundits' "…naturally expect that self-directed, interactive learning would improve learning outcome.' As a result, constructivists are increasingly calling for "richer learning environments that are in contrast with the typical, less interactive classroom environments relying on instructors, textbooks, and lectures" (Zhang, Zhou, Briggs, & Nunamaker, 2006 cited in Liaw 2008).

Brandt (1997; cited in Liaw, 2008) comments that learners can be well engaged and made to be more interested in learning through the help of the use of graphics, video, and other media. According to Liaw (2008) an e-Learning system built on constructivists view should consequently "enable learners to engage in interactive communication, self-directed activities, and multimedia learning materials during knowledge construction." Liaw (2008) adds further that cognitive information processing theory extends from the constructivist model which is based on a model of memory. The model of memory according to *Zhang et al.* (2006 cited in Liaw 2008) "proposes processes and structures through which an individual receives and stores information and focuses on cognitive processes during learning." These processes and structures according to Liaw, (2008).involve the processing "…of instructional

input to develop, test, and refine mental models until they are sufficiently elaborated upon and reliable to be effective in novel problem-solving situations

The cognitive learning model assumes that a learner's attention is limited and therefore selective (Liaw, 2008). The argument being presented is that a "learner who prefers a self-directed and interactive learning style has more flexibility to meet individual needs with more interactive and richer media available." Liaw *et al*. (2007, in Liaw 2008) assume that an instructional method should be effective if it provides a greater variety of interactions and richer media.

Furthermore, activity theory suggests "that increased student engagement can improve learning outcome, such as promoting problem solving and critical thinking skills" (Liaw et al., 2007, cited in Liaw 2008). This claim which is backed up by numerous studies has suggested that interactive communication and multimedia instruction creates a higher engagement of the learner; thus colluding that higher learner engagement and better learning outcome can be achieved with higher interactivity (Liaw, 2008).

3.4 LEARNING WITH TECHNOLOGY

An issue that should be taken serious by providers of higher education is how technology is changing the way teaching is done, and - more importantly - the way students learn (Contact North, 2013).

According to Newhouse (2002) "educational technology concerns the technology that is used to facilitate the teaching/learning process". Over the last two decades, a great deal of research has been done examining the effects of computer-supported learning (Steeples & Chris, 2002 cited in Akir, 2006). Newhouse (2002) brings to mind that educators are still debating amongst themselves "…on how technology should be used and what improvements in student learning could be expected."

There is no doubt that information technology has had a tremendous impact on faculty activities where ever it's been used. Researchers clearly indicate that use of web-based tools have "transformed the research and scholarship component of faculty life by easing the process of collegial communication and collaboration" (Baldwin, 1998, cited in Scagnoli, 2005).

It is expected that changes in society, student expectations, and technology advancements should motivate innovative HEI and faculty members and instructors to re-think pedagogy

and teaching methods. Students are growing up where technology is a natural part of their environment (Contact North, 2013) and it therefore becomes natural to expect the use of technology where appropriate to help them learn and develop skills relevant in the dispensation.

3.4.1 The relationship between technology and learning

Newhouse (2002) presents a review on how technology impacts “on learning, students, the curriculum, teachers, schools, and school systems”. He developed a framework (Figure 3.1) that shows the relevant connections between these entities.

The framework clearly shows that there is no direct link between using technology for teaching and learning outcomes. This is due to the fact that learning is facilitated through the learning environment and technology is only a component of that environment, and therefore completely removing the effects of other elements of the learning environment would not be possible (Newhouse (2002).This view is supported by Salomon (1994 cited in Newhouse 2002) in his argument that it is impossible to study the impact of educational technology “…use in the absence of the other factors nor to assume that one factor impacts outcomes independently of the others". Therefore it is essential to realise that technology is a support in the learning environment; its implementation should be framed around with methods that intends to use it to provide effective environments and learning situations (Newhouse, 2002).

This indirect link between technology and learning outcome, does not indicate that technology has no impact. Newhouse (2012), points to studies which have shown that technology indirectly impacts outcome. The framework clearly shows that though technology may not have direct impact on outcomes, it impacts directly on other components within the learning environment. We take a look at how educational technology relates within the various components.

3.4.2 How learning technologies impact on curriculum

Educational technology and the curriculum have a two-way relationship where educational technology may be used to assist in transmission of the curriculum but may change the content of the curriculum at the same time (Newhouse, 2002). Cradler & Bridgforth (2002, cited in Newhouse, 2002) point to findings of research “ that the effectiveness in the use of technology to support learning is a function of the curriculum content and the instructional strategy such that when appropriate content is addressed using appropriate strategies students and teachers will benefit” the viability in the utilization of technology to help learning

is a capacity of the educational module content and the instructional system such that when fitting substance is tended to utilizing suitable systems understudies and instructors will profit.

Newhouse (2002), suggests that the impact of technology on curriculum content may be viewed in terms of:

- Declarative knowledge - describes objects and events by specifying the properties which characterise them, or 'knowing that' and;
- Procedural knowledge - focuses on the processes needed to obtain a result, or 'knowing how'

3.4.3 Technology's impact on the learning environment

Earlier on (paragraph 3.4.1), it was presented that educational technology is a mediator of learning as a component of the learning environment, and may not directly affect learning outcomes. Review of the literature on technology and learning resulted in the conclusion that "technology has great potential to enhance student achievement and teacher's effectiveness, but only if it is used appropriately", thereby bringing to rest the debate (Ally, 2004) about whether it is the use of a particular delivery technology or the design of the instruction that improves learning. This goes to suggest that technology usage could have possible impacts when connected as a mediator with well researched theories of learning and strategies for providing learning opportunities.

Newhouse, (2002) alludes to a general agreement that institutions of learning need to exploit the unique instructional characteristics of educational technologies. Furthermore, he presents four distinct characteristics of technology which were identified by the Committee on Developments in the Science of Learning (2000) to have clear implications for using computer technologies in teaching. These distinct characteristics are "logical programming, interactive control, graphics and audio output, and information processing."

According to Newhouse (2002), these characteristics could be used in many ways "…and have been shown to support students and teachers in improving learning outcomes and increasing productivity." However, he emphasized that a group of variables will determine the extent to which each of these characteristics should be applied. This group of variables includes such elements as "the developmental age and personal characteristics of the student, the characteristics of the learning environment, and the nature of the curriculum content."

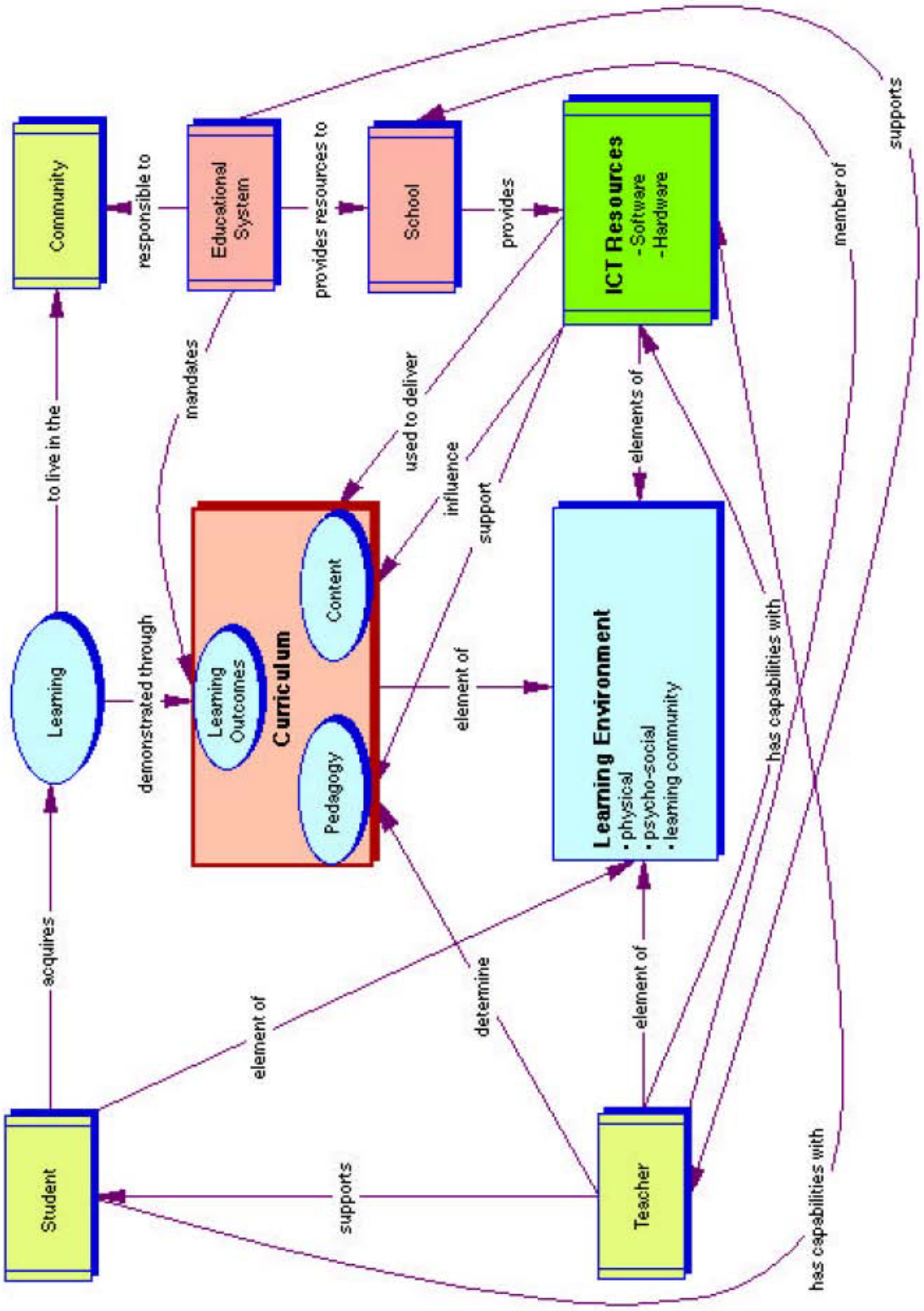

Figure 3.1: Concept map indicating relationships between learning environment entities and external (Source: Newhouse, 2002)

3.4.4 Technology integration in education

The integration of information and communication technologies into the educational process has been linked to and/or based on a variety of learning paradigms and teaching methods (Akir, 2006, p.2).

According to Cockbain et al. (2008), changing method of delivering instructions to learners by means of technology inclusion is an evolutionary process which requires constant evaluation, revisiting and revising. It therefore means that its success depends on communication between all involved. Cockbain et al. (2008) suggest that "adopting a blended approach to incorporating online teaching strategies is a cultural change for both students and academic staff and commitment by all is paramount to the successful implementation of an effective electronic learning environment with positive support at subject and institutional level essential in enabling these changes to take place".

Wilson (2007, p.13) is of the opinion that the first step to effective integration of technology is to answer this "most" important question: What is technology integration? In an attempt to answer this question, Wilson (2007, p.4) cites Dockstader's (1999) approach by defining what technology integration is not. According to Dockstader, it is not simply using pre-packaged programs and trying to make the curriculum fit the programs. Dockstader further defines technology integration as "incorporating technology in a manner that enhances student learning. The curriculum must determine what the technology will result in the learning, and not vice versa (Wilson 2007, p.4).

Cockbain et al. (2008) makes the suggestion that in order to respond to the external professional requirements and those of the university, professional academic programs need to provide opportunities for students to learn in ways that will increase student responsibility for their own learning, reduce their level of dependence on teaching staff and prepare them for the rigours of the workplace by developing high level cognitive and transferable skills.

Information technologies offer new opportunities for educators to enhance the quality and accessibility of their instructional material. Tools such as electronic mail, computer conferencing, and the World Wide Web are assumed to strengthen communication and collaboration between students and faculty members (Akir, 2006).

Clickering & Ehrmann, (1997, cited in Akir, 2006) are of the opinion that modern communication technologies provide increased opportunities for interaction that are useful for problem solving, sharing resources, and enhancing face-to-face contact. In addition, they claim that teaching and learning also benefits in illustration of difficult concepts with

animation or video and providing simulations and gaming in carrying out training and scientific experiments. These technologies, according to Guttormsen & Krueger (2000 cited in Akir, 2006), allow new information search methods, new teaching configurations, and just-in-time academic interchange. With Internet technologies, learners and educators can work collaboratively anytime, almost anywhere. The classroom experience is no longer limited to a physical space. It is now being extended through virtual private networks to include online classrooms characterized by an open and collaborative learning environment (Akir, 2006, citing Schank, 2001).

In many ways according to Collins & Berge (1996 cited in Akir, 2006), technology-supported collaborative learning has preserved, and in some cases added to, the advantages of traditional face-to-face collaborative learning).

Teachers have the opportunity to provide their students with more detailed feedback through creative and interactive presentations that allow for more learner input. Web-based teaching can accommodate varying rates of individual progression and provide a degree of flexibility not possible with the delivery of information through mass lectures. In addition, educational technologies have a positive role to play in providing flexible opportunities for continuing and life-long learning (Lueddeke, 1997 cited in Akir, 2006).

3.4.5 How technology supports learning

Societal changes that have been brought about by technological innovation and advancements have been massive (Bull, Knezek, Roblyer, Schrum, & Thompson, 2005, cited in Veletsianos, 2010). Newhouse (2002) recaps that technology is developed to solve problems associated with human need in more productive way, and he further emphasises that that educators should create and adopt technologies that address educational problems.

Rieber & Welliver (1989 cited in Newhouse 2002) define educational technology as “a process involving, a systematic approach to identifying instructional problems and then designing, developing, implementing, and evaluating instructional solutions”. They argue that, “in order for the full potential of educational technology to be realised, it must be viewed more as a process rather than just the implementation of educational tools”. As a result the process of introducing technology in educational begins with the identification of an educational problem, not with the existence of a technology (Newhouse, 2002).

Newhouse (2002) suggests that this question “*What educational problem(s) needs to be addressed?*” should be asked when the discussion for application of technology arises. The

use of technology for instruction involves introduction of new teaching methodologies in order to improve students' skills as well as their knowledge in the subject areas they are studying (Salas-Morera et al., 2012). In a research conducted on how e-Learning can be used to improve students' skills in areas such as problem-solving, information management, group working and the acquisition of writing and speaking skills Salas-Morera et al., (2012), claim to have achieved success in "…improving the students' general skills and knowledge, especially in terms of design methods and organisation and planning ability and in general academical performance".

It can therefore be argued that the teaching technology permits a much richer exploration of experience, but demands a high level of competence on the part of the teacher to permit students to fully benefit from this experience.

3.4.6 Strategic planning for integration of Learning Technology

Integration of technologies in on-campus teaching entails strategic planning for the university as a whole (Beller & Or, 2006). The following are matters which Beller & Or (2006) say should be carefully addressed:

- *The desired goals to be achieved by the integration of technologies*: improving the quality of teaching; greater effectiveness (pedagogically, economically and organizationally); using technology for enrichment or as a central delivery mode; with the end products (e.g., online courses) open to the public (as public goods).
- *Types of courses that lend themselves to an initial TML implementation plan:* all courses; introductory large courses; advanced courses, complex courses; others.
- *Leadership of the integration initiative:* Will it be regarded as a revolution led by top management, or as an evolutionary process that relies mainly on local initiatives and personal motivation?
- *Organizational aspects:* centralization/decentralization of the process; creating a general infrastructure, providing a suitable learning environment and a set of sound pedagogical tools; the support system (for applications, faculty and students).

According to Beller & Or (2006), the above analysis calls for universities to examine their academic and administrative structure (internal and external) in the face of the era of lifelong learning in a technologically-rich environment. Each institution of higher learning will need to tailor its own TML strategy to fit in with its vision; mission.

3.4.7 Technologies impact on Learning

According to Pea, (1985 cited in Jonassen *et al.* 1994) two popular views emerged on the use of technology for teaching. The one view being the moderate ‘‘amplification’’ view that using technology as a tool simply allows to amplify what can be done without technology already, while the other - the ‘‘augmentation’’ view - proposes that technology might augment the possible types of cognitive activity and thereby lead to a reorganization and extension of human cognition. These views clearly depict the contrasting ways in which technology is used in teaching. The holders of first view simply engage in the digitisation of print content, while the proponents of ‘‘augmentation’’ view ensure pedagogy is the underpinning the use of technology.

Jonassen *et al.* (1994) admonishes that instructional technology should not just be perceived as a specific way to deliver instructional materials but as a context of learning that influences the whole instructional process by enabling activities and cognitive processes of learners’ unseen in the context of traditional face-to-face instruction. In other words technological tools should be viewed as ‘‘facilitators of constructive learning, rather than the conveyors of instruction’ (Jonassen et al., 1994)’.

3.4.8 Developing student autonomy

In the notion of transformation quality, Harvey and Knight (1996) claim that empowering learners involves giving them power to influence their own transformation. This involves learners taking ownership of the learning process. Harvey and Knight (1996) further concluded that the transformation process itself provides the opportunity for self-empowerment, through increased confidence, self-awareness and so on.

Enhancing students’ responsibility for their own learning is crucial within teaching (Cockbain, Blyth, Bovill & Morss, 2008, cited in Harvey & Knight, 1996). In higher education the theory and practice of learning and teaching encourages individuals to become autonomous and take responsibility for developing their professional knowledge and skills and to place value on lifelong learning (Cockbain *et al*, 2008, p.242).

An essential skill for effective participation and in the knowledge society is lifelong learning (Hoic-Bozic et al., 2009). In other to develop this skill Hoic-Bozic, et al.(2009) postulates that the educational system should be such that engenders interest in independent learning. It is important to provide students with an ‘active’ educational experience to prepare them for their professional life and to meet the standards of education and training. This approach should aim at empowering learners.

3.4.9 Changing the role of faculty members

The impact of technology on teachers and the tactics they employ to facilitate the learning environment are critical because teachers are a key component in the learning environment. Whereas it is clear that the role of teachers will continue to be critical, the structure of that role is likely to vary to require a greater array of skills and understandings (Hoic-Bozic et al., 2009). Teachers need to acquire more skills needed to direct students through the huge quantities of rich information.

Hoic-Bozic *et al*. (2009) observe that the traditional approach to instruction, where the transfer of knowledge is achieved mostly by lecturing, has a number of inadequacies, in particular because the students are not inspired enough to acquire knowledge actively. The role of instructor must be redefined so as to accomplish a shift in pedagogy from an instructor-centred to a learner-centred environment (Hoic-Bozic et al., 2009). This new paradigm of teaching can be accomplished by the use of e-Learning especially because of the opportunities this technology offers.

With the move towards a more learner-centred, blended educational experience for the students, the lecturers' role has shifted to that of a facilitator and has enabled teaching staff to highlight to students that if they come unprepared for tutorials, the facilitator has no role (Cockbain *et al*, 2008). As a facilitator the lecturer can draw on his/her own experience and knowledge to move discussions to higher cognitive levels.

Innovative changes in teaching methods represent a paradigm shift in the way students learn, with academics undertaking radical alterations to the way they 'teach. These developments have been enabled by careful curriculum design which optimises the face-to-face and electronic elements of a blended approach to learning and aims to enhance students' control over their own learning (Cockbain et al., 2008).

The effect of the change of roles to facilitator is seen to change the ways teaching is done. A Blackboard research in this regard revealed lecturers at a university claim to be seeing less lecture/discussion/worksheet and more facilitation, more collaboration with other teachers and a shift in attitude as teachers help and encourage students to take more responsibility for their own learning (Blackboard, 2009). This approach to learning allow students to play dominant role in their learning as they need to develop a strong sense of responsibility for their own learning and develop skills associated with the management of time, concentration, self-discipline, attention to task and ability to follow instructions. This also creates the need to develop skills in reflecting on learning experiences and selecting and using learning (problem-solving) strategies (Newhouse, 2002).

Salas-Morera *et al.* (2012), authoritatively points to the definitive importance of teaching methods that involve fluid and effective interaction between teacher and student, and amongst the students themselves, with the aim of facilitating the exchange of opinions and general information, streamlining the tutorial system and encouraging group collaboration. This affirms that teaching methods should aim at enhancing the active and responsible participation of students in the learning process, and to enhance the acquisition not only of subject-related knowledge but also of certain general skills appropriate to the field of study.

The role of the lecturer as a manager of students, learning resources and to some degree of learning itself cannot be overlooked. For an effective learning process Newhouse (2002) beautifully outlines the role of the instructor. He indicates that the instructor will need to set broad learning objectives and task descriptions for students, and provide feedback and monitor progress. Furthermore the instructor will also need to provide students with access to e-Learning platform and ensure they know how to use and navigate through it.

According to Newhouse (2002), the instructor needs to be seen as both a supporter of and model of 'learning'. That is on one hand the instructor motivates, coordinates, sets the guidelines and helps students develop learning strategies while on the other hand he models learning by being involved in the students learning not as an expert but as a fellow learner. This frees lecturers to set problems or tasks that are not necessarily centred on their areas of expertise but this may unsettle teachers by placing them in the vulnerable position of 'not knowing'.

A study at another university by Blackboard describes another dimension to the efficacy of e-Learning (Blackboard, 2009).This research found that teachers' instructional practices are transformed by learning how to teach online, because they develop new skills and build pedagogical strategies using technology. The research also reported that online teaching improves practices in both virtual and face-to-face settings. Further, 75% of the teachers in this study said that teaching online had a positive impact on their face-to-face teaching. Lastly, the study pointed out that teachers who gain experience delivering instruction online can serve as change agents in the schools where they also teach face-to-face courses

3.5 E-LEARNING

The expectation of an e-Learning program is the facilitation of student's success in ways that may not be easily accomplished by face-to face model. Extending the traditional classroom through e-Learning provides institutions with new approaches and strategies for addressing

the challenges they encounter. It also affords them the opportunity to take advantage of the exciting new learning opportunities that are now available. E-Learning comes with a potential to provide a single experience that accommodates the three distinct learning styles of auditory learners, visual learners, and kinaesthetic learners.

As with most things, e-Learning has advantages and disadvantages, but the researcher argues that if it is well managed the advantages can well outweigh the disadvantages. Studies have cited many advantages of e-Learning, particularly the convenience and flexibility offered by the (asynchronous) 'anytime, anywhere, and anyplace' education (McDonald, 2002 cited in Connolly et al., 2012). This flexibility and convenience gives learners time for research, internal reflection, and 'collective thinking' (Garrison, 1997 cited in Connolly et al., 2012).

Jonassen, (1996 cited in Connolly et al., 2012)) claims that the text-based nature of e-Learning normally requires written communication from the learner, which encourage higher level learning such as analysis, synthesis, and evaluation along with reflection, and encourage clearer and more precise thinking. The capability of e-Learning program in presenting multiple representations of a concept, allows learners to store and retrieve information more effectively (Kozma, 1987) adds to the gains of e-Learning.

An e-Learning program is well capable of creating community of learners. Web 2.0 is a term often associated with "… the social use of the Web which allow[s] people to collaborate, to get actively involved in creating content, to generate knowledge and to share information online" (Grosseck, 2009, cited in Connolly, et al., 2012). The individual construction of learning can be complemented by the communal spaces created in an e-Learning platform through the use of interactive online asynchronous discussions.

According to Cockbain *et al*, (2008) discussions help students to make sense of their learning within a social community and examine their own knowledge, skills and views against those of others. These authors contend that renegotiating of meanings and learning with others is consistent with theories of social learning, social constructivist learning in virtual environments and the concept of learning communities and communities of practice. The presence of a community is essential to stimulate the commitment required by students to aid their progression through the stages of critical inquiry (Cockbain *et al*, 2008).

Further to the benefits of e-Learning Kruise (2008)(indicates that e-Learning has the ability to offer individualised instruction, which print media cannot provide by targeting specific needs. e-Learning can locate and target individual learning preferences with the assistance

of learning style tests. In addition to target learning Kruise (2013) suggests that synchronous e-Learning can be self-paced. Kruise (2013) is of the opinion that e-Learning makes it possible for advanced learners to speed through or bypass instruction that is redundant while novices slow their own progress through content, eliminating frustration with themselves, their fellow learners, and the course. In view of these benefits, Kruise (2013) therefore concludes that e-Learning is inclusive of a maximum number of participants with a maximum range of learning styles, preferences, and needs.

3.5.1 The concept of e-Learning

There are different forms of implantation of e-Learning. For contextual purposes, researchers (U.S. Department of Education, 2010) suggest that it is important to make distinctions between fully full online courses, partially partial online courses, and courses that are essentially face-to-face but which incorporate some resources online as each of these types of courses may have very different implications for access, progression, and student learning.

E-Learning opens doors of opportunities, innovation and value, and "…resulted in new modes of educational delivery, new learning domains, new principles of learning, new learning processes and outcomes, new educational roles and entities" (Harasim, 2000). The potential for e-Learning to provide more flexible access to content and instruction at any time, from any place has made it more popular amongst HEI. According to the US Department of Education (2010), e-Learning focus entails:

- Increasing the availability of learning experiences for learners who cannot or choose not to attend traditional face-to-face offerings
- Assembling and disseminating instructional content more cost efficiently, or
- Enabling instructors to handle more students while maintaining learning outcome quality that is equivalent to that of comparable face-to-face instruction.

E-Learning tools make it possible to design programs that can enhance the quality of learning experiences and outcomes. A common supposition by researchers (US DoE, 2009) is that to learn a complex body of knowledge effectively may require a community of learners and that such communities can be expanded and supported by e-Learning technologies. In addition, the asynchronous e-Learning tools are said to support deep learning. Researchers conclude that asynchronous discourse is inherently self-reflective and therefore more conducive to deep learning than is synchronous discourse.

E-Learning is a term that evolved from different terminologies, and has been defined in so many ways. The most suitable definition in the context of the study is provided by Horton

(2003, cited in Connolly et al., 2012). He defined e-Learning as "… any use of Web and Internet technologies to create learning experiences".

Most commentators view the e-Learning phenomenon as an evolution from distance learning or education (Connolly et al., 2012). Connolly and Stansfield (2007) cited in Connolly, et al., (2012) presented a six-generation model that describes the evolution of distance education to e-Learning:

- *The first generation (the 'correspondence model'):* education provided mostly through paper-based instruction and characterized by the mass production of educational materials.
- *The second generation (the 'multimedia model'):* education provided through integrated multimedia such as the use of television to deliver courses, and supplement printed material with audio and video tapes, computer-based learning (CBL).
- *The third generation:* using two-way communications media such as audio/video-conferencing and broadcast technology for delivery of lectures.
- *The fourth generation:* This is the first generation of e-Learning which was characterised by passive use of the Internet which involved the conversion of course material to online formats, the use of low-fidelity streamed audio/video, and basic mentoring using email.
- *The fifth generation:* The second generation of e-Learning which saw the use of more advanced technologies consisting of high-bandwidth access, rich streaming media, online assessment (eAssessment) and LMS that provide access to course material, communication facilities, and learner services.
- *The sixth generation*: This is the third generation of e-Learning which emphasises more on collaborative learning environment based much more on the constructivist epistemology, promotes reflective practice through tools like ePortfolios, Web 2.0 technologies such as blogs and wikis, online communities, and uses interactive technologies such as online visualizations, games, and simulations.

For second and third generation eLearning, LMS support new approaches for people to learn and assist with the delivery but also with the way in which information is presented leading to acquisition of new knowledge (Holmes & Gardner, 2006).

3.5.2 E-Learning in context

E-Learning is generally used to refer to the use of network technologies to produce, improve, convey, and enable learning, anytime and anywhere. There is yet to be a consensus on the definition of e-Learning. Authors have defined e-Learning based on individual or institutional application. A more general description of e-Learning is "the use of electronic technology to

deliver, support and enhance teaching and learning" (Learning Technologies, 2003 cited in Solimeno et al., 2008).

Furthermore, Capper (2001) cited in Liaw (2008) listed the e-Learning benefits as:

- *Any time:* An instructor or learner can access the learning program at any time that is convenient.
- *Any place:* Those participating an e-Learning program do not have to meet face-to-face
- *Asynchronous interaction:* Interactions can be more succinct and discussion can stay more on-track.
- *Group collaboration:* Tools such as electronic messaging creates new opportunities for groups to work together by creating shared electronic conversations and discussions.
- *New educational approaches:* Many new options and learning strategies become economically feasible through online courses. Online courses also can provide unique opportunities for teachers and learners to share innovations in their own works with the immediate support of electronic groups.

Teaching and learning experiences of both educators and learners can be greatly enriched by the new opportunities offered by e-Learning through virtual environments that support delivery and allows for the exploration and application of information and the promotion of new knowledge (Holmes & Gardner, 2006).

3.5.3 The provision of flexible learning

According to Harvey & Knight,(1996, p.148, citing Murray, 1991), the main factor determining student learning is individual studying outside of the class room. This statement supports the view that good teaching is about supporting this engagement and motivating students to work hard and purposefully on worthwhile tasks.

E-Learning is synonymous with flexibility and convenience to students, and is known to allow institutions be more flexible in their approach to education (Jaggars, 2011). E-Learning approach to education allows students to play the dominant role in their studies. This encourages them to develop a strong sense of responsibility for their own learning and develop skills linked with the management of time, attentiveness, self-discipline, attention to details and ability to follow instructions (Newhouse, 2002). It is essential for students need to develop skills in reflecting on learning experiences and selecting and using learning (problem-solving) strategies. These skills can well be articulated with well-designed e-Learning program.

Weggen (2000) expresses the view that the Internet facilitates e-Learning not only in terms of better delivery, but also by promoting more current, dynamic educational content, more personalized, relevant learning experiences, and more collaboration with experts and peers.

According to a Blackboard publication (2009, citing Baker & Wendel, 2001), research evidence confirms that "…a combination of flexible, independence and experience with online tools has been associated with improved critical thinking, research and computer skills".

Technology can be utilised for a variety of flexible learning modes and e-Learning has broadened access to programmes of higher education institutions as part of a worldwide, life-long learning philosophy students (du Pré, 2010). This covers the total spectrum of distance learning (e.g. technology-enhanced) as well as a variety of modes used on campus as part of a course.

Flexible learning makes the individualization of learning and courses for a variety of prospective learners (such as mature, working persons) possible by means of wider access, recognition of prior learning and telematics learning methods. The innovative work done by Leicester University in the UK in the area of eLearning and online learning is changing the face of how higher education institutions engage with their students (du Pré, 2010).

3.5.4 E-Learning and learner outcome

Literature abound based on empirical studies of the effectiveness of e-Learning. Many researchers have studied various aspects of e-Learning such as contrasting e-Learning with face-to-face learning by measuring outcomes, other have studied the effect of a mix of e-Learning and face-to-face approach.

A particular literature of interest and note is a report by the US Department of Education (U.S. Department of Education, 2010). This report is a culmination of a systematic search of research literature from 1996-2008. The process led to the identification of one thousand empirical studies of e-Learning. These studies were analysed and screened to find those that:

a. contrasted an online to a face-to-face condition;
b. measured student learning outcomes;
c. used a rigorous research design and
d. provided adequate information to calculate an effect size

The researchers perfumed a meta-analysis of those studies from which *effect sizes* that contrasted online and face-to-face instruction could be extracted or estimated.

These activities were undertaken to address four research questions:

- How does the effectiveness of online learning compare with that of face-to-face instruction?
- Does supplementing face-to-face instruction with online instruction enhance learning?
- What practices are associated with more effective online learning?
- What conditions influence the effectiveness of online learning?

A summary of studies comparing different forms of online learning is hereby provided:

- Students in online conditions performed modestly better, on average, than those learning the same material through traditional face-to-face instruction. Learning outcomes for students who engaged in online learning exceeded those of students receiving face-to face instruction.
- Instruction combining online and face-to-face elements had a larger advantage relative to purely face-to-face instruction than did purely online instruction.
- Effect sizes were larger for studies in which the online instruction was collaborative or instructor-directed than in those studies where online learners worked independently
- Most of the variations in the way in which different studies implemented online learning did not affect student learning outcomes significantly.
- The effectiveness of online learning approaches appears quite broad across different content and learner types.
- Effect sizes were larger for studies in which the online and face-to-face conditions varied in terms of curriculum materials and aspects of instructional approach in addition to the medium of instruction.

In summary, the meta-analysis found that, "…on average, students in online learning conditions performed modestly better than those receiving face-to-face instruction. The difference between student outcomes for online and face-to-face classes—measured as the difference between treatment and control means, divided by the pooled standard deviation—was larger in those studies contrasting conditions that blended elements of online and face-to-face instruction with conditions taught entirely face-to-face. Analysts noted that these blended conditions often included additional learning time and instructional elements not received by students in control conditions. This finding suggests that the positive effects associated with blended learning should not be attributed to the media, per se…"

3.5.5 An overview of an e-Learning platform

An e-Learning platform (EP) is a web based application created for instructional purposes. Nomenclatures such as Virtual Learning Environments (VLEs), Learning Management Systems (LMS), distributed learning systems, course management systems (CMS) and instructional management systems are other ways that e-Learning platforms have been referred to.

EPs combine a range of course/subject management and pedagogical tools to provide a means of designing, building and delivering learning online on via a network. As a Learning Management Systems, these platforms are scalable systems that can be used to support an institution's entire set of teaching and learning courses. There are many different LMS products available, some at considerable cost and others available as open source. Regardless of which product is chosen, most LMS contain similar functionalities.

An e-Learning application like Blackboard is a powerful electronic environment offering fresh possibilities for pedagogical approach. The facilities it offers are web-based tools which allow instructors and facilitators to build and manage learning content and provide an engaging environment for students.

There are tools to facilitate student participation, communication, collaboration, assessment and evaluation, all of which are pivotal in achieving the blended approach to teaching and learning staff were looking to achieve. If used as an integral part of careful program design, it is possible to produce a program which supports synthesis of the skills, knowledge and competencies required in the academic and clinical environments (Cockbain et al., 2008).

3.5.6 Blended Learning

Cockbain *et al* (2008) are advocates of program redesign that adopts a blended learning approach with both face-to-face and online learning aimed at enhancing the students' control over their own learning.

Blended learning is defined in many ways partly due to differences in its implementation and practices. Many authors suggest that blended learning significantly affects the roles of teachers, as they evolve from being lecturers to instructional guides.

The existing blended learning models are also flexible and adaptable. This allows instructors or teachers to create instructional activities and assignments that give students the opportunity to work collaboratively, tapping their interests.

3.5.7 Benefits of blended learning model

Many schools in the developed world are reaping great benefits from the integration of e-Learning. Literature has it that certain schools are addressing significant challenges through an e-Learning program. Some of this innovative implementation involves the offering of credit recovery, giving students anywhere, anytime access to remedial resources and providing additional instructions and practice on online format (Blackboard, 2009).

Many academics believe that an effective blended learning facilitates a community of learning and inquiry by encouraging discussion, debate, negotiation and agreement which is seen as attributes of higher education (Cockbain *et al*, 2008). The new design assumes that independent study through an e-Learning platform will be central to delivery and time with staff will be spent developing high level cognitive, transferable and practical skills.

In addition, schools have also found it very useful to deliver core curriculum, provide enrichment, support remediation and intervention programs, and to provide accelerated learning opportunities to students who want to take Advanced Placement courses or who will benefit from TAG (Talented and Gifted) instructional support (Blackboard, 2009).

The aforementioned ways in which e-Learning is being used to mitigate challenges and improve learning experience strongly attest its undeniable benefits. The following are some of the important benefits identified by educators which were put lined in a Blackboard publication (Blackboard, 2009):

- The ability for schools to maintain their central role in managing a student's educational process and personalising instruction;
- Providing curriculum developers and teachers the flexibility to address standards and maintain curriculum fidelity while integrating digital content and learning experiences that better engage 21st century learners; and
- Giving teachers valuable experiences in using technology effectively in their professional development courses, preparing them to use blended models creatively and strategically as this approach becomes more and more prevalent in the classroom.

It's imperative that faculty members leverage the power of an e-Learning program in a manner unique to their situation and circumstances. Experimenting with established e-Learning models could help faculty members discover "…new solutions to challenges and leveraging opportunities to improve and transform traditional instructional models" (Blackboard, 2009).

3.5.8 Factors that affect adoption of learning technology

Research has shown that faculty members resist the use of technology in teaching and learning across institutions (Moser, 2007). Adopting technology for teaching is a complex issue.

Moser (2007) in proposing a model for easy adoption of teaching technology suggested that time should be considered as a critical factor. He emphasises that because time is a scarce resource and many other activities compete for faculty attention, time commitment illustrate the value and importance assigned to an activity. Quoting a response of a faculty member of a university, Moser wrote: “At the end of the day since in my mind the most important factor is time, investments has to reflect the fact that we recognise people’s time”.

A second factor noted on Moers model is the reliability of the network that supports the teaching technology. According to Moser (2007), the reliability of technology can affect the teaching and learning progress considerably. He recounts the frustration expressed by faculty members of a North Eastern University in these words: “There are some issues with the network .... So we had some growing pains. I actually stopped using Blackboard for a while”. Jacobsen (1998) echoes this sentiment towards the adoption of teaching technology, stating that computers and the peripherals are not well designed, fault free and easy to use. And as a result, many are hesitant to adopt it.

A third factor according to Moser (2007) is feedback from students, individual experiences of the teacher and peer inputs. According to Moser (2007), reports of negative experiences travel fast and influence the opinions of the larger community.

Faculty support has been identified as a critical factor in the support of educational technology programs (Moser, 2007). There are complexities in integrating technology into teaching.

3.6 CONCLUSION

This chapter discusses the meaning of quality in relation to education. It describes the role technology plays in enhancing the quality of teaching and learning. In addition, the concept of e-Learning was introduced, expounding on the benefits of an e-Learning program to the lecturer and students. It explores the most effective model for e-Learning implementation.

The next chapter will discuss and justify the research strategy and data collection techniques.

CHAPTER 4: RESEARCH DESIGN AND METHODOLOGY

“Give me six hours to chop down a tree and I will spend the first four sharpening the axe.”
— Abraham Lincoln

4.1 INTRODUCTION

In chapter one, a synopsis of the research design and methodology for this study is presented. The highlight was an introduction to the planned approach for completing this study.

This chapter provides a broader perspective on the complete strategy for dealing with the fundamental research problem (see Chapter 1, section 1.3). In addition, it also provides the total organisation of the steps that the research follows, the data that is collected by the researcher, and the analysis that the researcher conducts on the data (Leedy & Ormrod, 2001, p.91). In other words, this chapter provides the complete plan of action for successful research.

Distinction is clearly made between research design and methodology. Mouton (2001, pp.55-56) identifies research design is a plan or blueprint of how one intends to conduct the research, while research methodology focuses intently on the research process and the kind of instruments and procedures to be used. Supporting this view, Leedy & Ormrod (2001, p.14) describe 'research methodology' as the general approach one takes in conducting a research project; this approach to a degree, prescribes the particular tools that the researcher selects.

This research explores findings and current theories about the influence of an e-Learning program on how lecturers teach and how students learn, and how it can improve the quality of teaching and learning. The research approach which seemed most appropriate for this study is the *case study* approach. A case study strategy is usually adopted within qualitative methodologies, based on the interaction between theory and empirical data (Fonseca et al., 2010). Exploratory and “how” questions are being posed, and the researcher’s focus is on a contemporary phenomenon within its real-life context (Yin, 2009, p.1).

4.2 RESEARCH APPROACH

This research employs a mix mode combining the quantitative and qualitative research approach for collecting data. The general approach is to use quantitative research techniques to answer the *how* questions while the quantitative research is used to answer the why questions (Biggam, 2008, p.85). In another level, qualitative technics deal with words and text, while quantitative technics is concerned with numbers- quantities and measurement (Biggam, 2008, p.86, Hesse-Biber & Leavy 2006, p.9).

4.2.1 Qualitative approach

According to (Leedy & Ormrod, 2001, p.101), qualitative research "is used to answer questions about relationships among measured variables with the purpose of explaining, predicting and controlling phenomenon." Biggam, (2008, p.86) links qualitative research to "in-depth, exploratory studies." Denzin & Lincoln (1994, cited in Biggam, 2008, p.86) maintains that this form of research approach "involves studying things in their natural settings, attempting to make sense of it, or interpret phenomena in terms of the meaning people bring to them". The general approach is to use qualitative research techniques to answer why questions (Biggam, 2008, p.86).

Qualitative technique is the secondary research approach to this study and is employed to understand the context in which e-Learning approach to teaching can result in improved quality of teaching and learning, and to verify conclusions based on other studies that teaching with technology can impact learning and teaching quality.

Qualitative research methods engaged in this study involves collection of existing and past records, personal interaction with students, observations and literature.

4.2.2 Quantitative approach

The quantitative research approach - which is sometimes called the traditional, experimental, or positivist approach (Leedy & Ormrod, 2001, p.101) - is a secondary research approach used for this study. Quantitative research is employed to provide answers to questions about interactions that take place among measured variables which aims to explain, predict, and control occurrences (Leedy & Ormrod, 2001, p.101). It is considered by Struwig & Stead (2001, p.4) as a "form of conclusive research which involves large representative samples and fairly structured data collection procedures."

Quantitative research approach is used to explore the general view of lecturers and students on the relationship between teaching methods involving technology and quality of teaching and learning.

The data collection method for this approach is the survey questionnaire.

4.3 SAMPLE DESIGN

Data needs to be collected from the body of people under consideration, referred to as the population. It is necessary to clearly define the target population, which Collis and Hussey (2009, p.62), define as "...any precisely defined body of people or objects under consideration for statistical purposes."

Getting data from the whole target population and students would be a daunting task and may be impossible to accomplish. Therefore a sample of the population is considered. A sample is defined as a subset of a population (Collis & Hussey, 2009, p.62), and must be selected to represent the population.

The technique for selecting items (or persons) for sample is referred to as sample design and is defined as "...a plan for obtaining a sample from a given population" (Collis & Hussey, 2009, p.62).

The students sampling consists of a probability sample drawn from the population of students who took classes in Computer Skills and End User Computing in the Department of Industrial and Systems Engineering. These students took the classes between first term of 2012 and third term of 2013. Four groups of classes make up this population with varying sizes.

The lecturer (faculty member) sample also consisted of a probability sample which was limited to a population of lecturers and academic support staff who participate in e-Learning workshops and seminars organised by the Fundani Centre for Higher Education Development. There are about 160 faculty members who make up this population

4.3.1 Sample size

The sample size is a list or record of population from which fall the sampling units are drawn (Watkins, 2008, p.54). In this study, the sample size is determined from two strata of the population – lecturers and students. In each stratum, a population is chosen based on

uncommon characteristics of interest to the research. The table that follows summarises the makeup of the sample.

Table 4.1: Sample design

Stratum	Total Population size	Uncommon characteristic
Lecturers	160 out of about 765 lectures are on the mailing list of the Fundani Centre for Higher Education Development.	Active participation in e-Learning workshops and seminars and passionate about teaching with technology.
Students	340 out of 20,000 are first level students of the department of Industrial Engineering at the University	Students who are taught a specific subject using an e-Learning program

4.4 DATA COLLECTION

There are different methods for collecting research data. This study employs mixed methodology for collection of data. The methods used include questionnaire survey, students test records and observation.

According to Easterby-Smith, Thorpe & Lowe (1996, cited in Watkins 2008), the use of multiple and in dependent measures is known as triangulation. (Collis & Hussy, 2009, p.85) define triangulation as the "use of multiple sources of data, different research methods or more than one researcher to investigate the same phenomenon in a study."

Four categories of triangulations were identified, of which one of them is methodological triangulation (Watkins, 2008, p.64). Methodological triangulation according to Easterby-Smith *et al* (1996, cited in Watkins 2008, p.65) refers to a research where both qualitative and quantitative research approaches are used to collected data; thereby culminating in diverse data collection techniques which can be juxtaposed.

Using a mixed mode is viewed as having the capacity to reduce bias in data sources, methods and investigators, and also allows the researcher to get a much clearer picture of the was the participants experience the phenomenon under investigation (Collis & Hussy, 2009, p.85).

The efficacy of a mixed method over single methods is expressed by Green & Caracelli, (1997, cited in Hesse-Biber & Leavy 2006, p.9) and reads as follows: "The combination of two different methods can create a synergic research project whereby one method enables

the other to be effective, and together both methods provides a fuller understanding of the research problem…"

Furthermore, Green & Caracelli, (1997, cited in Hesse-Biber, et al., 2006) express the view that mixed method design can also help to get a "subjugated knowledge" and give voice to those whose viewpoint may be left out of the research process with the goal of presenting a plurality of intersects, voices and perspective".

4.4.1 Data collection using questionnaire

The questionnaire is devised to get answers to the sub questions. The questions in the questionnaire were drawn based on careful evaluation of literature dealing with best practices on e-Learning approaches, teaching and learning best practices and theories on e-Learning.

Two questionnaire instruments were developed for this study with regards to the target populations – staff and students. The two instruments are described further below.

Each instrument was divided into two parts, Part A and Part B. Part A constitutes of demographic data which are basically background information collected for contextualisation purposes while Part B comprised of Likert scale items.

Responses to Questions in Part B of the questionnaire were all answered by means of a rating scale whereby respondents were asked to respond to statements. The rating scale is named after the creator Likert; who developed it to assess people's attitudes ((Leedy & Ormrod, 2001, p.197). According to (Leedy & Ormrod, 2001, p.197), a rating scale is more useful when a …"phenomenon of interest needs to be evaluated in continuum of say, 'inadequate' to 'excellent', 'never' to 'always', or 'strongly disapprove' to 'strongly approve'".

Emory & Cooper (1995, pp.180-181) assert that the Likert scale can be used in studies in which responses differ between people (respondent-centred) and studies in which responses differ between various stimuli (stimulus-centred). This forms the basis for its selection for this study since it is considered as "most appropriate to glean data in support of the research problem in question" (Emory & Cooper 1995, pp.180-181).

With respect to ensuring confidentiality of the responses, it was clearly stated in the questionnaire informing participating respondents that their responses would be held in the strictest confidence and their names were not required. The questionnaires were

administered online via an online survey software and questionnaire tool (https://www.inqwise.com). The URL of the page containing the questionnaire was emailed to participants.

Instrument 1: The Impact of e-Learning on teaching and learning quality questionnaire

This is the instrument developed for administering to the selected sample of lecturing staff. The questionnaire was divided into two parts A and B.

Part A of the questionnaire solicited the following information:

1. Respondents campus
2. Respondent's faculty
3. Respondents' Position at Faculty/Department
4. Years of teaching/lecturing experience.
5. Frequency of use Blackboard for teaching
6. Use of Blackboard beyond the distribution of class notes
7. Use of other web platforms for teaching
8. Respondents proficiency in ICT (Internet/Web) and Computer Skills

Part B was further divided into four sections; each section forming a measurement scale. Each scale required participants to respond to items on a ranking of 1 to 5, with 1 being 'strongly disagree' and 5 'strongly agree'; thereby indicating the extent to which they 'agree' or 'disagree' with each statement. The statements were designed to be easily understood, and presented in positive terms.

The sections and statements of the Part B of this instrument are categorised and outlined as follows:

Section A: Teaching methods and quality of learning scale

This scale aims to explore the extent to which the method of teaching or instruction can influence the quality of students learning. The statements are as follows:

9. A style of instruction/teaching that accommodates individual styles of learning improves students learning experience.
10. A teaching method that increasingly engages students enhances students' learning experience.
11. A teaching method that allows active and responsible participation of students in the learning process improves outcomes.
12. A system of continuous assessment and prompt feedback on assessment results improves how students learn.

13. Lecture activities that involve students working in teams to accomplish an assigned task foster their learning process.

14. Teaching methods that encourage and allow students to become independent learners improves their academic performance.

15. Assessments that require students to deeply understand the concept being taught, rather than memorize the content improves the way students learn.

16. A learning environment that involves the innovative use of technology in teaching and learning improves students' learning experience.

Section B: Enriched learning environment scale

The objective of this scale is to explore the relevance of an e-Learning program in enriching a learning environment for utmost results. The statements are as follows:

17. Students' learning experience is improved by a learning environment that incorporates different types of interactivity and direct feedback.

18. A learning environment that allows for active and flexible learning has the ability to improve students learning experience.

19. A learning environment that encourages continuous study and revision through a system of continuous [formative] assessment contributes to students ' success in the final test/exams.

20. A learning environment that takes into account the individual learning styles and needs of the students improves the way students learn.

21. A learning environment in which the instruction methods match students' needs increases their motivation to learn.

22. A learning environment that provides students with ample opportunities for interaction, communication, and cooperation with peers and instructors leads to authentic knowledge construction.

23. A learning environment that encourages students to development self-regulation skills improves the way they learn.

Section C: e-Learning effect on how Lecturers teach scale

The objective of this scale is to explore the extent to which the implementation of an e-leaning program in the curriculum will affect the way lecturers deliver instructions. The statements are as follows:

24. Lecturers understanding of the possibilities and potentials of an e-Learning program increase their motivation to be more effective in the delivery of instructions.

25. The implementation of a curriculum that includes e-Learning requires lecturers to improve on their instruction delivery skills.

26. The introduction of e-Learning in the curriculum increases the efficiency of lecturers in their role as learning facilitators.

27. The introduction of e-Learning in the curriculum brings about increased collaboration among lecturers and experts.

28. Introduction of e-Learning into the curriculum encourages research-based instruction techniques.

29. A teaching method that involves innovative use of an e-Learning platform provokes and engages lecturers' creativity.

Section D: Strategies for e-Learning scale.

The objective of this scale is to solicit lecturer's opinion on strategies that can be employed by which desired learning outcomes can be achieved through an e-Learning program at the UoT. The statements are as follows:

30. Gradual and systematic integration of e-Learning with traditional instruction methods boosts students' acceptance and confidence in use of e-Learning platforms.

31. An e-Learning environment that provides self-directed activities increases students' motivation to learn and improve learning outcome.

32. An instructional method that provides a greater variety of interactions and richer media (video, audio) and self-directed activities improves learning outcome.

33. The adaptation of best practices for teaching in an e-Learning environment results in achievement of desired learning outcomes.

34. The redesign of the curriculum to include the use of e-Learning as an instructional (teaching and learning) method can improve the quality of teaching and learning.

35. Well-designed e-Learning activities in which learners play active roles engages and motivates them to learn more effectively.

36. Identifying instructional problems and then designing, developing and implementing hybrid instructional solutions improves teaching and learning experiences.

37. An informed understanding of students' approaches to learning by lecturers leads to the design of highly engaging e-Learning environment.

Instrument 2: The effectiveness of SAM for teaching questionnaire

The purpose of this second instrument is to measure the students' level of satisfaction with and their attitude toward an e-Learning program referred to as Skills Assessment Manager (SAM). An overview of SAM is presented in paragraph 4.4.4. The instruments also had two parts, A and B.

The following questions were asked in Part A are:

1. Was computer studies part of your high school curriculum?
2. If yes, which of the following software packages did you work with or learn at high school? Select all possible options.
3. How will you rate your skills level before of this subject?
4. How will you rate your skills level on completion of the subject?
5. Select the range that best places you final mark for the assessment of each software package.
6. Please indicate the semester or year of study of the subject

Part B of this instrument has two Likert-type items and a Likert scale of fifteen statements. The Likert-type items measure students overall satisfaction with SAM, and SAM's overall usefulness to their learning of the subject. The levels of satisfaction and usefulness employed 1 to 4 for ranking.

The 15-statement Likert scale required participants to respond to positively worded statements on a ranking of 1 to 5, with 1 being 'strongly disagree and 5 'Strongly agree'; thereby indicating the extent to which they 'agree' or 'disagree' with each statement.

The Likert-type scale items are:

7. What was your overall level of satisfaction with SAM?
8. How valuable was SAM to your learning of Microsoft Office software packages?

The Likert scale statements are as follows:

9. SAM has helped me develop comfort in the use of the web and the internet.
10. SAM reduces test anxiety because students are better prepared through practice tests
11. Using SAM made learning Microsoft Office Word, Excel and PowerPoint enjoyable.
12. SAM helped me to achieve better understanding of the use of Microsoft Office Word, Excel and PowerPoint
13. I recommend continued use of SAM
14. I wish my other subjects were taught using a program like SAM
15. SAM helped me achieve a higher grade than I would have otherwise
16. SAM practice sessions helped me to prepare for exams
17. SAM helped me understand the subject matter
18. SAM was easy to use
19. SAM made the course more visual and interactive
20. The immediate result and feedback offered by SAM was very useful
21. Simulations (video trainings) of the software packages was useful
22. The flexibility offered by SAM was useful to my learning style

23. I would have performed better in Microsoft project if it was taught using SAM

4.4.2 Validating survey questions

Validation of survey questions ensures that the questions are certain to measure what it is supposed to measure. For an effective research, the scale must be a valid instrument. Jackson (2008) refers to *validity* as "whether the measuring instruments measures what it claims to measure". To put it in another way, validity is the ability of the instrument to provide appropriate, useful and meaningful feedback.

One way in which the researcher attempted to achieve valid measurement was to include explanatory notes based on theories underpinning each statement. With that, the participants have an idea of what the questions require. The web application used to administer the questionnaire had provisions for such inclusions.

Finally, a pilot test was run. Three faculty members and three students, where asked to complete the respect questionnaires in order to test the questionnaire's statements. They all reported that the questions were easy to understand, and straight to the point.

4.4.3 Secondary Data

A comparison study is needed to achieve one of the objectives of this study; which is *to determine if supplementing traditional method of instruction with an e-Learning will enhance student's learning and improve out outcome, and the level of students' satisfaction with an e-Learning program.*

The data include test results of four modules of a subject which aimed at equipping students with computer and internet skills. The subject is referred to as either Computer skills or End User Computer depending on the umbrella course under which it is offered, but the curricula and assessment are the same or similar.

The subject was divided into four modules. Three of the modules are taught using the blended leaning approach in which an e-Learning program known as Skills Assessment Manager (SAM) was used. There was not provision in SAM for the fourth module, as a result it was taught using the traditional method. An overview of SAM is provided in the next section. The majority of students were between 17 and 24 years of age in the full-time classes, and an age range between 19 and 45 years in a part-time class. Larger number of

the students had no previous contact with computer. And a minority studied basic computer skills at high school, and for many of them this was their first experience in using an e-Learning platform'. Most students had previously informally used the web to gather information, or prepare coursework in high school, prior to entering university.

On completion of all modules of this subject, the test result is collected for analysis. A statistical test is done to establish difference in outcome between each subject taught in the SAM and the fourth taught without SAM.

SAM was used for training, practice and assessment of Microsoft Office suit which included 3 of the 4 subject modules. Training for each module was assigned before an exam, giving students an opportunity to learn and practice all skills on which they will be tested. Students were motivated to take advantage of all three methods.

SAM practice Projects were scheduled to give students an opportunity to learn the SAM interface and testing procedures before it is time to test. This helped students to follow up with SAM Training for tasks they answer incorrectly on SAM Project. The students received immediate feedback.

Students were assessed to prove the skills they acquired. Scripts were submitted for grading on SAM. Student work was automatically graded and instant feedback was provided.

4.4.4 Skills Assessment Manager (SAM) overview

SAM is an educational system that helps measure the ability of a student to use Microsoft Office applications and improve Office skills using high powered simulations and live-in-the application case projects. SAM allows student to practice and apply their skills in an easy-to-use online environment working in their own pace or within a schedule set by the instructor. Students are able to achieve the highest level of proficiency with SAM.

SAM is designed to help bring students from the classroom into the real world. It allows students to train on and test computer skills in an active, hands-on environment. The system includes powerful interactive exams, training and projects on Microsoft applications. SAM simulates the Microsoft office application environment, allowing students to demonstrate their knowledge and think through the skills by performing real-world tasks.

The following are the main features of SAM and it is reported in verbatim as described on the instruction manual of the application (Cengage, 2010).

- **Training:** SAM offers three training methods for maximum retention. They can be repeated as many times as necessary, until students feel comfortable with a particular skill. Training helps students get proficient in their skills and to check their level of understanding before taking a quiz or test.
- **Observe:** Students learn how to perform tasks by watching and listening to brief instructional videos.
- **Practice:** Students learn tasks by performing them with the help of guided audio and on-screen instructions. The Observe and Practice modes have controls that allow students to pause, rewind, and replay the instructions as often as they would like.
- **Apply**: Students learn in a hands-on, do-it-yourself environment. For a Training task to be considered complete, students must click Task Complete after completing the Apply method correctly.
- **Assessment:** SAM Assessment (referred to as exams, tests or quizzes) give students the chance to prove their new-found skills and also see which topics they may need to study more for better results on future exams. Exams may cover computer concepts and/or one or more of the Microsoft Office 2010 applications. Questions can be objective-based (multiple choice, true/false, etc.), or task-based (students perform a task, such as bolding text, in a simulated Microsoft Office 2010 environment).
- **Projects:** With SAM Projects, students work directly within the Microsoft Office 2010 applications, following directions to complete a real-world business case project. Projects typically come from one end-of-chapter project as well as a second project covering similar skills in a different assignment. Capstone projects for each application assess student understanding of each application, using skills taught in Microsoft® Office 2010 textbooks. They are typically assigned after completing several chapters to ensure there is cumulative knowledge of an application. Using SAM Projects to assess students not only gives them a real-world problem to solve, but also provides instant grading and immediate, detailed feedback. Students are required to download a start file and an instruction file. Once they are finished working on their assignment, students upload the completed file back to SAM and it is graded in moments.
- **Reporting:** SAM's powerful reporting features provide you with instant information regarding student performance. A variety of reports are available, ranging from one that shows how each student in the class performed on a particular exam, to a frequency analysis report showing the number of students completing a task correctly or incorrectly. These reports then can be used to modify the lesson plans so that the instructor can spend more time teaching concepts students have difficulty learning.

4.5 CONCLUSION

This chapter gives a comprehensively description of design and methods used in this research with highlights critical aspects pertaining to “data collection design and methodology used in this study.

In the next chapter, collected data is analysed and interpreted for purposes of making conclusions.

CHAPTER 5: DATA DESCRIPTION, ANALYSIS AND INTEPRETATION

"The true method of knowledge is experiment." - William Blake

5.1 INTRODUCTION

The process and technique for collecting research data was discussed extensively in the previous chapter. This chapter focuses on the description, analysis and interpretation of data collected for this study. As indicated in the previous chapter, three sources of data are employed; two being primary data, and the other secondary data.

The primary data was gathered through two independent survey instruments; each targeting a population of faculty members and students respectively at the university. The secondary data is academic records of a particular subject undertaken by four class groups, and were obtained from an academic department of the university.

5.2 METHOD OF DATA ANALYSIS

Data analysis according to De Vos (2002, cited in Nguenang, 2011) is “the process of bringing order, structure and meaning to the mass of collected data”. Involved in the analysis of research data, is the breaking up of collected data into manageable themes, patterns, trends and relationships (Mouton, 2001, p.108).

As in most social research, the following are the major steps undertaken in the analysis of the data for this study:

1. Cleaning, organising and coding the collected data. This included identifying incomplete responses, eliminating those that would falter the analysis and creating a database structure for the statistic computer application.
2. Use descriptive statistics techniques to describe the basic features of the collected data
3. Apply bivariate analysis where necessary to identify trends and examine possible associations between one variable and another (Williams, 2003).
4. Apply inferential statistics to test the resulting assumptions made through hypothesis.

Microsoft Excel Data Analysis and IBM SPSS 21 are used as analysis tools.

5.2.1 Validation of survey results

Validation is the process by which the dependability (validity) of any data collected by a questionnaire is assessed. It is also a process of ensuring that the statistical software used

for analysis operates on clean, correct and useful data (Joarder et al., 2013). Validity is defined by Kazi & Khalid (2012) as “the degree to which an assessment measures what it is supposed to measure.” Though there are different types of data validations, only construct validation is considered in this section.

The extent to which the questionnaire measures what it is supposed to measure indicates the scope of the construct validation. Construct validation was addressed in the planning phases of the survey and when the questionnaire instrument was developed (refer Chapter 4). The questionnaire underwent a validation procedure to ensure that it measures accurately what it was intended to measure, irrespective of the responder. Valid questionnaire is intended to help collect credible data.

5.2.2 Data format

The data for the study are classified into nominal, ordinal and interval data types. The nominal data is data collected by the Part A of both measuring instruments. The ordinal data are the responses to the Likert-type items and Likert scale questions of both questionnaire instruments and the interval data are the assessment results of students.

The web application used in this survey exports the result in Microsoft Excel file format. The data had to be coded before being imported into SPSS. Each variable and category of response where coded. The coding was carefully planned and carried out in such a way that categories of variables are ranked in an ascending order; either from the least to highest values or from negative to positive. Table below gives an example.

Table 5.1: Coding and ranking of variable categories

Nominal data			**Likert scale (ordinal) data**		**Assigned code**
No	Novice	0 - 30	Somewhat Unsatisfied	Strongly Disagree	1
Yes	Basic	31 - 49	Somewhat Satisfied	Disagree	2
-	Intermediate	50 - 74	Very satisfied	Neutral	3
	Expert	75 - 89	Very Unsatisfied	Agree	4
	-	90 - 100	-	Strongly Agree	5

The appropriate ranking of data is essential for correct correlation result when testing relationships between and amongst variables.

The interval data (test results) were coded into respective class groups before importation to SPPS.

The variables of the measuring instruments names are coded for the purposes of better presentation of the results. It is therefore needful to refer to the sections that provide the full description of all variables during the review of the analysis. To this effect, detachable sheets describing the codes are included in the appendices (APPENDIX G).

5.2.3 Preliminary analysis

The reliability of the statements in both questionnaire instruments is measured using the Cronbach's Alpha test. A uni-variate descriptive analysis was performed on all the original variables, displaying frequencies, percentages, means, standard deviations, range, median, mode, etc. These descriptive statistics are discussed in respective sections for both instruments.

5.2.4 Inferential statistics

Inferential statistics is a statistical procedure that looks at whether there are any relationships or differences between variables that are genuine and not due to chance. Conclusions about a population based on data collected from a sample can be drawn through procedures provided by inferential statistics (Jackson, 2008, p.320). It falls within the ambit of bivariate and multivariate analysis. This study employs only bivariate analysis techniques to make inferences.

Inferential statistics used in the analysis of data are:

- **Cronbach Alpha test:** The test is done to obtain a Cronbach‟s Alpha coefficient. Cronbach‟s Alpha coefficient is an index of reliability associated with the variation accounted for by the true score of the "underlying construct. Cooper & Schindle (2014, p.249) define a construct "an image or idea specifically invented for a given research and/or theory-building purpose". According to Eiland (2008, p.40), Cronbach's Alpha measures how well a set of items (or variables) measures a single uni-dimensional latent construct. When data has a multidimensional structure, Cronbach‟s Alpha will usually be low (Eiland, 2008, p.40).

- **The Chi-Square goodness-of-fit test:** According to IBM (2013) this test procedure tabulates a variable into categories and computes a chi-square statistic (X^2). This goodness-of-fit test compares the observed and expected frequencies in each category to test that all categories contain the same proportion of values or test that each category contains a user-specified proportion of values.

- Fisher's Exact test: According to IBM (2013) the Fisher's Exact Test provides an additional method for calculating significance levels for the statistics. It provides a means for obtaining accurate results when the data fail to meet any of the underlying assumptions necessary for reliable results using the standard asymptotic method. The null hypothesis for the test is that there is no association between the variables. If the exact p-value is less than the level of significance, the null hypothesis would be rejected. The Fisher's Exact test was employed in thus study due to the large categorisation of the variables, which resulted in violation of many of the underlying assumptions necessary for reliable results using the standard asymptotic method such as chi squared test for independence.

- **Spearman's rho rank-order test:** This is a correlation test conducted in order to study the extent of relationships between variables. A correlation test determines the extent to which differences in one characteristic or variable are related to differences in one or more other characteristics or variables (Leedy and Ormrod, 2001, p.193). Strengths of the relationships vary in magnitude as there maybe be no relationship between variables, or the relationship may be weak (Jackson, 2008, p.109). This Spearman's rho rank-order test results in a statistics (Spearman's rho rank-order coefficient) which describes the direction and extent of relationship, correlation or agreement between pairs of actual or imposed ranks (Girden & Kabacoff, 2010, p.387). The coefficient is reported on a scale of -1.00 to +1.00. The Spearman's rho rank-order test is chosen for this study because of the categorised data i.e. the variables are measured on ordinal or ranking scale (see Section 5.2.2 and Table 5.1).

- **Independent-Samples *t* Test**: The independent samples ***t*** test is a parametric statistical test that compares the means of two different samples of participants. The test procedure compares means for two groups of cases. According to Jackson (2008), this test indicates either whether the two samples performed are so similarly that a conclusion can be drawn that they are likely from the same population, or whether they performed so differently that it can be concluded they represent two different populations. The study employs this test to statistically analyse students' tests results to determine whether the observed difference in means of subject modules taught using different approaches are statistically significant.

5.2.5 Assistance to researcher

The conclusions made by the researcher were validated only by a statistical report. Help was not provided to interpret the outcome of the data.

5.2.6 Sample

As discussed Chapter 4, there are two target populations for this study. The first target population is faculty members who make up a list of participants at the UoT's e-Learning workshops, seminars and conferences. The second target population is first year and semester one (S1) students of the Industrial Engineering Department of the UoT. A sample was drawn from these target populations and the samples realisation was randomly selected.

The sample size that was eventually realised was 44 based on the responses of faculty members, and 119 from students' population.

5.3 ANALYSIS OF IMPACT OF E-LEARNING ON TEACHING AND LEARNING QUALITY QUESTIONNAIRE DATA

In total, 47 respondents participated in the survey, but only 40 respondents (85%) submitted a completed response. Furthermore, 4 respondents (9%) who did not complete the entire questionnaire, but completed at least one scale in the questionnaire instrument were retained for the statistical analysis based on the fact that the analysis deals with individual scales and not with the entire instrument. Therefore the statistical analysis is based on sample size of 44.

Descriptive statistics is given for each variable and only the respondents who completed the at least one scale in the questionnaire, is used in the inferential statistics.

5.3.1 Reliability testing

The Likert scale section of the *impact of e-Learning on teaching and learning quality* survey questionnaire comprised of 37 statements. Reliability tests (Cronbach's Alpha Coefficient) are done on sets of statements to measure internal consistency i.e. the extent to which items measure same characteristic consistently (Girden & Kabacoff, 2010). These statements where further divided into five sections by summing up several statements to form a total score for a construct (Hair, Babin, Money & Samouel, 2003, pp.171-173). A total of four (4) constructs were formed and the average Cronbach's Alpha Coefficients all of the constructs was more than 0.853. The summary results of the Cronbach Alpha coefficient for each construct are shown in Table 5.2.

All construct had Alpha values more than 0.7 (the acceptable level according to Nunnally, 1978**:** 245), indicating a good association between statements in the construct. The values obtained for the Cronbach's Alpha coefficient prove that the questionnaire is reliable and

consistent for all the items in in each scale. This reflects the extent to which respondents agree to the statements in each scale.

The detailed report of each scale is contained within the ambit of APPENDIX A due to their voluminous nature, and for ease of reference. This detailed report shows the correlation between the respective items and the total sum score (without the respective item) for each scale and the internal consistency of the scale (coefficient alpha) if the respective item would be deleted.

Table 5.2: Impact of e-Learning survey questionnaire Cronbach's Alpha Coefficients

Statements	# of Items	Construct	Cronbach's Alpha Coefficient	Strength of Association
BQ09 – BQ16	8	Teaching methods and quality of learning	0.776	Good
BQ17 – BQ23	7	Enriched learning environment	0.863	Very Good
BQ24 – BQ29	6	ELearning effect on how Lecturers teach	0.873	Very Good
BQ30 – BQ37	8	Strategies for e-Learning	0.901	Excellent
Average Cronbach's Alpha coefficient			**0.853**	**Very Good**

5.3.2 Descriptive statistics

This section provides statistical summaries of data with the aim of providing an overall coherent and straight forward picture of the data (Struwig & Stead, 2001, p.158). Basic features of the data in the study are described in order to provide simple summaries about the sample and the measures using charts and tables.

5.3.2.1 Frequency distribution

Table 5.21 (APPENDIX B) shows the descriptive statistics for all the categorical demographic variables as well as the variables that make up the Likert scale with the frequencies in each category and the percentage out of total number of questionnaires. It is of great importance to note that the descriptive statistics are based on the total sample. In some cases responses were not provided for some statements. These statements were left blank in the questionnaire.

5.3.2.2 Central tendency and dispersion of data

The following tables show the descriptive statistics for central tendency and dispersion of Likert scale data of the *Impact of e-Learning* questionnaire. The central tendency is

described in terms of the *median* while the dispersion of data is described using the *interquartile range*. This choice of *median* and *interquartile range* is based on the fact that the data is classified as ordinal data (Watkins, 2008, p.166).

In the tables the following are the legends.

N= sample size,
Q_1 = Lower Quartile
Q_2 = Median
Q_3 = Upper Quartile
IQR = Interquartile Range (Q_3 - Q_1)

Kurt = Kurtosis
Skew = Skewness

In Table 5:3 below: the following could be extracted:

1. A minimum of 38 respondents answered all questions in the questionnaires.
2. The Mode value for 81% of the variables is 4, while the value of balance 19% is 5. This strongly suggests that for all variables, more respondents tended towards agreeing to strongly agreeing with the statements
3. The *Range*, *Minimum* and *Maximum* values indicates the following:
    a. for 32% of the variables (count = 12), responses to the statements range from *Strongly Disagree* and *Strongly Agree* (both extremes)
    b. For 41% of the variables (count = 15), responses range from *Disagree* to *Strongly Agree*.
    c. For 24% of the variables (count = 9), responses range from *Undecided* to *Strongly Agree*
    d. Of all the variables 3% (count = 1), had responses ranging from *Agree* to *Strongly Agree*
    e. In all of the variables, there was at least one respondent who strongly agreed to all of the statements.
4. The *First Quartile* (Q_1) value of 19% of the variables (count = 7) is 3 and suggests that less than 75%, but more than 50% (between 50% and 75%) of the responses to the statements tend towards *agree* to *strongly agree*. 81% of the variables (count = 30) on the other hand have a Q_1 of 4; clearly indicating that at least 75% of the responses agree to strongly agree to the statements.
5. The *Median* (or the *Second Quartile,* Q_2) value is 4 for 86% of the variables (count = 32); indicating that at least 50% of the responses to the statements of each of these variables tend to *agree* and *strongly agree*. The Median value for the balance 14% of the variable is 5. This indicates that least 50% of the responses to the statements each of these variables tend to *strongly agree.*

6. The *Third Quartile* (Q_3) value is 5 for 89% of the variables (count = 33); indicating that a minimum of 25% of the responses *strongly agree* to the statements of these variables. The Q_3 value of the balance 11% of the variables indicates the extent of agreement of between 25% and 50% of respondents.

Table 5.3: Measure of central tendency and dispersion of data

Var.	N	Mode	Range	Min	Max	Percentiles				Mean	Skew	Kurt
						Q1	Median	Q3	IQR			
BQ09	44	4	2	3	5	4	4	5	1	4.32	-0.048	-0.590
BQ10	44	5	1	4	5	4	5	5	1	4.57	-0.285	-2.012
BQ11	44	5	2	3	5	4	5	5	1	4.61	-0.949	-0.172
BQ12	44	4	3	2	5	4	4	5	1	4.32	-1.373	3.371
BQ13	44	4	3	2	5	4	4	5	1	3.95	-0.744	0.120
BQ14	44	5	3	2	5	4	5	5	1	4.36	-1.286	1.144
BQ15	44	5	4	1	5	4	5	5	1	4.52	-2.556	9.609
BQ16	44	5	4	1	5	4	4	5	1	4.07	-1.171	0.856
BQ17	42	4	2	3	5	4	4	5	1	4.43	-0.172	-1.053
BQ18	42	4	3	2	5	4	4	5	1	4.29	-1.217	1.868
BQ19	42	5	3	2	5	4	4	5	1	4.33	-1.312	1.928
BQ20	42	4	3	2	5	4	4	5	1	4.36	-1.072	2.515
BQ21	42	4	3	2	5	4	4	5	1	4.36	-1.078	1.839
BQ22	41	4	3	2	5	4	4	5	1	4.15	-1.054	0.971
BQ23	41	4	2	3	5	4	4	5	1	4.27	-0.280	-0.575
BQ24	40	4	3	2	5	4	4	5	1	4.08	-0.778	0.649
BQ25	40	4	3	2	5	4	4	5	1	4.18	-0.942	0.818
BQ26	40	4	4	1	5	4	4	5	1	4.03	-1.104	1.301
BQ27	40	4	4	1	5	3	4	4	1	3.68	-0.921	1.051
BQ28	40	4	4	1	5	3	4	4	1	3.53	-0.618	0.391
BQ29	40	4	4	1	5	4	4	5	1	4.03	-1.196	1.761
BQ30	40	4	4	1	5	4	4	5	1	4.03	-1.314	3.041
BQ31	40	4	2	3	5	4	4	5	1	4.08	-0.100	-0.827
BQ32	40	4	3	2	5	4	4	5	1	4.15	-1.057	0.901
BQ33	40	4	3	2	5	3	4	5	2	3.95	-0.438	-0.346
BQ34	40	4	4	1	5	3	4	4	1	3.80	-0.902	0.599
BQ35	40	4	2	3	5	4	4	5	1	4.28	0.046	-0.384
BQ36	40	4	2	3	5	4	4	5	1	4.20	-0.115	-0.339
BQ37	40	4	4	1	5	3.25	4	4.8	1.5	3.93	-1.003	1.853
BQ38	39	4	2	3	5	4	4	5	1	4.18	0.073	0.093
BQ39	40	4	4	1	5	4	4	5	1	4.03	-1.104	1.301
BQ40	38	4	3	2	5	3	4	5	2	4.00	-0.469	-0.648
BQ41	38	4	2	3	5	4	4	5	1	4.29	-0.240	-0.521
BQ42	39	4	3	2	5	4	4	5	1	4.26	-0.880	1.233
BQ43	38	4	4	1	5	3.75	4	5	1.25	3.87	-0.983	0.342
BQ44	40	5	4	1	5	4	5	5	1	4.40	-1.980	5.615
BQ45	39	4	3	2	5	4	4	5	1	4.26	-1.185	1.756

7. The Inter-Quartile Range (IQR) values of 90% of the variables (count = 33) indicate that the range of the "middle half" of the responses to the statements of these variables is 1.
8. The shape of the data distribution for each variable is defined by the values of Skewness and Kurtosis. The shape is negatively (or left) skewed for all variables except variable BQ35 and BQ38, thus indicating that most values are concentrated on the right of the mean, with more data points on the left. The degree of Skewness varies between *highly* skewed (46% of variables) and *moderately* skewed (54% of variables).

5.3.3 Uni-variate graphs for impact of e-Learning on teaching and learning quality data set

5.3.3.1 Demographic data

This section only provides graphical representation of demographic data (section A of the questionnaire). The graphs are not based on the total sample that participated in the survey, but on the population of sample that completed at least one Likert scale.

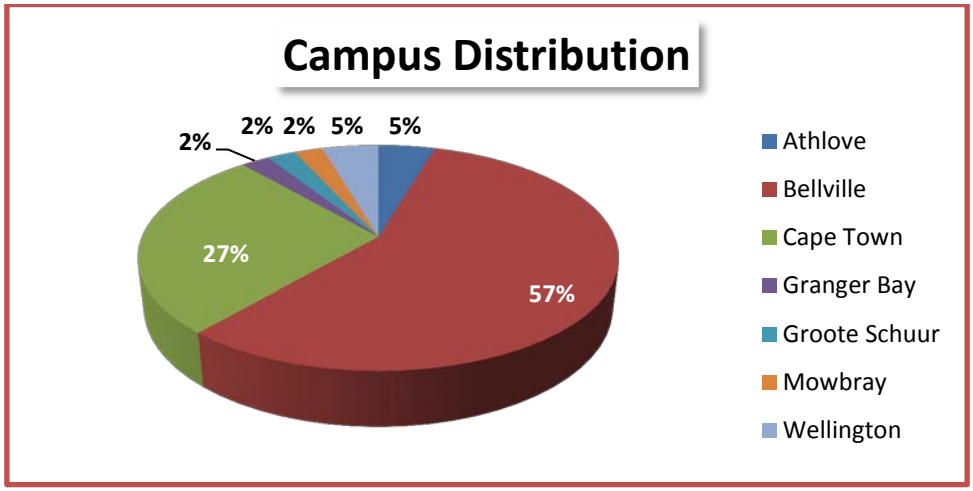

Figure 5.1: Pie Chart showing respondents' distribution by campus

Figure 5.1 shows that majority of the respondents (57%) are from Bellville campus of the university, while the next larger group is from Cape Town campus (27%). The other campuses contribute just a fraction of between 2% and 5 %.

According to the data on respondent's participation by faculty (Figure 5.2), the faculty of Engineering had the largest contribution of 40%. Business faculty comes next with 21%. The non- academic departments with contributed 17% or respondents constituted of participants from the Library, Fundani and the Disable Unit of which majority of them are involved in lecturing.

Figure 5:3 shows that 82% of the respondents are involved in teaching at the university.

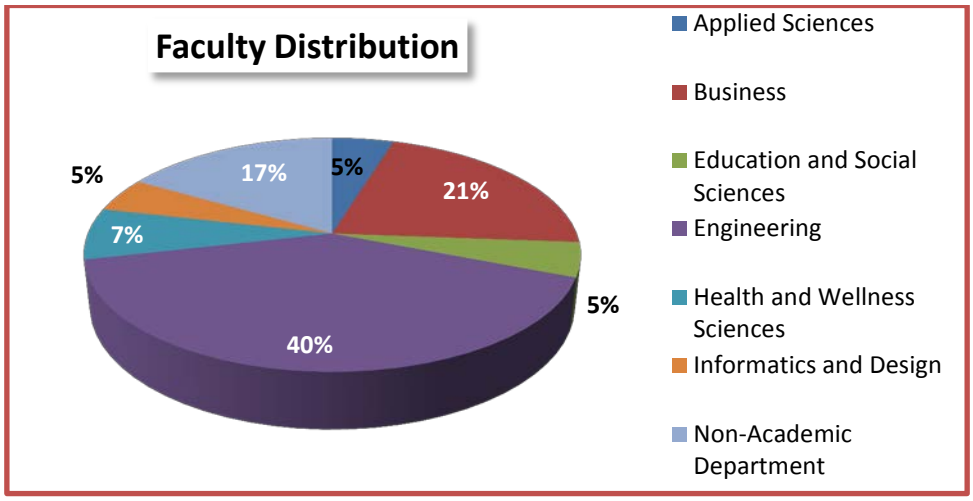

Figure 5.2: Pie chart showing the years of teaching experiences of respondents

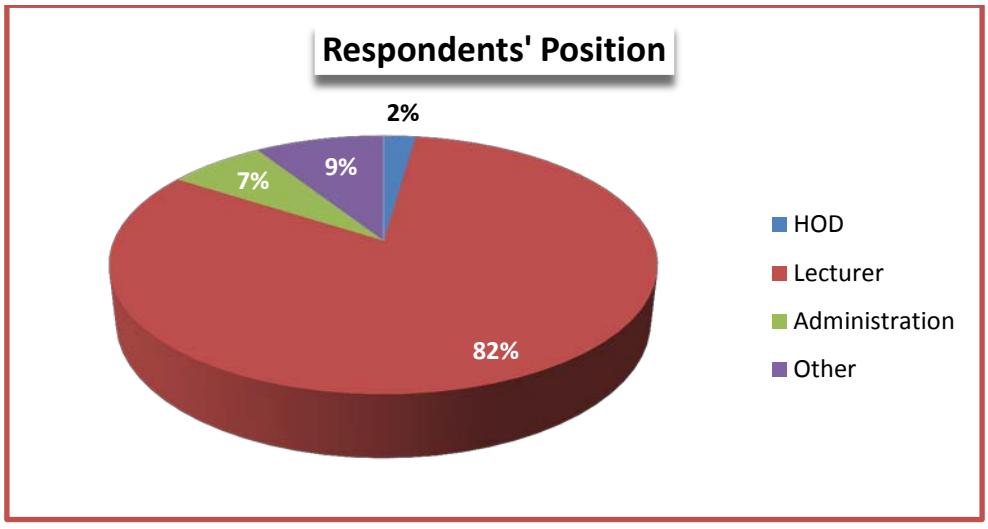

Figure 5.3: Pie chart showing respondents' functions/responsibilities

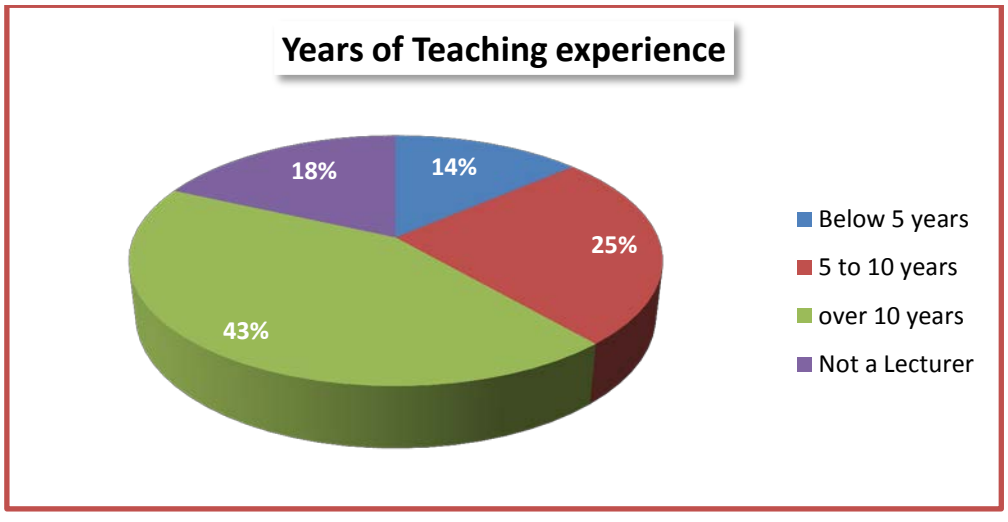

Figure 5.4: Pie Chart showing years of experience of academic staff

Figure 5.4 shows that greater number of respondents (43%) has been teaching for more than 10 years. 25% have 5 to 10 years teaching experience, 14% have below 5 years' experience, and 18% are not involved in teaching.

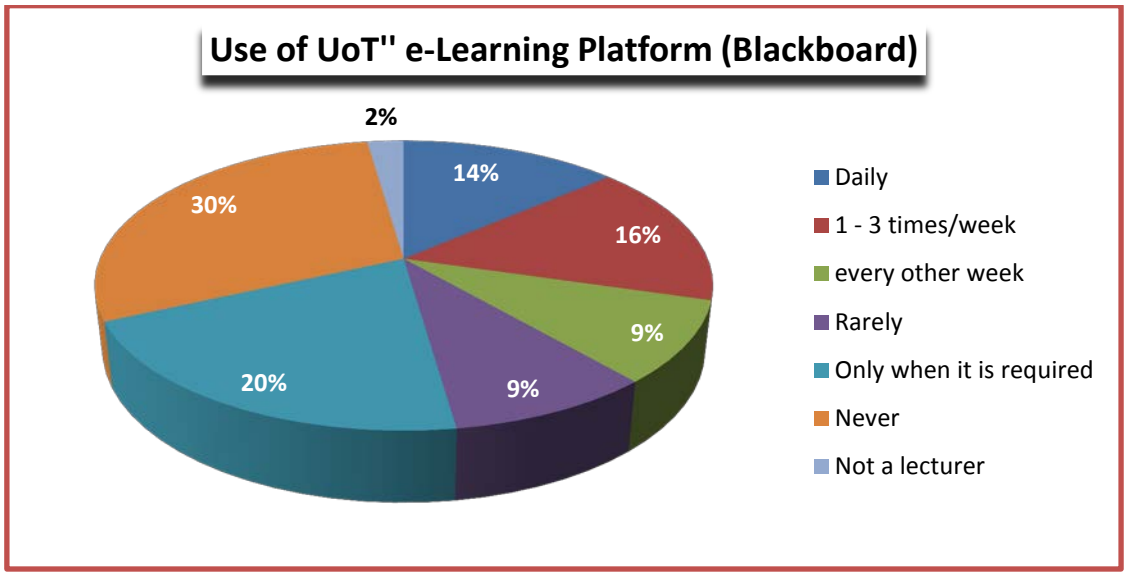

Figure 5.5: Pie Chart showing how academic staff engages with Blackboard

The figure (Figure 5.5) above shows how the institution's e-Learning platform is being used by respondents. It reveals that 30% of respondents do not use blackboard for any activity.

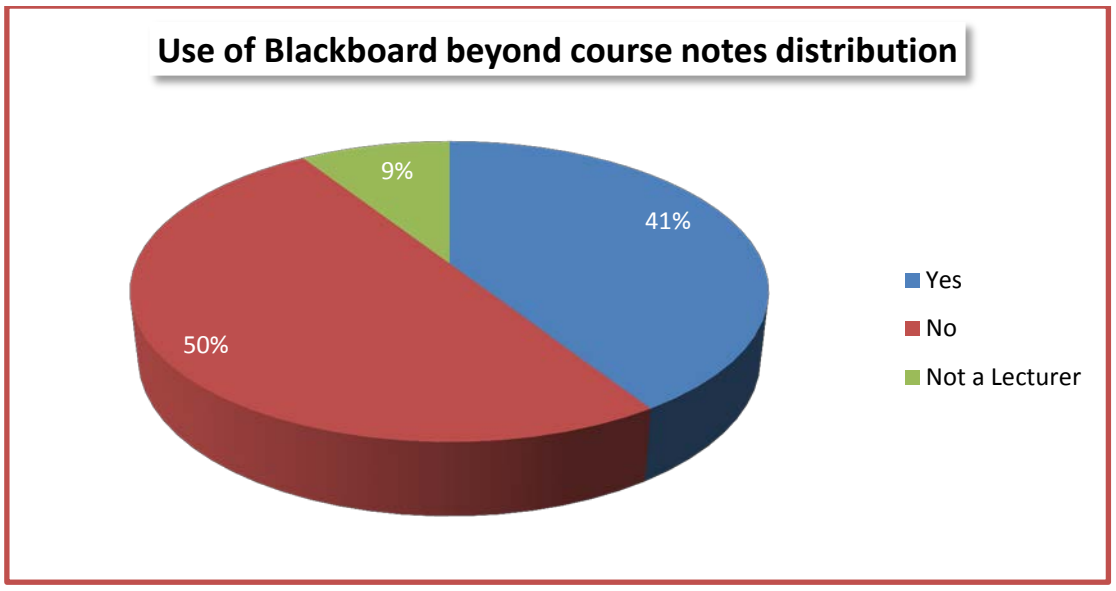

Figure 5.6: Pie Chart showing the use of Blackboard beyond course notes distribution

As shown Figure 5.6 above, 50% of respondents do engage Blackboard beyond course notes distribution class activity. From cross tabulation it is seen that only 45 % of academic

staff engage Blackboard beyond course note distribution. This implies that pedagogy is not involved in the use of Blackboard by 55% of the lecturers.

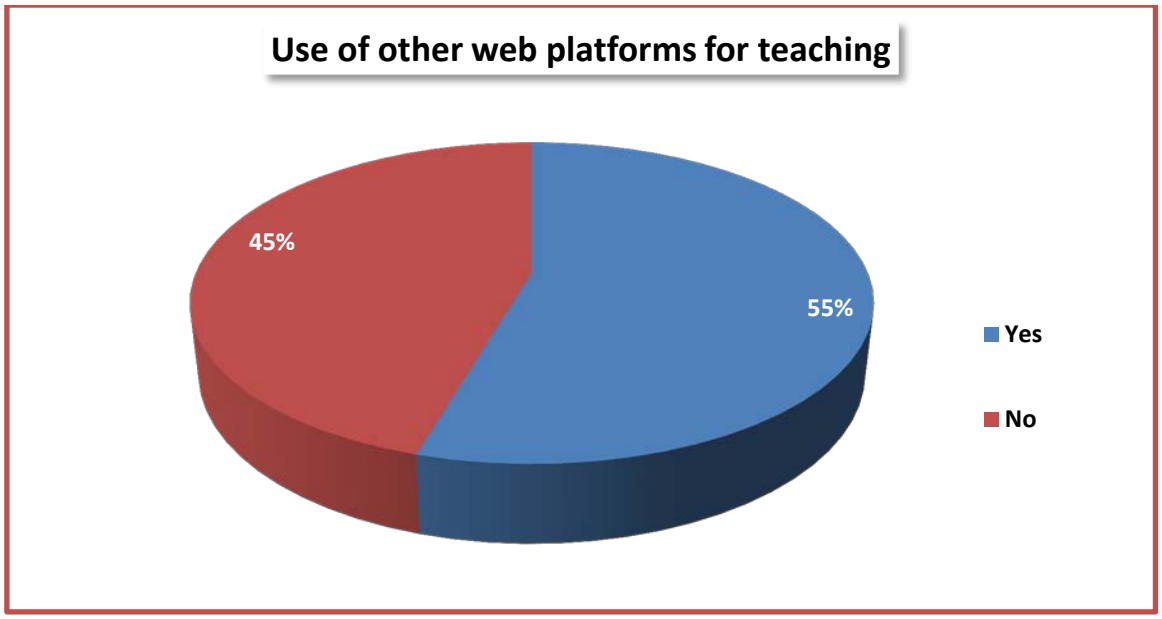

Figure 5.7: Pie Chart showing the use of other web platforms for teaching

As shown Figure 5.7 above, 55% of respondents do engage in the use of other platforms such as Facebook and Google docs for e-Learning activities.

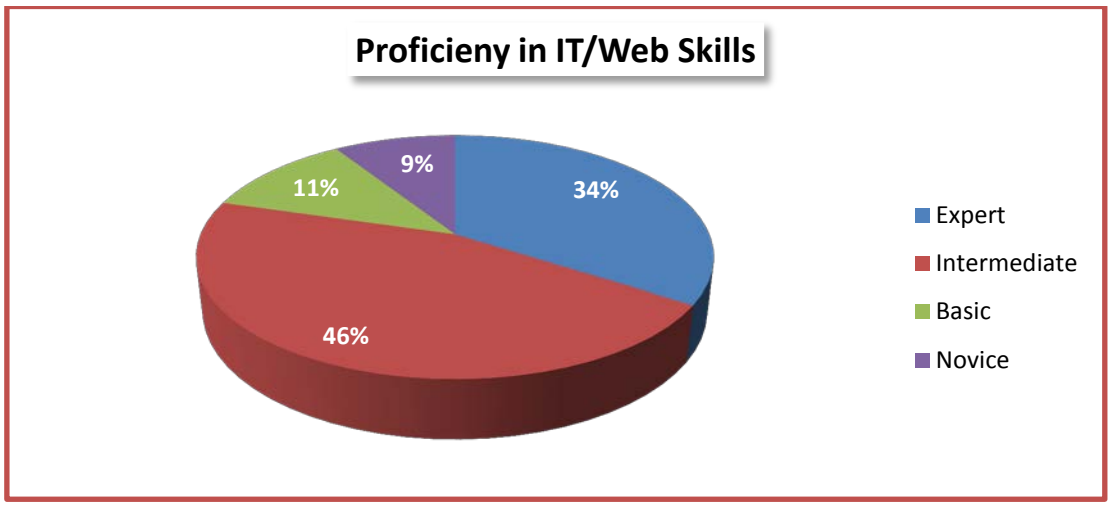

Figure 5.8: Pie Chart showing faculty members' proficiency in ICT/Computer skills.

The above figure shows that only 9% of respondents are novice in the use of ICT and the web. Greater percentage (46%) is in the intermediate level of skills.

5.3.3.2 Graphical representation of Likert scales data

This section uses stacked bar graphs to show the full scale of responses to the questionnaire; presenting the response to each category of all variables in percentages. The stacked bar is used to compare the percentage each category contributes to the total response to a statement. The responses are grouped to create scales of measurement.

Kindly note that the researcher does not deem it necessary to give a detailed description of response to each variable on the chart since the charts presentations are clear, and the pictorial nature makes it easy to read off. But description and analysis of cross-tabulation data between related nominal and ordinal variables will be used to provide insight on details not obvious in these charts.

Table 4 APPENDIX G (Page 176) provides a detachable description of the code for each variable.

A. Teaching methods and quality of learning (BQ09 to BQ16)

Figure 5.9 shows the response to statements that measure respondents view on the effect of teaching methods on the quality of students' learning. The chart clearly shows that most respondents *agree* to *strongly agree* to all the statements across all variables.

There was a unanimous agreement by all respondents to variable BQ10 which states that *a teaching method that increasingly engages students enhances students' learning experience*.

Variables BQ13 and BQ16 ranked the lowest in agreement with only 77% and 8% respectively. BQ 13 measures the fostering of *the* learning process through lecture activities that involve students working in teams to accomplish assigned tasks. The reason for the uncertainty and disagreement for variable BQ 13 can be attributed to poor management of group activities, whereby group activities are left for high achievers within the groups to complete. This trend robs the non-participators from learning during the process

Variable BQ16 highlights the role technology plays in students' learning. The uncertainty and disagreement may be attributed to the fact that some lecturers have a very superficial grasp or vague awareness of the e-Learning potential, or there is a greater focus on the challenges presented by use of technology in teaching.

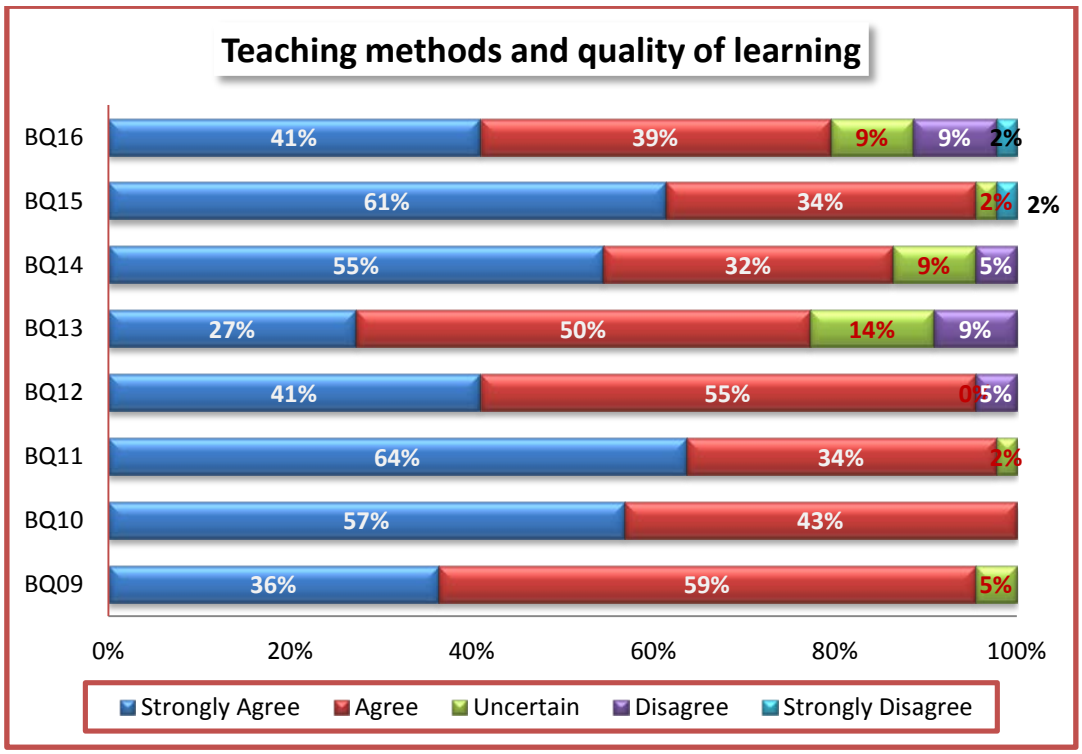

Figure 5.9: Responses to the Teaching methods and quality of learning scale variables

B. .Enriched learning environment scale (BQ17 to BQ23)

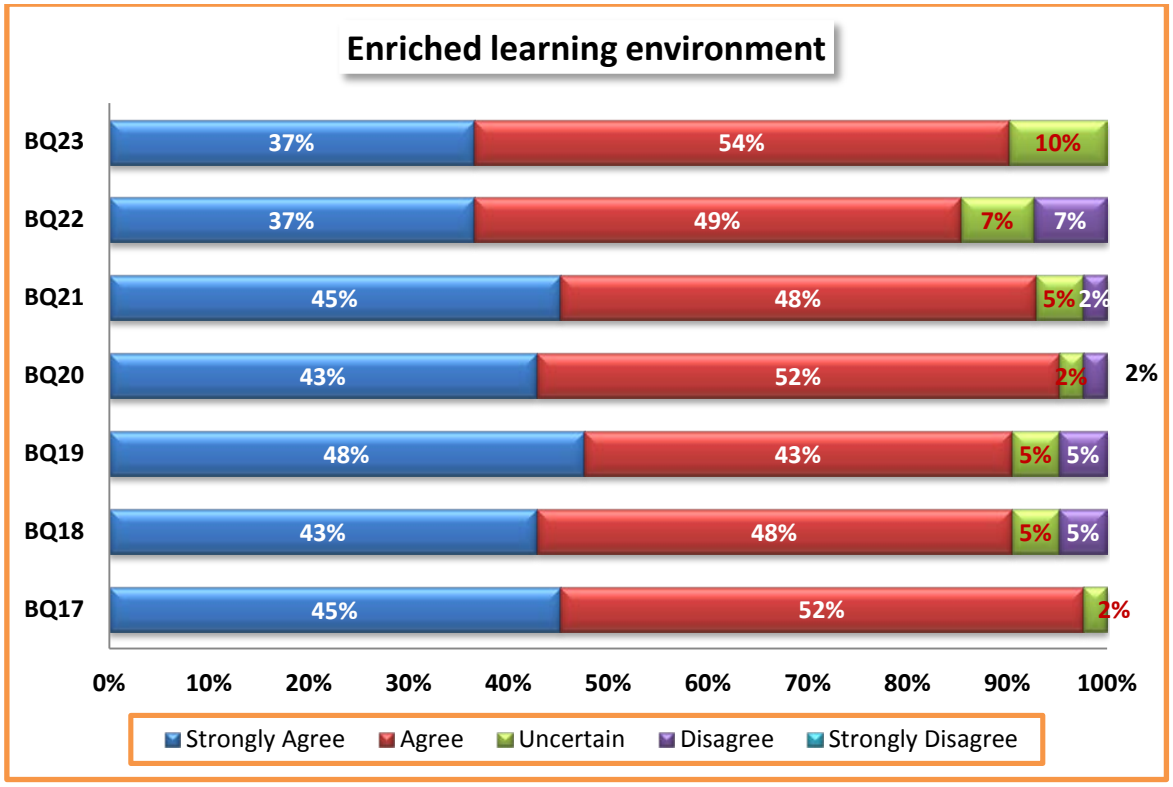

Figure 5.10: Responses to the enriched learning environment measurement variables

The stacked bar in Figure 5:10 shows the classification of responses to the section of the questionnaire that lays emphasis on the very important attributes of an e-Learning program that enriches a learning environment.

The graph clearly shows that larger number of respondents tended towards *agree* to *strongly agree*; with greater proportion on the extent of *agree*. Variable BQ22 which states that a *learning environment that provides students with ample opportunities for interaction, communication, and cooperation with peers and instructors leads to authentic knowledge construction* is observed to be the least with 85%. It is also observed that no one *strongly disagree* with any of the statements for all variables. In addition, there was no level of disagreement observed in variables which states that *students' learning experience is improved by a learning environment that incorporates different types of interactivity and direct feedback* (BQ17) and BQ22. The percentage of respondents who were *uncertain* is either equal to, or slightly greater than those who were in *disagreement* in each respective variable.

C. E-Learning effect on how Lecturers teach scale (BQ24 to BQ29)

The stack bar chart in Figure 5:11 below displays responses from the scale that solicited opinion on how the implementation of an e-Learning program would affect or influence the way lecturers deliver instructions.

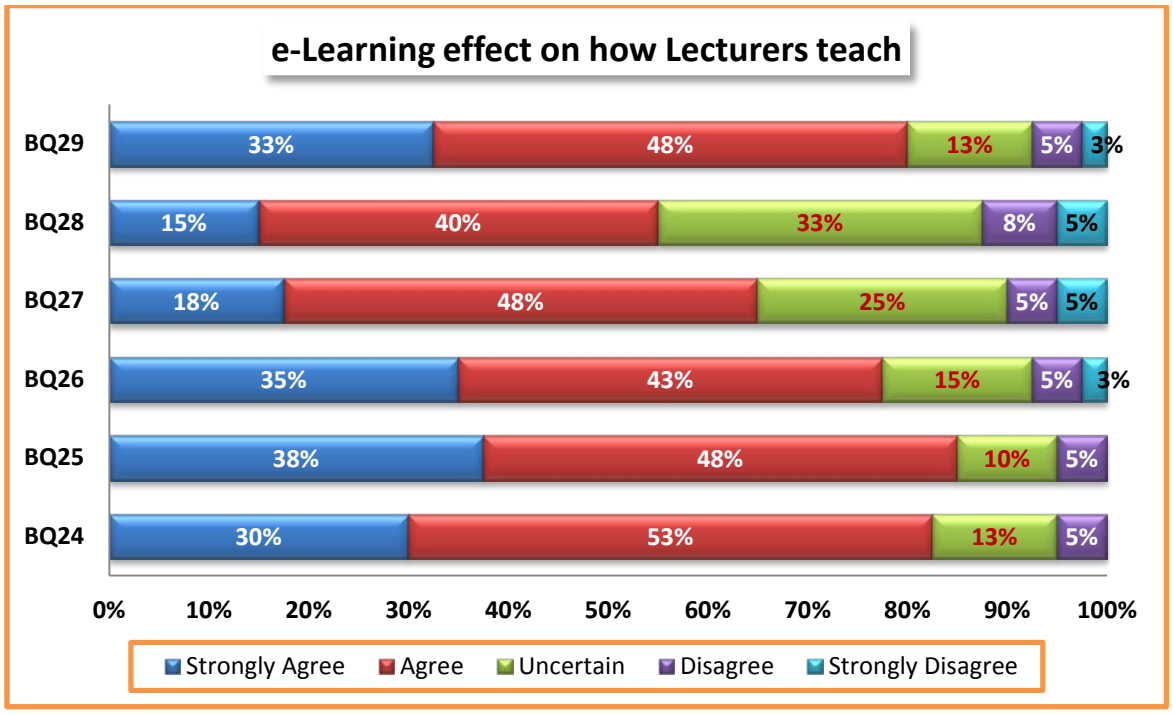

Figure 5.11: The extent to which respondents agree to statements measuring e-Learning effect on how Lecturers teach

The chart shows that greater percentage of respondents tends towards *agree* to *strongly agree* with all the statements; however the frequency of respondents who *agree* is more for all variables. Variables BQ27 and BQ28 are observed to have the highest level of *uncertainty* and *disagreement*. It shows that 35% are *uncertain* or in *disagreement* that the introduction of e-Learning into the curriculum would bring about increased collaboration among lecturers and experts. Collaboration provides an avenue to share success stories and exchange ideas. In addition, 46% do not support the notion that the introduction of e-Learning into the curriculum will encourage research-based instruction techniques.

D. Strategies for e-Learning scale (BQ30 to 37)

Figure 5.12 shows the frequency of distribution of the scale that measures respondent's opinion on strategies that would bring about achieving desired outcomes through an e-Learning program.

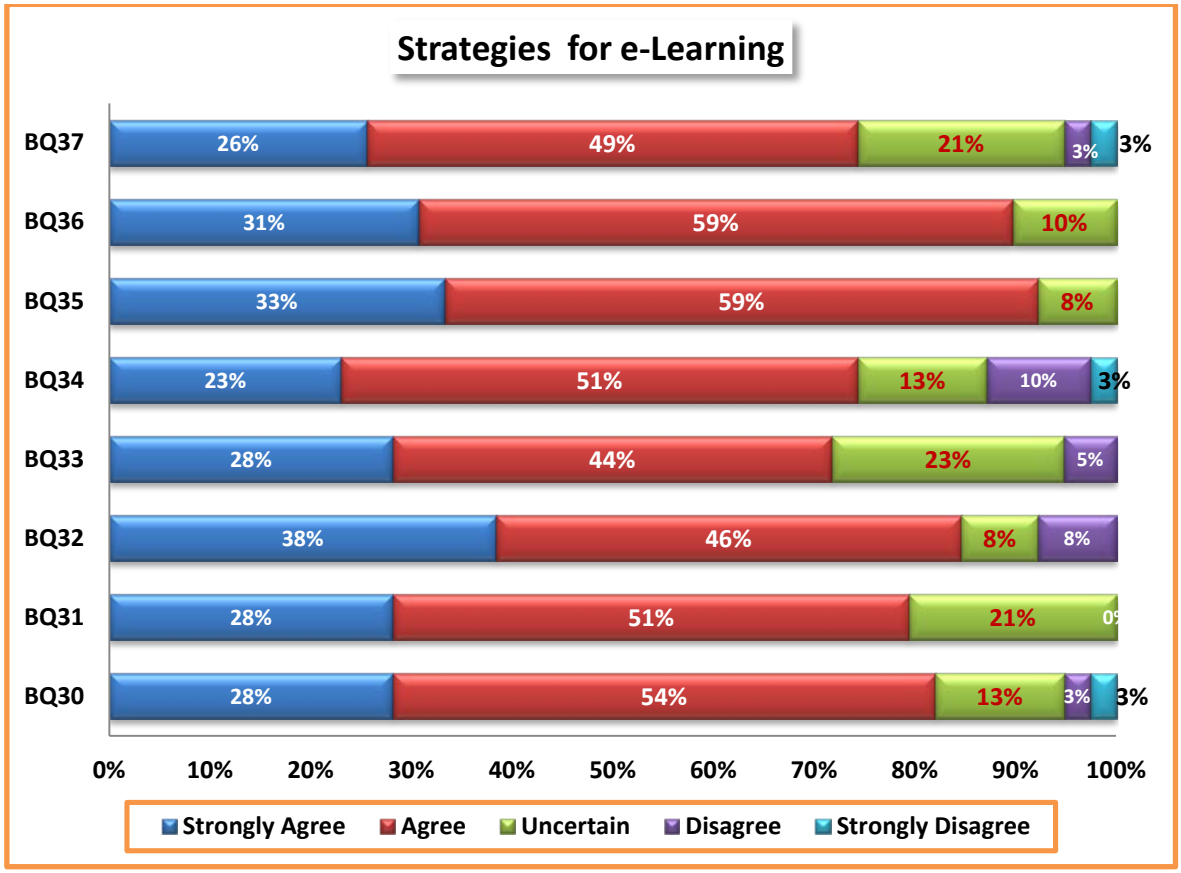

Figure 5.12: Extent to which respondents agree to statements measuring the strategies for e-Learning

In all statements, the extent to which respondents *agree* is far greater than the extent to which they *disagree* or are *uncertain*. The highest extent of agreement is 92% (BQ35) which implies that most respondents believe that well-designed e-Learning activities in which

learners play active roles will engage and motivate them to learn more effectively. It is worthy to note that no respondent is in *disagreement* with the statement; though 8% are *uncertain*. The lowest extent of agreement (72%) is with regards to the statement (BQ33) that the adaptation of best practices for teaching in an e-Learning environment will result in achievement of desired learning outcomes.

E. Summary of responses per scale (BQ09 to 37)

The stacked bar chart below (figure 514) displays the summary of response for each scale of measurement. It can be seen that in general, there was more positive response in each scale. The extent to which respondents *disagree* to *strongly disagree* in all scale is very low with a high of 8% and a low of 3.1%.

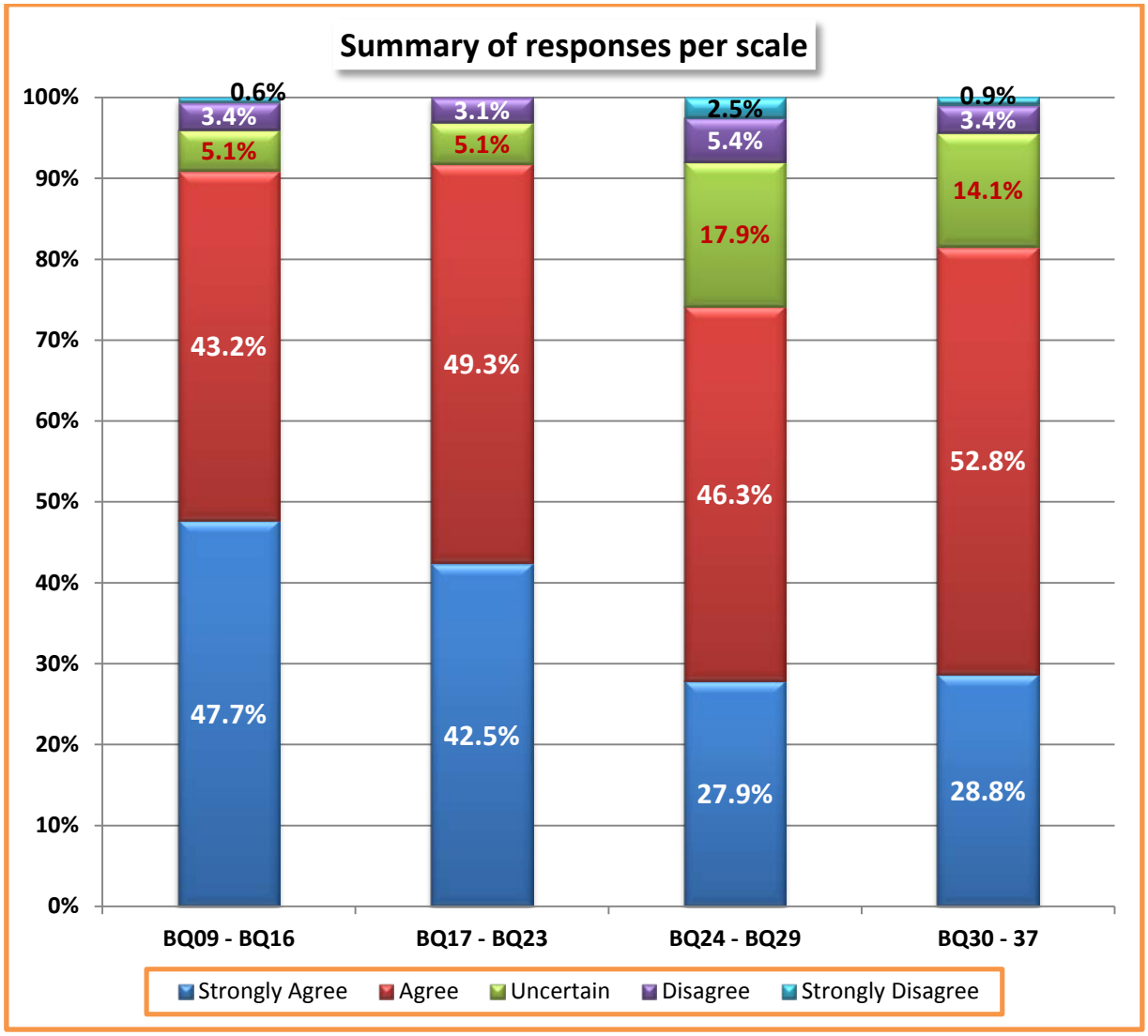

Figure 5.13: Summary of responses per scale

5.3.4 Chi-square test for goodness of fit

A chi-square test for goodness of fit was conducted for statistical evidence as a proof of significant difference in the frequency of extents of *agreement* and *disagreement* to all statements of each variable of each scale. The results (Table 5.4) give a *p*-value of between 0.000 (p<0.001) and 0.05 ((p=<0.05) for all variables except variable BQ10 (where p = 0.451) indicating a significant difference in extent of agreements and disagreements. *Agree* and *strongly agree* are the only categories in variable BQ10. The *p* value therefore indicates that there is no significant difference between the two extents of agreement.

Table 5.4: Chi-square test for goodness of fit

Variables	Chi-Square	*P* (Exact)	Prevailing Extent
BQ09- A style of instruction/teaching that accommodates individual styles of learning improves students learning experience.	19.818	0.000	*Agree*
BQ10- A teaching method that increasingly engages students enhances students' learning experience.	0.818	0.451	*Agree* and *Strongly Agree*
BQ11- A teaching method that allows active and responsible participation of students in the learning process improves outcomes.	24.864	0.000	*Agree*
BQ12- A system of continuous assessment and prompt feedback on assessment results improves how students learn.	17.636	0.000	Largely *Agree*
BQ13- Lecture activities that involve students working in teams to accomplish an assigned task foster their learning process.	17.818	0.000	*Agree*
A BQ14- Teaching methods that encourage and allow students to become independent learners improves their academic performance.	28	0.000	*Strongly Agree*
BQ15- Assessments that require students to deeply understand the concept being taught, rather than memorize the content improves the way students learn.	42.909	0.000	*Strongly Agree*
BQ16- A learning environment that involves the innovative use of technology in teaching and learning improves students' learning experience.	29.409	0.000	*Strongly Agree*
BQ17- Students' learning experience is improved by a learning environment that incorporates different types of interactivity and direct feedback.	18.429	0.000	*Agree*
BQ18- A learning environment that allows for active and flexible learning has the ability to improve students learning experience.	27.714	0.000	*Agree*
BQ19- A learning environment that encourages continuous study and revision through a system of continuous [formative] assessment contributes to students ' success in the final test/exams.	27.714	0.000	*Strongly Agree*
BQ20- A learning environment that takes into account the individual learning styles and needs of the students improves the way students learn.	35.143	0.000	*Agree*

BQ21- A learning environment in which the instruction methods match students' needs increases their motivation to learn.	30.952	0.000	*Agree*
BQ22- A learning environment that provides students with ample opportunities for interaction, communication, and cooperation with peers and instructors leads to authentic knowledge construction.	21.732	0.000	*Agree*
BQ23- A learning environment that encourages students to development self-regulation skills improves the way they learn.	12.049	0.002	*Agree*
BQ24- Lecturers understanding of the possibilities and potentials of an e-Learning program increases their motivation to be more effective in the delivery of instructions.	21.4	0.000	*Agree*
BQ25- The implementation of a curriculum that includes e-Learning requires lecturers to improve on their instruction delivery skills.	20.6	0.000	*Agree*
BQ26- The introduction of e-Learning in the curriculum increases the efficiency of lecturers in their role as learning facilitators.	25.75	0.000	*Agree*
BQ27- The introduction of e-Learning in the curriculum brings about increased collaboration among lecturers and experts.	24.75	0.000	*Agree*
BQ28- Introduction of e-Learning into the curriculum encourages research-based instruction techniques.	19.25	0.001	*Agree*
BQ29- A teaching method that involves innovative use of an e-Learning platform provokes and engages lecturers' creativity.	30	0.000	*Agree*
BQ30- Gradual and systematic integration of e-Learning with traditional instruction methods boosts students' acceptance and confidence in use of e-Learning platforms.	39	0.000	*Agree*
BQ31- An e-Learning environment that provides self-directed activities increases students' motivation to learn and improve learning outcome.	6.95	0.030	*Agree*
BQ32- An instructional method that provides a greater variety of interactions and richer media (video, audio) and self-directed activities improves learning outcome.	20.4	0.000	*Agree*
BQ33- The adaptation of best practices for teaching in an e-Learning environment results in achievement of desired learning outcomes.	13	0.005	*Agree*
BQ34- The redesign of the curriculum to include the use of e-Learning as an instructional (teaching and learning) method can improve the quality of teaching and learning.	26.75	0.000	*Agree*
BQ35- Well-designed e-Learning activities in which learners play active roles engages and motivates them to learn more effectively.	19.85	0.000	*Agree*
BQ36- Identifying instructional problems and then designing, developing and implementing hybrid instructional solutions improves teaching and learning experiences.	15.2	0.001	*Agree*
BQ37- An informed understanding of students' approaches to learning by lecturers leads to the design of highly engaging e-Learning environment.	30.75	0.000	*Agree*

5.3.5 Bivariate Analysis: viewing relationships between variables

The Spearman's rho rank-order correlation coefficient is used to measure the degree of relationship between variables. It is used to identify how variables within a scale correlate with each other and with relevant nominal variables.

5.3.5.1 Relationship between demographic variables

Table 5:5 shows a significant positive correlation between these two nominal variables. The correlation between AQ04 and AQ05 is moderately significant and indicates that lecturers with more years of experience are more likely to use the e-Learning platform (Blackboard) actively. There is also a significantly strong correlation between the active use of Blackboard (AQ05) and use of Blackboard beyond notes distribution (AQ05) which reveals that lecturers who are active on Blackboard find ways to use it more effectively. There is a weak positive correlation between active use Blackboard and lecturer's proficiency in ICT and the web.

Table 5.5: Relationships between selected demographic variables

Variable 1		Variable 2		Spearman Coefficient	Result
Code	**Description**	**Code**	**Description**	**p**	
AQ04	Years of teaching experience	AQ05	Active use of Blackboard	0.467**	Significant
AQ05	Active use of Blackboard	AQ06	use of Blackboard beyond lecture notes distribution	0.748**	Significant
AQ05	Active use of Blackboard	AQ08	Proficiency in ICT/Web skills	0.128	Not significant
**. Correlation is significant at the 0.01 level (2-tailed).					

5.3.5.2 Correlation between variables within each scale and associated demographic variables

Table 5.6: Teaching methods and quality of learning scale correlations

Teaching methods and quality of learning scale correlations								
	BQ09	**BQ10**	**BQ11**	**BQ12**	**BQ13**	**BQ14**	**BQ15**	**BQ16**
AQ04	0.373*	0.468**	0.400**	0.263	0.249	0.609**	0.187	0.196
BQ09		0.556**	0.480**	0.587**	0.328*	0.429**	0.388**	0.389**
BQ10			0.862**	0.453**	0.301*	0.628**	0.421**	0.427**
BQ11				0.367*	0.291	0.551**	0.385**	0.275
BQ12					0.358*	0.382*	0.314*	0.441**
BQ13						0.378*	0.080	0.218
BQ14							0.588**	0.442**
BQ15								0.262
*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).								

The tables (Table 5.6 above and Table 5.7 to Table 5.9 below) provide correlation coefficient between all variables in each scale and with associated demographic variables. It is observed that there is a significant positive correlation relationship among variables in all the scales.

Table 5.7: Enriched learning environment scale correlations

Enriched learning environment scale Correlations							
	BQ17	**BQ18**	**BQ19**	**BQ20**	**BQ21**	**BQ22**	**BQ23**
AQ04	0.343*	0.257	0.206	0.124	-0.041	0.463**	0.442**
BQ17		0.691**	0.529**	0.603**	0.480**	0.575**	0.594**
BQ18			0.537**	0.581**	0.480**	0.539**	0.660**
BQ19				0.588**	0.438**	0.618**	0.502**
BQ20					0.556**	0.465**	0.398*
BQ21						0.401**	0.288
BQ22							0.555**
*. Correlation is significant at the 0.05 level (2-tailed).							
**. Correlation is significant at the 0.01 level (2-tailed).							

Table 5.8: E-Learning effect on how Lecturers teach scale Correlations

E-Learning effect on how Lecturers teach scale Correlations						
	BQ24	**BQ25**	**BQ26**	**BQ27**	**BQ28**	**BQ29**
AQ05	0.346*	0.060	0.283	0.020	-0.025	0.170
BQ24		0.548**	0.725**	0.584**	0.581**	0.580**
BQ25			0.680**	0.456**	0.526**	0.560**
BQ26				0.487**	0.470**	0.658**
BQ27					0.701**	0.615**
BQ28						0.365*
*. Correlation is significant at the 0.05 level (2-tailed).						
**. Correlation is significant at the 0.01 level (2-tailed).						

Table 5.9: Strategies for e-Learning scale correlations

Strategies for e-Learning scale correlations									
	AQ05	**BQ30**	**BQ31**	**BQ32**	**BQ33**	**BQ34**	**BQ35**	**BQ36**	**BQ37**
AQ04	0.467**	0.054	0.119	0.059	0.087	0.021	0.249	0.129	0.140
BQ30			0.530**	0.561**	0.505**	0.541**	0.525**	0.709**	0.441**
BQ31				0.503**	0.689**	0.654**	0.753**	0.558**	0.583**
BQ32					0.682**	0.486**	0.305	0.633**	0.672**
BQ33						.753**	0.567**	.517**	0.584**
BQ34							0.701**	0.500**	0.578**
BQ35								0.567**	0.526**
BQ36									0.601**
**. Correlation is significant at the 0.01 level (2-tailed).									

5.4 ANALYSIS OF THE EFFECTIVENESS OF SAM AS AN E-LEARNING PROGRAM QUESTIONNAIRE DATA

In total, 147 students participated in the survey, but only 119 students (81%) submitted a completed response. The researcher had anticipated greater number of response from the students. It was gathered that at the time the online questionnaire was sent out, many of the students were unable to access their emails associated with the university network. Some students also complained of technical difficulties with navigating through the questionnaire. This was investigated and it was discovered that the version of Internet Explorer (Microsoft web browser) used by most students was not compatible with the online survey application.

The *frequency distributions* in Appendix D consider all responses. Other forms of descriptive statistics (charts) and inferential statistics will be given for each of 119 respondents, who completed the questionnaire,

5.4.1 Reliability of the measurement scale

The questionnaire comprised of two Likert-type statements and a Likert scale of 15 statements. The Likert scale solicits students' view on how SAM contributed to their success in the subject. The entire scale used as a construct for reliable testing. It is regarded as "Success with SAM" construct.

The Cronbach's Alpha coefficient from the test was 0.878 which is viewed as very good; thereby indicating internal consistency within the scale and a reliable scale for measurement.

The *item-total statistics* table for this test (as shown in Appendix D) indicates acceptable item-*total Correlation* with the lowest value of 0.377 and a high of 0.710. The overall Cronbach's Alpha coefficient value does not increase if any of the items is deleted but rather decreases. This indicates that the statements are appropriate for intended measurement.

Table 5.10: Cronbach's Alpha Coefficient for success with SAM construct

Statements	# of Items	Construct	Cronbach's Alpha Coefficient	Strength of Association
STUD_BQ3 to STUD_BQ17	15	Success with SAM	0.878	Very Good

5.4.2 Frequency distribution

Table 5.2 (APPENDIX D) shows the descriptive statistics for all the categorical demographic variables as well as the variables that make up the Likert scale with the frequencies in each category and the percentage out of total number of questionnaires. It is great importance to note that the descriptive statistics are based on the total sample. In some cases responses were not provided for some statements. These statements were left blank in the questionnaire.

5.4.3 Central tendency and dispersion of data

The following tables show the descriptive statistics for central tendency and dispersion of the data. The central tendency is described in terms of the *median* while the dispersion of data is described in terms the *interquartile range*. This choice of *median* and *interquartile range* is based on the fact that the data is classified as ordinal data (Watkins, 2008, p.166).

In the tables the following are the legends.
N = sample size,
Q_1 = Lower Quartile
Q_2 = Median
Q_3 = Upper Quartile
IQR = Interquartile Range (Q_3 - Q_1)

The following can be gleaned from the “Success with SAM” scale section of table 5.11

1. A minimum of 117 respondents answered all questions in the questionnaires.
2. The Mode value for 87% (count = 13) of the variables is 5, while the value of the balance 13% is 4 (2). This strongly suggests that for all variables, more respondents tended towards *strongly agreeing* with the statements.
3. The *Range*, *Minimum* and *Maximum* values indicate the following:
    a. for 33% of the variables (count = 5), responses to the statements range from *Strongly Disagree* and *Strongly Agree* (both extremes)
    b. For 53% of the variables (count = 8), responses range from *Disagree* to *Strongly Agree*, indicating that no respondent *strongly disagree* with the statements of these variables.
    c. For 13% of the variables (count = 2), responses range from *Undecided* to *Strongly Agree*, an indication there was no extent of disagreement with these variables.
    d. In all of the variables, there was at least one respondent who strongly agreed to all of the statements.

Table 5.11: Central tendency and dispersion of data

Variable Code	N	Mode	Range	Min	Max	Percentiles				Skewness	Kurtosis
						Q_1	Median	Q_3	IQR		
Likert-type data (STUD_BQ1 & STUD_BQ2)											
STUD_BQ1	117	4	3	1	4	3	4	4	1	-1.609	2.556
STUD_BQ2	117	4	2	2	4	4	4	4	0	-2.421	5.376
Likert scale data: "Success with SAM" (STUD_BQ3 - STUD_BQ17)											
STUD_BQ3	119	5	3	2	5	4	4	5	1	-1.147	0.901
STUD_BQ4	119	5	4	1	5	4	5	5	1	-1.800	3.901
STUD_BQ5	118	5	3	2	5	4	5	5	1	-1.037	0.393
STUD_BQ6	117	5	3	2	5	4	5	5	1	-1.107	0.712
STUD_BQ7	115	5	2	3	5	4	5	5	1	-1.286	0.633
STUD_BQ8	118	5	4	1	5	4	4.5	5	1	-1.355	1.770
STUD_BQ9	118	5	4	1	5	4	4	5	1	-1.142	1.192
STUD_BQ10	119	5	3	2	5	4	5	5	1	-1.628	2.821
STUD_BQ11	117	5	3	2	5	4	4	5	1	-0.843	0.240
STUD_BQ12	119	4	3	2	5	4	4	5	1	-0.592	-0.332
STUD_BQ13	119	5	2	3	5	4	4	5	1	-0.577	-0.859
STUD_BQ14	119	5	3	2	5	4	5	5	1	-0.952	0.379
STUD_BQ15	119	4	4	1	5	3	4	5	2	-0.933	1.088
STUD_BQ16	119	5	3	2	5	4	4	5	1	-0.770	0.022
STUD_BQ17	119	5	4	1	5	4	5	5	1	-1.697	2.569

4. Only one variable (STUD_BQ15) has a *First Quartile* (Q_1) value of 3 and suggests that less than 75%, but more than 50% (between 50% and 75%) of the responses to the statements tend towards *agree* and *strongly agree*. 93% of the variables (count = 14) on the other hand have a Q_1 of 4; clearly indicating that within these 14 variables, at least 75% of the respondents *agree* and *strongly agree* to the statements.
5. The *Median* (or the *Second Quartile,* Q_2) value is 4 for 47% of the variables (count = 7); indicating that at least 50% of the responses to the statements of each of these variables tend to *agree* and *strongly agree*. The Median value for the balance 47% of the variables is 5. This indicates that least 50% of the responses to the statements each of these variables tend to *strongly agree.*
6. The *Third Quartile* (Q_3) value is 5 for all of the variables (count = 15); indicating that a minimum of 25% of the responses *strongly agree* to all the statements of the scale variables.
7. The shape of the data distribution is for each variable is defined by the values of Skewness and Kurtosis. The shape is negatively (or left) skewed for all variables, thus indicating that data values are concentrated on the right of the mean, with more data points on the left. The degree of Skewness is regarded as *highly* skewed).

8. The Inter-Quartile Range (IQR) values of 90% of the variables (count = 13) indicates that the range of the “middle half” of the responses to the statements of these variables is 1.

5.4.4 Uni-variate graphs for the effectiveness of SAM for teaching data

5.4.4.1 Demographic data

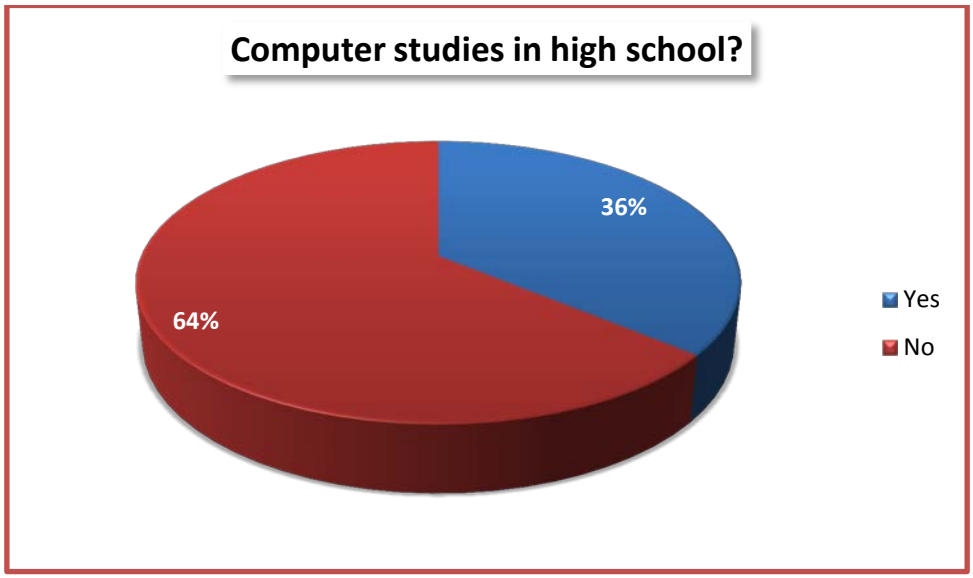

Figure 5.14: Pie chart showing distribution of students who had computer lessons at high school

The pie chart above (Figure 5.14) shows the percent of students who either had some form of lessons in computer programs or performed activities with computer at high school. It shows that 64% of respondents never had computer lessons at high school.

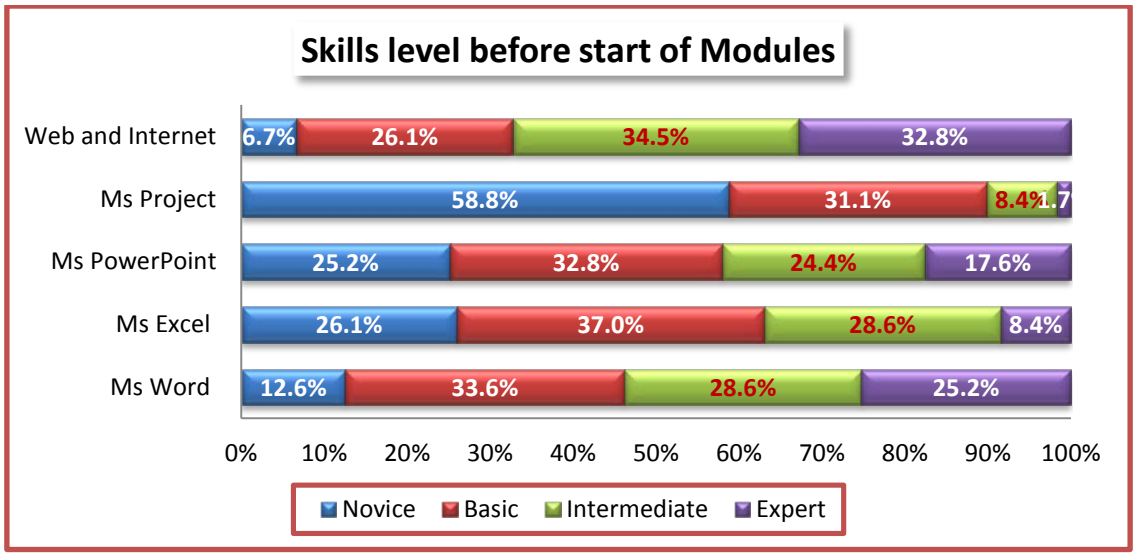

Figure 5.15: Stacked Bar showing students’ skills level before the start of the modules

Figure 5.15 above shows the computer literacy skills level of respondents before undertaking the modules for the computer course at the university. Majority of the students claimed to have had either basic skills or were novices in each of the Microsoft Office applications.

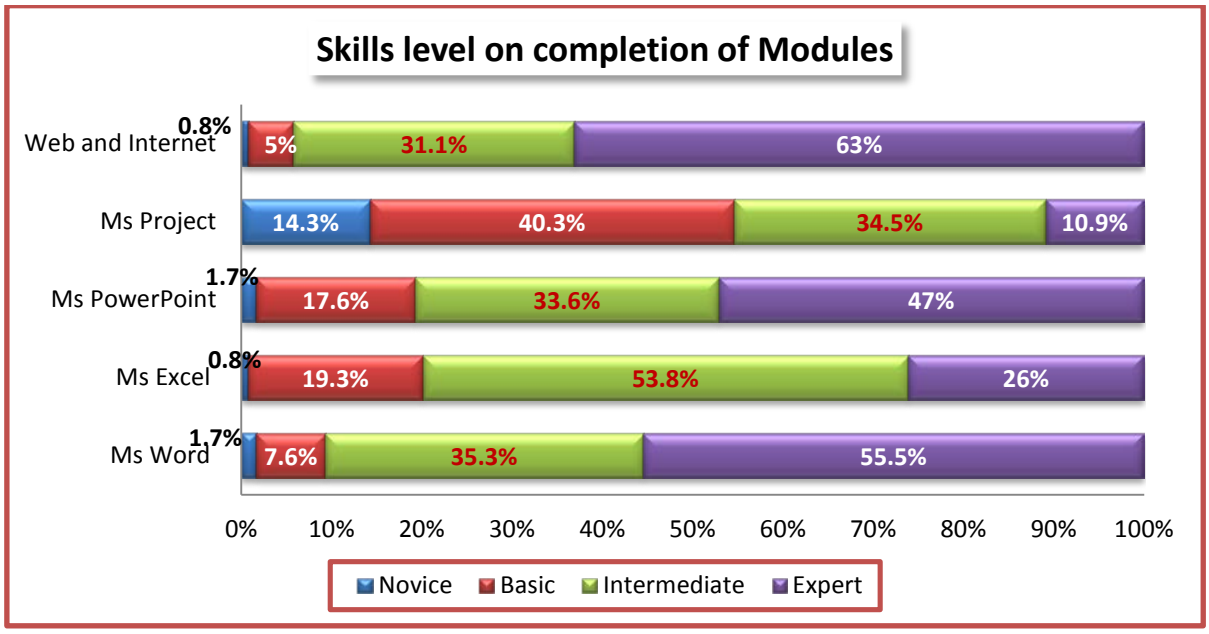

Figure 5.16: Stacked Bar showing students' skills levels on completion of the modules

Figure 5.16 shows that the skills level of respondents after completing the modules for the computer course. Comparing Figures 5.15 and 5.16 reveals appreciable increase of skills in all modules. It is noted that expert level is very low in the Microsoft Project module compared to the others, and it has the highest percentage of respondents who still claim the to be novice in using the software.

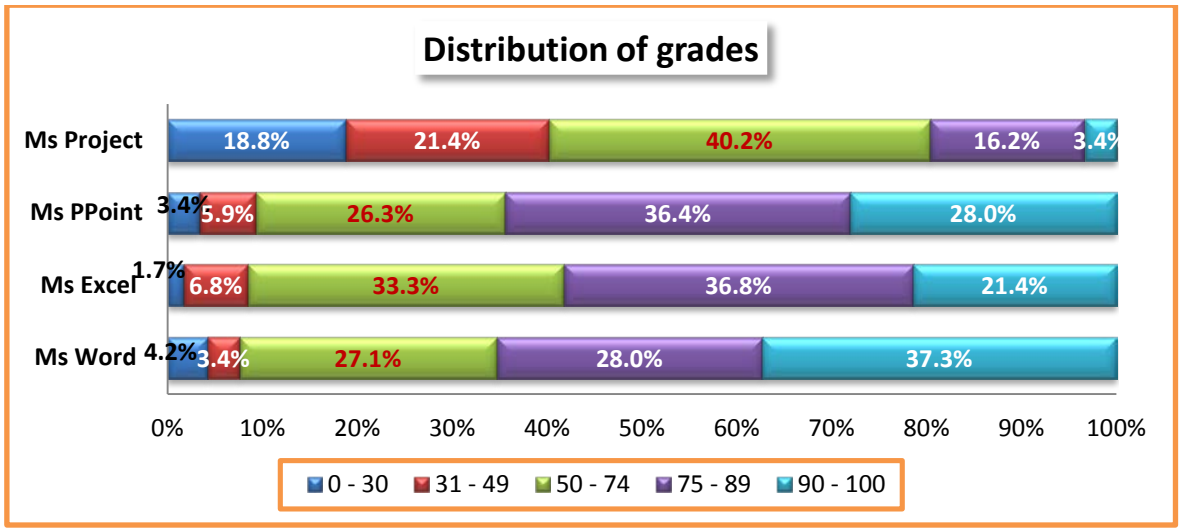

Figure 5.17: Tests grades distribution

Figure 5.17 shows the distribution of assessment grades for all 4 modules. It reveals that Microsoft Project module has the highest percentage of respondents who scored below 50%, and lowest percentage amongst those who scored above 75% compared to other modules.

5.4.4.2 Likert-type data

In Figure 5.18, the chart shows that more than 98% of respondents report that they are satisfied with their experience with SAM. Only a fraction (less than 2%) was *very unsatisfied*.

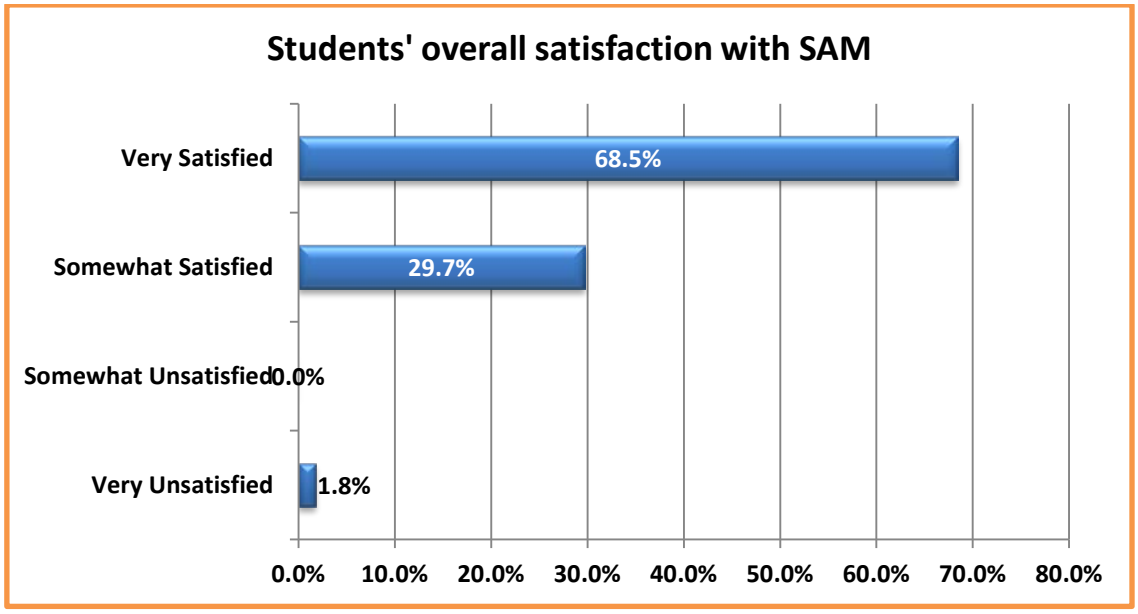

Figure 5.18: Students' overall satisfaction with SAM

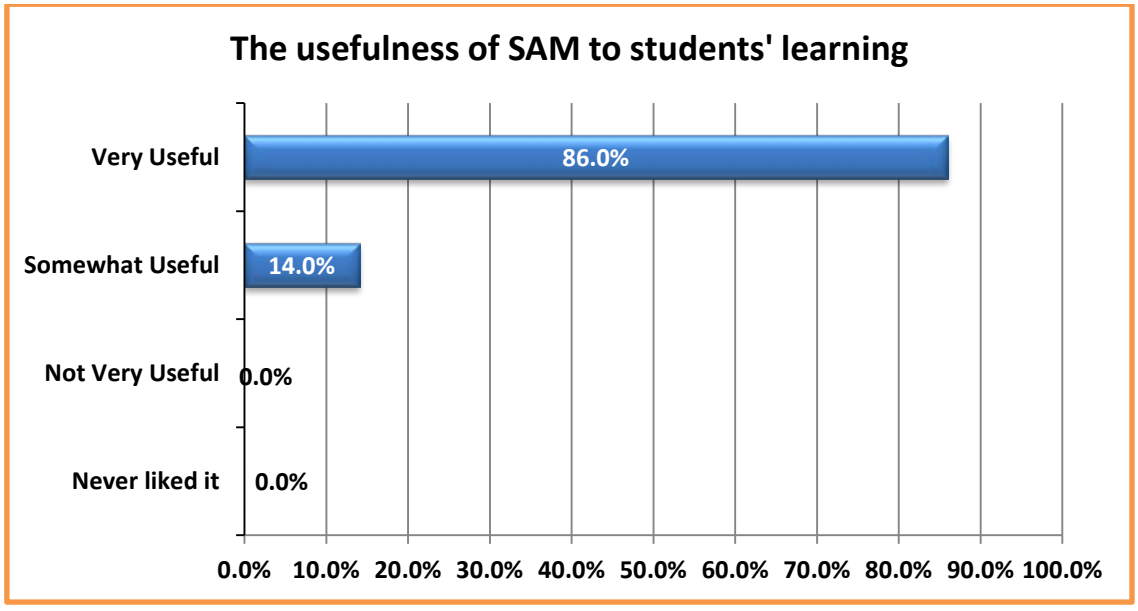

Figure 5.19: The usefulness of SAM to students' learning

On the usefulness of SAM to learning of the modules, Figure 5.190 shows that all of the respondents said it was useful; with 86% saying it was very useful.

5.4.4.3 Success with SAM Likert scale data

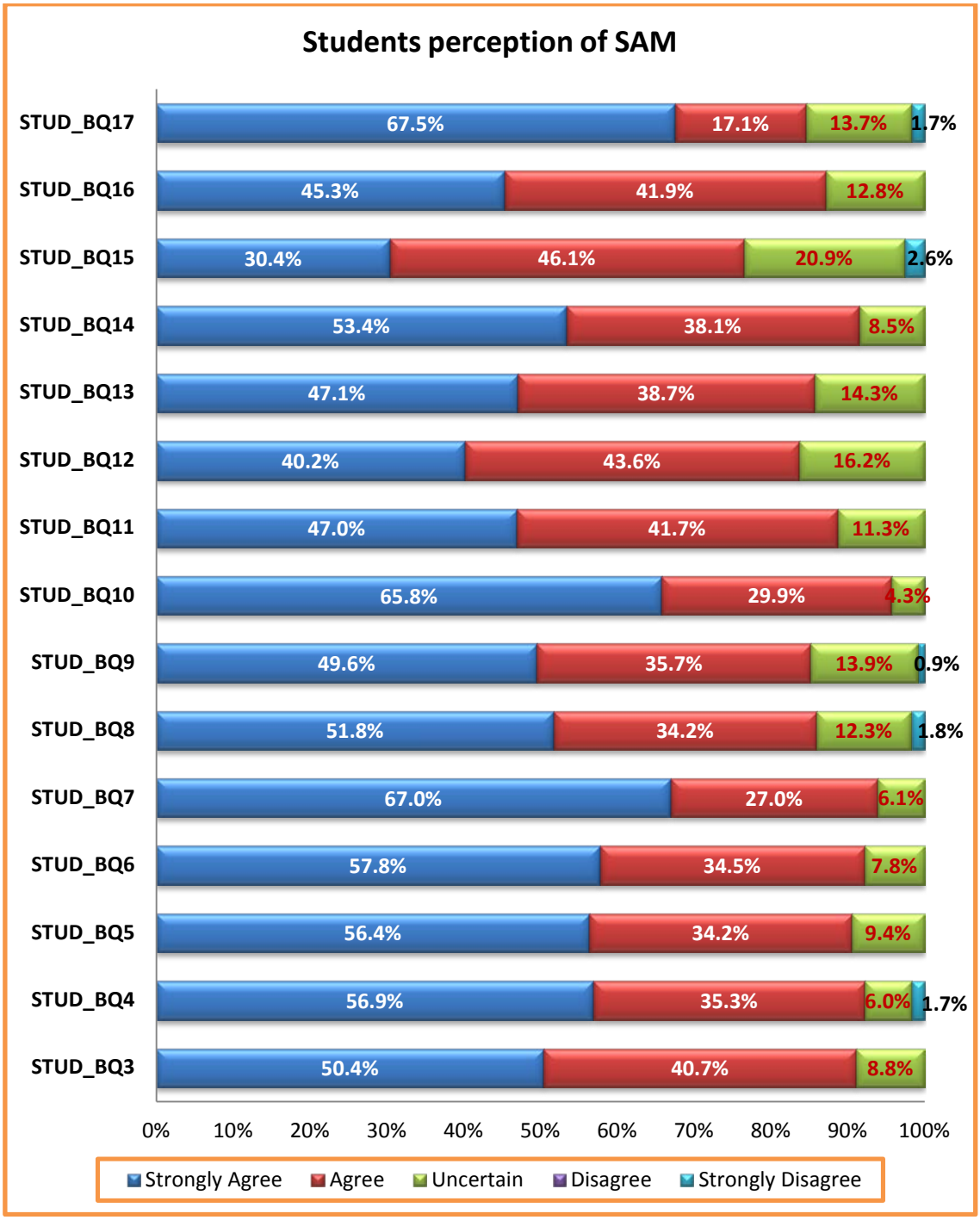

Figure 5.20: Students' perception of SAM (Detachable description of the variables codes is provided in Table 26 of APPENDIX G on Page 178)

Figure 5.20 shows percentage distributions of responses to each variable in their categories. It is clear from this distribution that most respondents "*Strongly Agree*" with all of the statements with exception to variable STUD_BQ15 (Simulations -video trainings- of the software packages was useful) in which most respondents "*Agree*". The extent to of "*general agreement*" obviously and greatly outweighs the extent of *general uncertainty* and *disagreements* with all of the statements. It is also observed that there was no disagreement

to ten of the statements; and all extent of *disagreement* is less than 2% of respondents where ever applicable.

Figure 5.21 gives the overall distribution of responses scale-wise. It reveals that 52.6% of the responses within the scale are “strongly agree”. 35.9% of the responses are “agree”. In total, 88.3% of responses were positive towards SAM as teaching method, 11% were cautious and only less than 1% of the responses fell within the “disagree” paradigm.

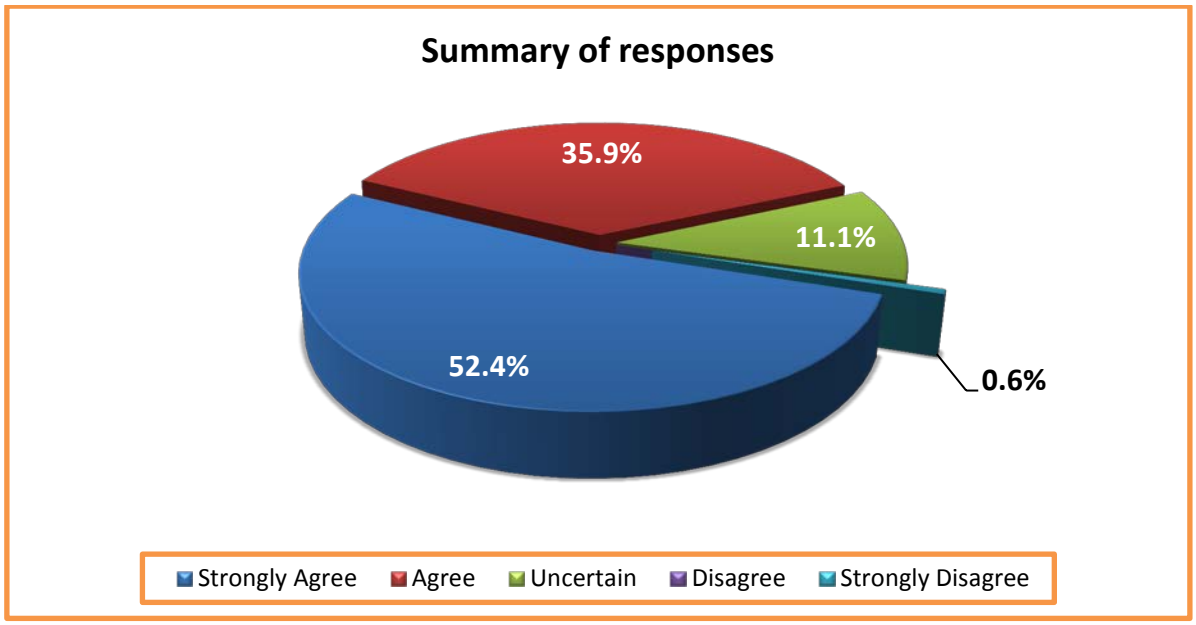

Figure 5.21: Pie chart showing overall distribution of responses to the scale

To statistically prove that significant difference exists in the frequency of extents of *agreement* and *disagreement* to all statements of each variable, a chi-square test for goodness of fit was conducted. The results (Table 5.12) give *p*-values of 0.000 (p>0.001) for all variables indicating a significant difference of agreements. The results show that respondents do largely “agree” to “strongly agree” with all statements in the scale.

5.4.5 Bivariate Analysis: correlation test for relationship among variables.

Spearman’s rho rank-order correlation is used to assess the degree to which the variables are related to each other. Table 5.13 presents the Spearman rank correlation coefficients for each pair of variables being assessed. The bivariate relationships indicates that variable STUD_AQ1 (the variable that asks if respondents had any form of computer studies at high school) is either negatively correlated with the scale variables, or positively weak in correlation. This suggests that prior knowledge of subject matter was insignificant in student’s success in these computer modules.

Most of the scale variables are positively correlated with each other, with 82% of all correlation coefficients being statistically significant ranging between moderate and strong correlation. However, some weak negative correlations were observed.

Table 5.12: Chi-square test for goodness of fit for Success with SAM scale

Variables	Chi-Square	P (Exact)	Prevailing Extent
STUD_BQ3: SAM has helped me develop comfort in the use of the web and the internet.	65.908	0.000	*Strongly Agree*
STUD_BQ4: SAM reduces test anxiety because students are better prepared through practice tests	137.261	0.000	*Strongly Agree*
STUD_BQ5: Using SAM made learning Microsoft Office Word, Excel and PowerPoint enjoyable.	88.034	0.000	*Strongly Agree*
STUD_BQ6: SAM helped me to achieve better understanding of the use of Microsoft Office Word, Excel and PowerPoint	93.974	0.000	*Strongly Agree*
STUD_BQ7: I recommend continued use of SAM	66.017[e]	0.000	*Strongly Agree*
STUD_BQ8: I wish my other subjects were taught using a program like SAM	103.102[f]	0.000	*Strongly Agree*
STUD_BQ9: SAM helped me achieve a higher grade than I would have otherwise	102.169[f]	0.000	*Strongly Agree*
STUD_BQ10: SAM practice sessions helped me to prepare for exams	122.445[a]	0.000	*Strongly Agree*
STUD_BQ11: SAM helped me understand the subject matter	67.376[d]	0.000	*Strongly Agree*
STUD_BQ12: SAM was easy to use	54.950[a]	0.000	*Agree*
STUD_BQ13: SAM made the course more visual and interactive	20.689[g]	0.000	*Strongly Agree*
STUD_BQ14: The immediate result and feedback offered by SAM was very useful	85.874[a]	0.000	*Strongly Agree*
STUD_BQ15: Simulations (video trainings) of the software packages was useful	75.748[b]	0.000	*Agree*
STUD_BQ16: The flexibility offered by SAM was useful to my learning style	63.824[a]	0.000	*Strongly Agree*
STUD_BQ17: I would have performed better in Microsoft project if it was taught using SAM	171.126[b]	0.000	*Strongly Agree*

Table 5.13: Spearman rank correlation matrix

	STUD_BQ1	STUD_BQ2	STUD_BQ3	STUD_BQ4	STUD_BQ5	STUD_BQ6	STUD_BQ7	STUD_BQ8	STUD_BQ9	STUD_BQ10	STUD_BQ11	STUD_BQ12	STUD_BQ13	STUD_BQ14	STUD_BQ15	STUD_BQ16	STUD_BQ17
STUD_AQ1	.023	.039	-.077	.025	-.025	-.232*	-.092	-.107	-.120	-.042	-.131	-.011	-.033	-.007	-.097	.009	.017
STUD_BQ1		.416**	.408**	.213*	.334**	.259**	.290**	.206*	.227*	.162	.267**	.077	.051	.156	.246**	.123	.310**
STUD_BQ2			.229*	.061	.175	.238*	.166	.084	.095	-.028	.131	.123	-.015	.158	.145	.070	.000
STUD_BQ3				.187*	.461**	.388**	.292**	.266**	.351**	.154	.395**	.114	.287**	.242**	.287**	.360**	.295**
STUD_BQ4					.306**	.406**	.376**	.343**	.298**	.478**	.418**	.368**	.322**	.198*	.102	.275**	.125
STUD_BQ5						.598**	.420**	.274**	.420**	.402**	.553**	.135	.348**	.198*	.311**	.499**	.400**
STUD_BQ6							.466**	.315**	.457**	.474**	.621**	.247**	.428**	.063	.343**	.421**	.347**
STUD_BQ7								.424**	.488**	.352**	.399**	.289**	.475**	.302**	.339**	.386**	.245**
STUD_BQ8									.428**	.413**	.444**	.304**	.465**	.290**	.371**	.423**	.280**
STUD_BQ9										.409**	.481**	.164	.477**	.182*	.409**	.409**	.316**
STUD_BQ10											.579**	.305**	.407**	.232*	.234*	.425**	.409**
STUD_BQ11												.313**	.527**	.214*	.398**	.523**	.356**
STUD_BQ12													.399**	.374**	.234*	.407**	.238**
STUD_BQ13														.350**	.387**	.517**	.253**
STUD_BQ14															.212*	.436**	.296**
STUD_BQ15																.508**	.276**
STUD_BQ16																	.454**

***. Correlation is significant at the 0.05 level (2-tailed).**

****. Correlation is significant at the 0.01 level (2-tailed).**

5.4.6 Bivariate Analysis: test for independence among selected variables

A test for independence is carried out to predict performance and outcomes on basis of relatedness of variables.

Due to the large categorisation of the variables, the data violates many of the underlying assumptions necessary for reliable results using the standard asymptotic method such as chi squared test for independence; the Fisher's Exact test is employed to establish the effect of one variable on the other. The Fisher's Exact Test hypothetically states that the two variables under investigation are independent; i.e. treatments do not affect outcomes.

Therefore the hypothesis for the test is stated as follows:

H_0 = The results of variable 2 are independent of the actions of variable 1
H_1 = The results of variable 2 are dependent of the actions of variable 1

H_0 is rejected if Exact Significant value, $p < 0.05$.
The results in the succeeding table (Table 5.14) show that out of 31 combinations of different variables, 21 combinations indicate that the null hypothesis is to be rejected for these combinations. This clearly shows a cause-and-effect relationship between the variables of which the null hypothesis was rejected.

The following associations can be deduced form the test:

- There is statistically significant evidence that the "What was your overall level of satisfaction with SAM" (STUD_BQ1), "How valuable was SAM to your learning of Microsoft Office software packages?" (STUD_BQ2), "SAM reduces test anxiety because students are better prepared through practice tests (STUD_BQ4)" and "SAM was easy to use" (STUD_BQ12) differ depending upon the respondent's skills level ($p<0.05$).
- The overall satisfaction with SAM (STUD_BQ1) is also depended on how students enjoyed learning with the program (90.6% of students agree to strongly agree, $p<0.05$)
- Students recommending the continued use of SAM (STUD_BQ7) is dependent on the overall satisfaction with the program and the high achievements in tests

Table 5.14: Fisher's Exact Test results

Test	Variable 1		Variable 2		Exact Test	Results
	Code	Description	Code	Description	p	
1	STUD_AQ5	Assessment Results	STUD_BQ1	Overall Satisfaction with SAM	0.03	Reject H_0
2	STUD_AQ4	Skills level on completion of Module	STUD_BQ1	Overall Satisfaction with SAM	0.89	H_0 not rejected
3	STUD_AQ5	Assessment Results	STUD_BQ2	The Value of SAM in your studies	0.01	Reject H_0
4	STUD_AQ4	Skills level on completion of Module	STUD_BQ2	The Value of SAM in your studies	0.32	H_0 not rejected
5	STUD_AQ3	Skills level before Module	STUD_BQ3	SAM's help with web skills	0.38	H_0 not rejected
6	STUD_AQ4	Skills level on completion of Module	STUD_BQ3	SAM's help with web skills	0.53	H_0 not rejected
7	STUD_AQ5	Assessment Results	STUD_BQ4	Reduction of test anxiety	0.04	Reject H_0
8	STUD_BQ1	Overall Satisfaction with SAM	STUD_BQ5	SAM made learning enjoyable	0.00	Reject H_0
9	STUD_AQ3	Skills level before Module	STUD_BQ6	Achieving better understanding of Subject	0.04	Reject H_0
10	STUD_BQ1	Overall Satisfaction with SAM	STUD_BQ7	I recommend continued use of SAM	0.01	Reject H_0
11	STUD_AQ5	Assessment Results	STUD_BQ7	I recommend continued use of SAM	0.18	H_0 not rejected
12	STUD_BQ1	Overall Satisfaction with SAM	STUD_BQ8	Program like SAM for other subjects	0.03	Reject H_0
13	STUD_AQ5	Assessment Results	STUD_BQ8	Program like SAM for other subjects	0.25	H_0 not rejected
14	STUD_AQ5	Assessment Results	STUD_BQ9	SAM helped me achieve a higher grad	0.08	H_0 not rejected
15	STUD_AQ5	Assessment Results	STUD_BQ10	SAM practice sessions helped me to prepare for exams	0.24	Reject H_0
12	STUD_AQ5	Assessment Results	STUD_BQ11	SAM helped me understand the subject matter	0.11	Reject H_0
17	STUD_AQ3	Skills level before Module	STUD_BQ12	SAM was easy to use	0.11	Reject H_0
18	STUD_AQ4	Skills level on completion of Module	STUD_BQ12	SAM was easy to use	0.01	Reject H_0
19	STUD_AQ5	Assessment Results	STUD_BQ12	SAM was easy to use	0.03	Reject H_0
20	STUD_BQ15	Simulations were useful	STUD_BQ13	SAM made the course more visual and interactive	0.00	Reject H_0
21	STUD_BQ6	Achieving better understanding of Subject	STUD_BQ14	The immediate result and feedback offered by SAM was very useful	0.51	H_0 not rejected
22	STUD_BQ2	The Value of SAM in your studies	STUD_BQ15	Simulations were useful	0.04	Reject H_0
23	STUD_BQ2	The Value of SAM in your studies	STUD_BQ16	The flexibility offered by SAM was useful	0.43	Reject H_0
24	STUD_BQ4	Reduction of test anxiety	STUD_BQ16	The flexibility offered by SAM was useful	0.00	Reject H_0
25	STUD_BQ5	SAM made learning enjoyable	STUD_BQ16	The flexibility offered by SAM was useful	0.00	Reject H_0
26	STUD_BQ6	Achieving better understanding of Subject	STUD_BQ16	The flexibility offered by SAM was useful	0.00	Reject H_0
27	STUD_BQ8	Program like SAM for other subjects	STUD_BQ16	The flexibility offered by SAM was useful	0.00	Reject H_0
28	STUD_BQ9	SAM helped me achieve a higher grad	STUD_BQ16	The flexibility offered by SAM was useful	0.00	Reject H_0
29	STUD_bQ10	SAM practice sessions helped me to prepare for exams	STUD_BQ16	The flexibility offered by SAM was useful	0.00	Reject H_0
31	STUD_BQ1	Overall Satisfaction with SAM	STUD_BQ17	I would have performed better in Ms Project	0.01	H_0 not rejected

- Statistical evidence concludes that students wish that other subjects had an instructional program like SAM is not connected to the test results (high pass rate), but is related to the level of satisfaction derived from using SAM.
- There is no statistical evidence associating the overall satisfaction of respondents with SAM and its value to their studies with skills acquired during the learning process.
- Statistical evidence shows that there is a relationship between the student's achievement of better understanding of the subject matter and the acquired level of skills.
- Evidence exist that students found SAM easy to use irrespective of the fact that their web and internet skills were inadequate.
- The statistical established relationship between SAM being visual and interactive, and the usefulness of the simulations is critical to students overall satisfaction.
- The effect of the immediate feedback offered by SAM is not statistically significant in student's achievement of better understanding of the subject matter, and test results in all of the modules. In one module, results showed a significant effect of the immediate feedback on grades levels.
- Statistical evidence suggests a relationship between students overall satisfaction with SAM and their claim that they would have done better in Microsoft Project, if it had been taught with a program like SAM.
- The flexibility offered by SAM is statistically significant in the reduction of test anxieties, making learning enjoyable, achieving good results and improving preparations for exams. The Fisher's Exact test also showed that respondents wish to have similar flexibility incorporated in the teaching of other subjects.

5.4.7 Benefits of SAM to students

In order to give students the opportunity to reflect on their experiences with SAM, a part of the questionnaire requested they give further expressions to their experience with SAM and the method of teaching the subject by way of comments. The responses to this are as follows:

"I would to comment by saying that I really enjoyed learning the subject via a program like SAM. It was an enjoyable experience with the course."

"SAM is very useful."

"SAM is a good way to learn computer skills."

“The program was fun and made learning easy because it gave us chance to repeat if you fail from the first trail you did.”

“I think every Microsoft office should be taught using SAM, and of course a very patience lecture understanding one.”

“Just want to thank the department for giving us the best program of study because is putting us on the standard level. Either way I am also happy with our lecturer who doesn’t stop helping us with some practices who was driving us towards positive results.”

“I really did enjoy with SAM at the university and it was my first time to use a web site like that. Once more thank you Joseph.”

“I like SAM, it improved my computer skills, and I am so wishing that you can continue using it for the next generation.”

“SAM is the best way for learning Microsoft packages. The practice sessions really help a lot and you had fun while you doing them.”

“The lecturer knows SAM and he made it very interesting.”

“I strongly suggest that SAM should be used in other learning subjects in the faculties”

“SAM is the best to teach student and help to use Microsoft office.”

“I learned a lot from SAM and it was enjoyable to me.”

“I appreciate throughout this survey because really SAM made my studies to have view of the course I am studying Thanks you.”

“SAM is useful to study, SAM taught us how to use Microsoft Office and SAM gave us chances to redo our school work and SAM is the best.”

“The subject was fun. SAM2007 made things very easy for me. It was like playing my favourite computer and learning at the same time and the lecturer made the lessons interesting.”

“I like SAM because it was very kind, it makes you to be excited about your work because you know your results immediately and what I like from it is that it gives you chances and shows you your mistakes.”

“SAM played a very huge role on my computer skills of which I recommend the continuation of SAM.”

“SAM2010 helped me very well and I appreciate its role. Thank you.”

“SAM is very effective and advice continuous use as it helps improve understanding and marks as well.”

“No objections I am much satisfied with SAM”

“I can say SAM is very interesting, although I did not use it before. I learnt something and I still learn about it.”

“It would be very useful to me if other subjects can be taught using a program like SAM.”

SAM offered me the best learning curve in terms of my computer skills. I now know things that I did not know about computer because of SAM.´

I really enjoyed the use of SAM in our program because now I can apply my skills where they are needed.

“I think Microsoft Project must be on SAM because SAM helped us to see where we were wrong and is easy to correct our mistakes and prepare for the exams. If SAM was available for Ms Project I think now I would have more than 90% so far.”

“I was introduced to End User Computing through SAM for the first time and was very lost at beginning, but now I do understand how a computer works but not really an expect as it was my first time learning computer skills.”

“SAM has helped me a lot and made me to understand the content of the subject. I recommend that the use of SAM to be continued.”

“I did well in all Microsoft Office Word, Excel and PowerPoint because of the practices offered in SAM. Microsoft Project had no practices and no place to check how is your

progress and therefore I did badly for the exams because of that. I therefore strongly suggest that there is a Microsoft Project be included in SAM."

"SAM is a good learning program, but is lacking in its user interface. It could seem intimidating to a person who is new to using computers (many new users have asked me for assistance). It's online marking and grading is very helpful with letting you know where you went wrong and how to fix it. SAM needs to accommodate MS Project to become an all-round learning application for this subject."

"SAM is a very useful and creative way of teaching these Microsoft Office packages. It also goes into depth of how and why those tool icons are there. I would strongly recommend SAM course 2010 to anybody who has difficulty in using the computer programs mentioned above."

"I liked using SAM2010. It helped me a lot and I also wish that the upcoming students will be thought on SAM2010."

"It would have been great and I would have passed Microsoft Project if it was available on SAM."

"SAM 2010 is a great idea … SAM2010 enables us to practice for exams and lessens anxiety levels caused by exams. That's SUPER! Gives us more CONFIDENCE."

The foregone quotes from the students participants clearly indicates that SAM was essential in helping students develop confidence. The researcher from his observation recalls that many of the students felt intimidated at the beginning of the course. Being the first time they have used the computer, many panicked with fear of not passing the subject. But as they began to work and practice with SAM, their confidence with computer and the applications developed.

5.4.8 Analysis of secondary data

This section deals with the presentation and analysis of grades of four groups of student. Statistical analysis is performed on the test grades to compare performance of students with respect to method of instruction. Three of the modules were taught using an e-Learning program known as Skills Assessment Manager (SAM).

The data being analysed is a collection of test result from four class groups. Three groups completed the modules in a semester period while the other group completed the in a period of semester and half. The groups are as follows:

Table 5.15: Computer course class groups

Group	Subject Code	Course	Period
Group 1	CMS102S	Industrial Engineering	2nd Semester 2012
Group 2	CMS102S	Industrial Engineering	1st Semester 2013
Group 3	EUC102S FT	Operations Management (full-time)	1st Semester and 1st term of 2nd Semester 2013
Group 4	EUC102S PT	Operations Management (part-time)	1st Semester 2013

5.4.9 Data summary, central tendency and dispersion

The following table gives the summary statistics for the collected data for the 4 class groups. Group 3 had the largest sample size.

Table 5.16: Summary statistics of test results

	N	Mean	Median	Min	Max	Percentiles			Std. Dev
						25	50	75	
Group 1									
Ms Word	14	57.3	60.0	29.9	85.4	33.1	60.0	74.1	20.092
Ms Excel	13	74.9	77.2	48.7	91.5	67.6	77.2	83.5	13.170
Ms PowerPoint	13	81.2	83.5	67.0	100.0	72.3	83.5	89.0	9.623
Ms Project	11	34.7	25	7.5	70.0	12.5	25.0	60.0	23.692
Group 2									
Ms Word	40	75.4	85.5	25.0	100.0	65.3	85.5	93.8	22.660
Ms Excel	41	79.1	86	23.0	98.0	70.0	86.0	93.0	17.952
Ms PowerPoint	40	78.3	86	3.0	100.0	69.3	86.0	93.0	19.830
Ms Project	38	53.9	59.5	5.0	88.0	29.8	59.5	73.5	23.757
Group 3									
Ms Word	146	75.3	80.5	5.0	100.0	62.6	80.5	93.6	22.530
Ms Excel	146	65.3	74.0	5.0	100.0	48.5	74.0	87.0	25.208
Ms PowerPoint	141	61.2	65.0	5.0	100.0	45.0	65.0	80.0	24.375
Ms Project	104	47.2	47.0	1.0	93.0	32.3	47.0	65.0	24.075
Group 4									
Ms Word	39	55.8	60.0	7.0	100.0	33.0	60.0	78.0	26.461
Ms Excel	39	63.2	64.0	6.0	100.0	45.0	64.0	83.0	25.011
Ms PowerPoint	37	56.9	59.0	10.0	97.0	34.5	59.0	83.0	28.164
Ms Project	28	43.8	40.5	3.0	86.0	28.5	40.5	61.0	21.067

5.4.10 Analysis of differences in performance in modules

The comparisons are made in terms of the average score, median score, pass rates, failure rates and the percentage with distinctions (75% and above).

The average score for each module varies with the class group. Figure 5.22 shows that Microsoft Project module has the lowest average score amongst the modules in all the four groups. Group 1 has the lowest average score of 34.7 while Group 2 has the highest in the Microsoft Project Module.

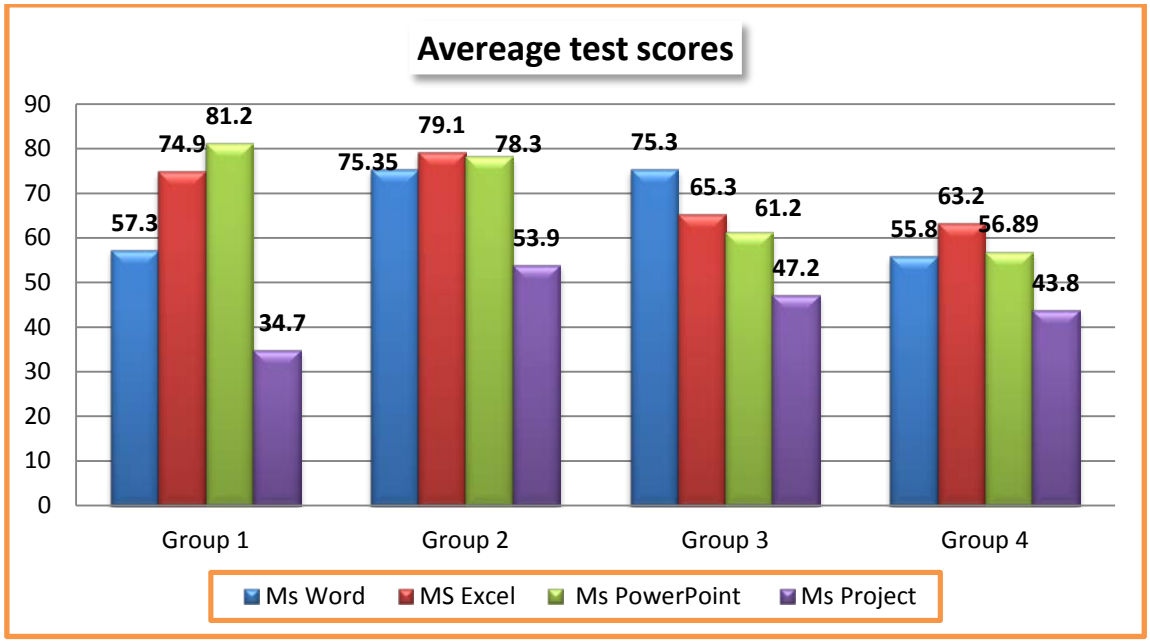

Figure 5.22: Overall average grade for each module of all class groups

Figure 5.23 gives the comparison of median scores. It indicates that of all modules, the median score for Microsoft Project is the lowest.

The comparison of pass rates in all class groups is shown in Figure 5.24. It reveals that the Microsoft Project module has the lowest pass rate among modules an all class groups.

Figure 5.25 compares the rate of failure in each module in all groups. Microsoft Project Module has the highest failure rate across board.

With respect to the modules with lowest number of student who scored above 75%, figure 5.26 shows that Microsoft Project produced no student with a distinction in Group 1, and has the lowest rate of distinction in the other groups.

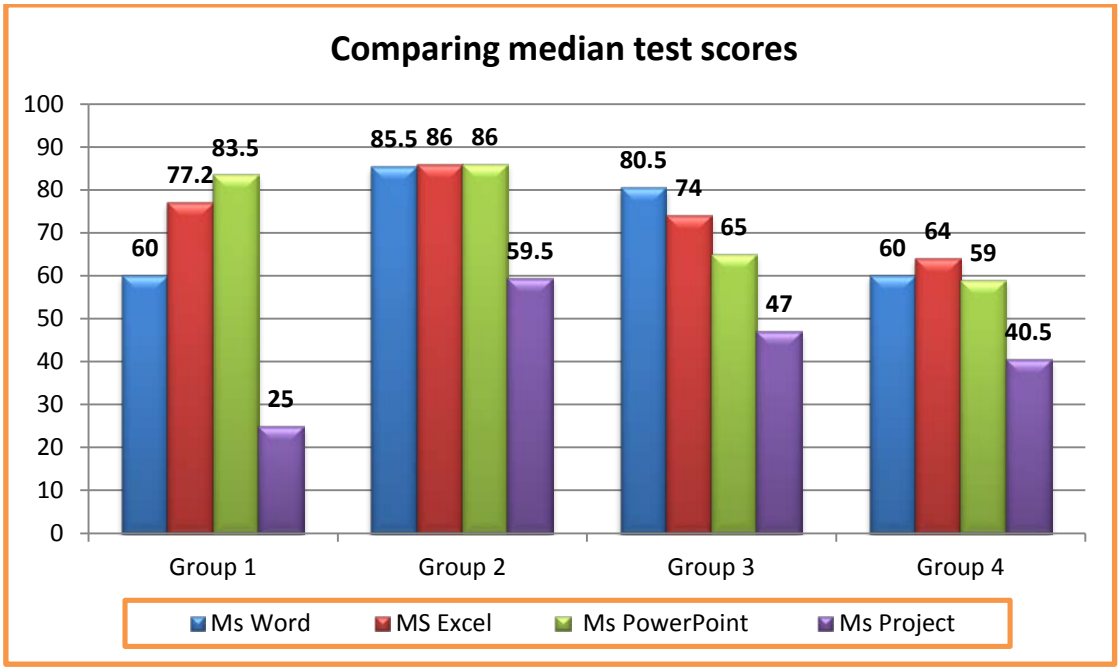

Figure 5.23: Overall median grade for each module of all class groups

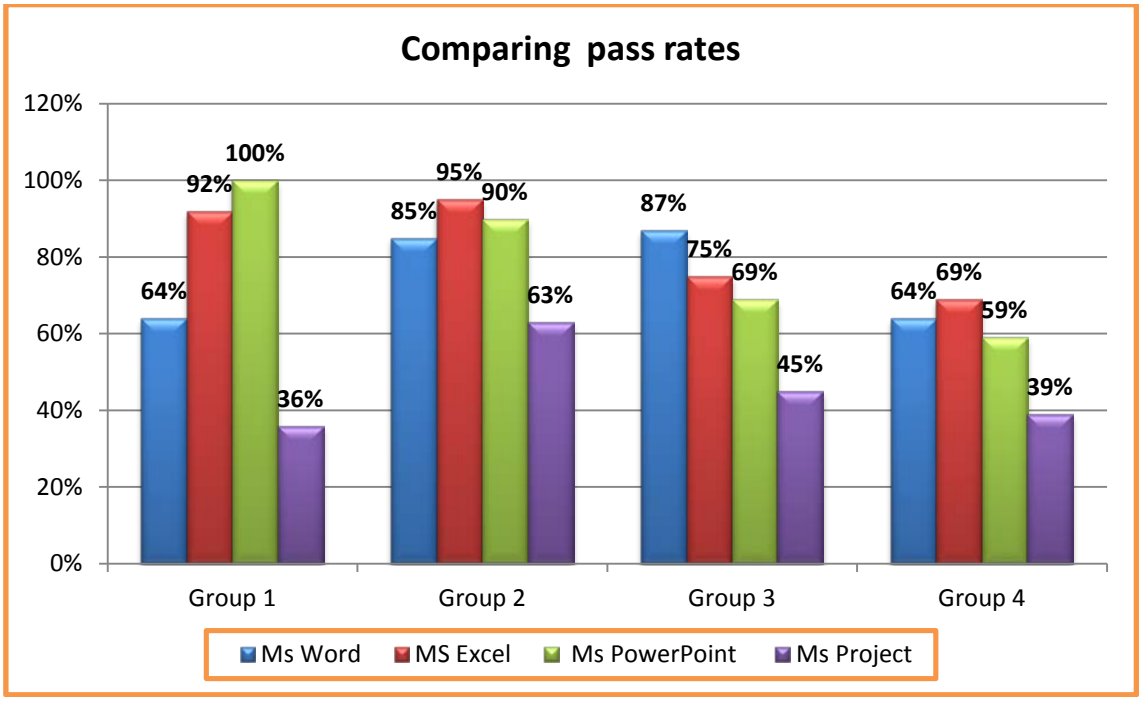

Figure 5.24: Pass rate for each module of the for class groups

The charts do clearly show that students performed better in the modules taught with SAM. This finding will be collaborated by a statistical analysis to ensure that the differences in the in mean are significant.

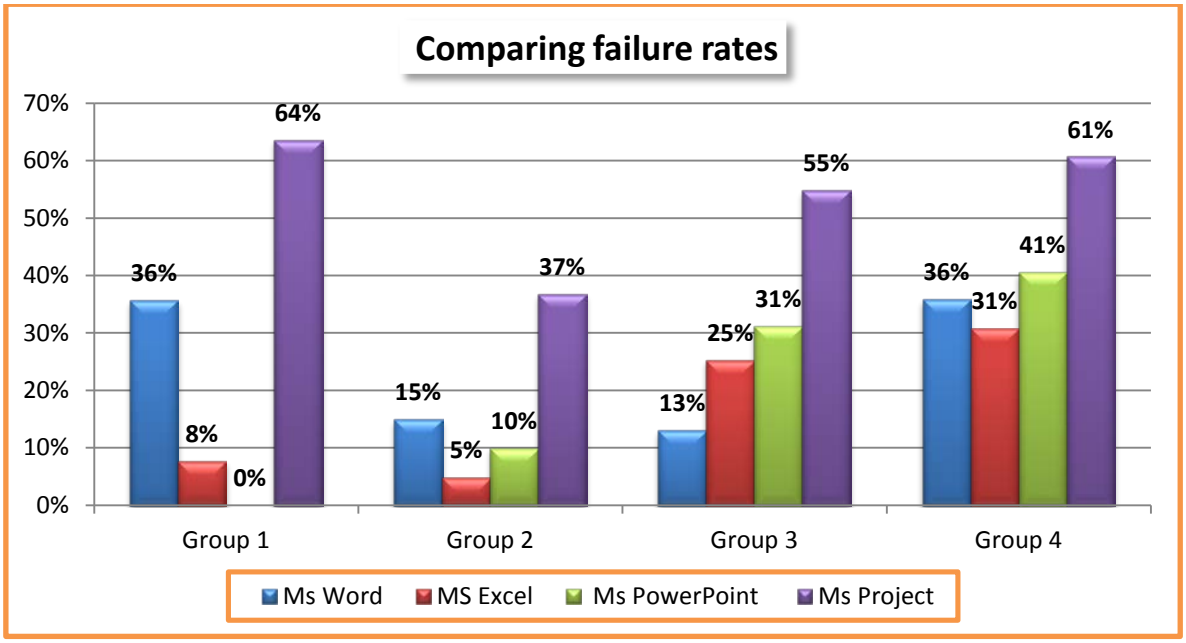

Figure 5.25: Failure rate in each module

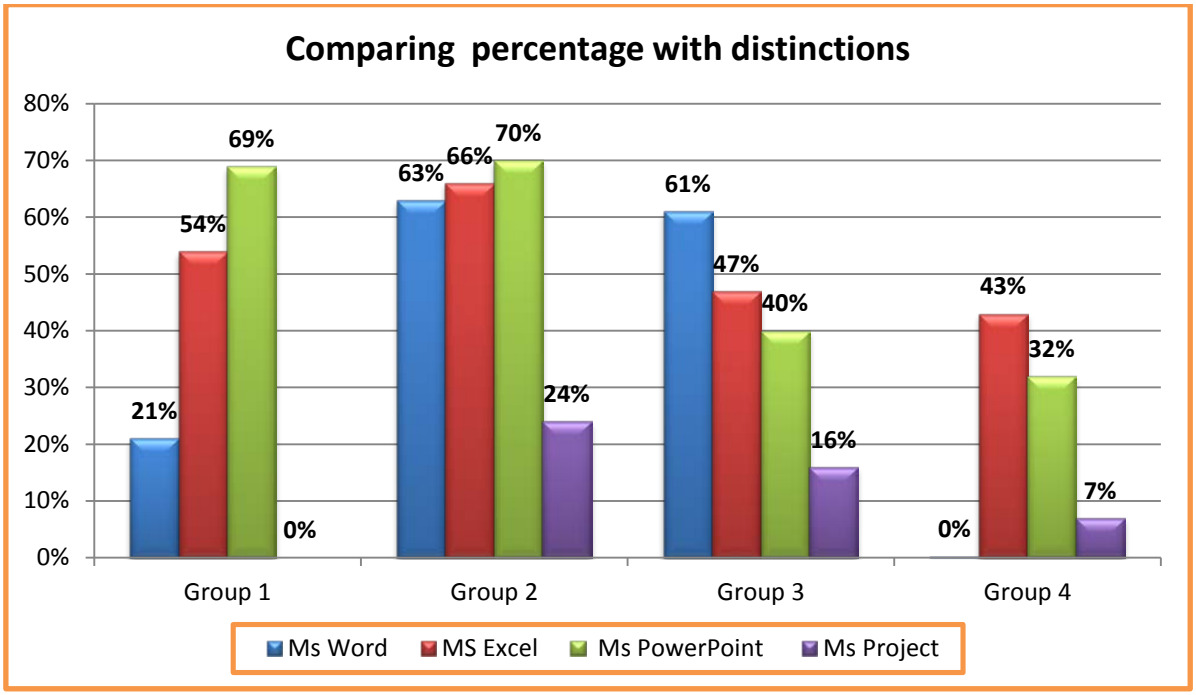

Figure 5.26: Number students with distinctions in each module

5.4.11 Test for statistical significance in mean difference

T-test was conducted to discover if the difference in mean between the modules taught using e-Learning (SAM) and the other taught without e-Learning program are statistically significant. T-test was used to look at the difference between the means of two groups at a significant level of 0.05.

The test for independent samples was done by comparing the mean test grades of each of the three modules taught with SAM (Modules A – C) and the module not taught using SAM (Module D).

The hypothesis being tested is as follows:

H_0 = There is a significant difference in mean score grade of modules taught with SAM and the module not taught with SAM

H_1 = There is no significant difference in mean score grade of modules taught with SAM and the module not taught with SAM

Module A = Microsoft Word
Module B = Microsoft Excel
Module C = Microsoft PowerPoint
Module D = Microsoft Project

The results in table show that a significant difference exists between the mean test grades of modules taught using e-Learning program and the module taught without an e-Learning program for this class group ($p < 0.05$). These tests established a statistical difference at a significant level of 0.05 between the grades of modules taught with SAM, and module taught without SAM. In each case, the modules taught with SAM yielded a higher mean score. Consequently, the null hypothesis (H_0) is accepted for all class groups.

- **Class Group A – CMS102S Semester 2 2012**

Table 5.17: *t* Test results for Class Group A

	N	Mean	SD	t	df	p	Results
Module A	14	57.29	20.005	2.582	23	0.00	Significant
Module B	13	74.88	13.170	5.004	15.055	0.00	Significant
Module C	13	81.15	9.623	13	81.15	0.00	Significant
Module D	11	34.73	23.692				

- **Class Group B– CMS102S Semester 1 2013**

Table 5.18: *t* Test results for Class Group B

	N	Mean	SD	t	df	p	Results
Module A	40	75.35	22.660	4.087	76	0.00	Significant
Module B	41	79.15	17.952	5.304	68.722	0.00	Significant
Module C	40	78.28	19.830	4.913	72.187	0.00	Significant
Module D	38	53.87	23.757				

- **Class Group C– EUC 102S Full-time 2013**

Table 5.19: t test results for Class Group C

	N	Mean	SD	t	df	p	Results
Module A	146	75.27	22.530	9.442	248	0.00	Significant
Module B	146	65.31	25.208	5.709	248	0.00	Significant
Module C	141	61.17	24.375	4.463	243	0.00	Significant
Module D	104	47.18	24.075				

- **Class Group D – EUC 102S Part-time 2013**

Table 5.20: *t* Test results for Class Group D

	N	Mean	SD	t	df	p	Results
Module A	39	55.82	26.461	1.994	65	0.05	Significant
Module B	38	64.74	23.486	3.739	64	0.00	Significant
Module C	37	56.86	28.164	2.058	63	.044	Significant
Module D	28	43.79	21.067				

5.5 FINDINGS AND DISCUSSIONS

To explore the effect that an e-Learning program can have on the quality of students, this study embarked on the development of two instruments and statically compared test results of two different approaches to instruction.

5.5.1 Instrument 1- Impact of e-Learning on teaching and learning quality survey

The first instrument attempted to assess from faculty members perspective, conditions in which learning can be enhanced by supplementing traditional methods with an e-Learning program.

From the faculty member's perspective, many tend to agree that methods of instruction have great influence on how students learn, which in turn impacts on the outcome. Cross examining the variables with years of teaching experience, the identifiable trend shows that the higher the years of experience, the more likelihood to agree with the statements.

Further to these methods of instruction, the instrument investigated what type of learning environments where such teaching methods can thrive, resulting in improved students' learning experiences. The statements of the section of the instrument were designed based on the concept of blended or hybrid learning approach in which traditional method is supplemented by e-Learning activities. In general, faculty members favoured this learning environment as one that will enhance learning, increase motivation to learn and increase student's achievements in assessment. More than 90% of faculty members tend to throw their weight behind a learning environment with the following characteristic, indicating its ability to achieve desired objectives.

Based on the response, an e-Learning inclusive instructional method can create a learning environment that:

- allows for active and flexible learning;
- encourages continuous study and revision through a system of continuous [formative] assessment;
- Takes into account the individual learning styles and needs of the students.
- instruction methods match students' needs;
- provides students with ample opportunities for interaction, communication, and cooperation with peers and instructors; and
- Encourages students to development self-regulation skills.

It is encouraging to note that these characteristics are conveniently attained through a combination of traditional methods of learning and e-Learning. The overwhelming support for such an environment indicates that should lecturers fully understand how an e-Learning program could make their work easier and improve learning experience, they would embrace it. This would lead to a suggestion that lecturers who have the interest of their students at heart and understand the potentials of an e-Learning program in enhancing their learning experience would engage it as a tool for teaching. Many lecturers may not have engaged in e-Learning due to their inability to envision how it would fit into their style of teaching, and/or create the desired learning environment. This is where research and training will play a pivotal role.

To illustrate the above assertion that lecturers who have the interest of their students at heart and understand the potentials of an e-Learning program in enhancing their learning experience would engage it as a tool for teaching, and encounter with the head of a programme at the faculty of engineering is herewith presented:

This faculty member for a long time had been critical of and negative towards the use of the e-Learning platform for teaching for reasons already highlighted in Chapter 2; which includes, *inter alia,* unstable communication network, lack of time to use the system, inaccessibility to student's, as well as students not having personal computers etc. But due to the need and subsequent pressure to improve students pass rates and throughput for his programme, he came across success stories of how lecturers on some other faculties have used e-Learning as a tool to engage students and improve outcomes. He attended workshops and seminars where he learnt about the immense impact internet technology can have on students learning and how it can used to engage 'them. He was exposed to such tools as *early warning systems* that help identify at-risk students on-time, use of podcasts, videos and online access to electronic books. Based on the success stories of others, he is now advocating a paradigm shift in his department. He currently champions the move towards e-Learning by attending all necessary seminars and encouraging his staff to do same. He has requested staff to research of how e-Learning tools are being used in the subjects they teach.

The above case clearly reveals that adequate and complete knowledge of the potentials and the correct applications of an e-Learning programme can changes attitudes of lecturers and create enthusiasm towards its productive use for teaching and learning.

Furthermore, the investigation into what effect of an e-Learning inclusive curriculum would have on the way lecturers teach was met with cautious responses; with many respondents seating on the fence while few "categorically" disagree. This could be attributed to lack of understanding of e-Learning pedagogy. This development can also be attributed the expressed bias against the UoT's e-Learning platform. Many have claimed to have had negative experiences with it, in addition to an unstably network environment. Such factors as these would reduce faculty member's enthusiasm towards an e-Learning program. Some other contributing factors may include beliefs about teaching, instructional goals and difficulties associating with making changes.

The response to the statement "*Introduction of e-Learning into the curriculum encourages research-based instruction techniques*" leaves much to be desired from academic staff. Only 52% of teaching staff accept the fact that lecturers would need to engage in research to

effectively use e-Learning in teaching. This position could be the result of an institutional culture that does not promote evidence-based teaching practice, which is built on the findings of research. Innovation is required to mitigate educational challenges, and this can only be achieved through research. As Andy-Hor (2003) puts it, “effective teaching must be driven by effective learning”.

In general however, in spite of the bias against the impact of an e-Learning program on how lecturers teach, a fair amount of lecturers agree that introducing e-Learning into the curriculum will definitely change the way lecturers deliver instructions, and would require them to make drastic changes.

The correlation analysis between variables across the scales of measurement reveals high degree of positive and significant relations between variables. This in turn established some level of dependency between constructs. This could lead to a supposition that strategic implementation of an e-Learning program would have a positive impact on how instructions are delivered. The new or enhanced delivery methods would create a rich learning environment that is student-centred, thereby improving students learning experience which will ultimately lead to student improved outcomes.

5.5.2 Instrument 2-The effectiveness of SAM as an e-Learning program survey

This second instrument focussed on students’ attitude towards a particular subject taught with an e-Learning program called SAM.

The findings discussed here are based on Fischer’s Exact test results.

- Overwhelmingly, students enjoyed using SAM for learning. The overall satisfaction with SAM was dependent on how students enjoyed learning with the program (90.6% of students agreed)
- The majority of students recommended the continued use of SAM for instruction, and this is due to their overall satisfaction with the program and the high achievements in tests.
- Students strongly wish that other subjects had an instructional program like SAM is not connected to the test results (high pass rate), but is related to the level of satisfaction derived from using SAM.
- Statistical evidence shows that there is a relationship between the student’s achievement of better understanding of the subject matter and the acquired level of skills.
- Many of the students found SAM easy to use irrespective of their web and internet skills were inadequate on the unset of the modules.

- The visual and interactive aspect of SAM, and the usefulness of the simulations were critical to students overall satisfaction.
- In one module, 'there is a significant effect of immediate feedback on students' performance in tests.
- The flexibility offered by SAM impacts significantly on the reduction of test anxieties, making learning enjoyable, achieving good results and improving preparations for exams. The Fisher's Exact test also showed that respondents wish to have similar flexibility incorporated in the teaching of other subjects.
- Finally, many students who performed poorly in the module not taught without SAM claim that they would have done better in that module (Microsoft Project), if it had been taught with SAM. Is attributed to the overall satisfaction provided by SAM

The above findings would lead to a conclusion that students' satisfaction with a teaching method can positively influence how they learn and the outcomes they achieve. The satisfaction in this wise was achieved through the effective use of an e-Learning program for augmentation of the learning environment.

5.5.3 Secondary data- comparison of test results

Statistical analysis is done to compare achievements of each module taught with an e-Learning program and the module not taught using e-Learning. Descriptive and inferential statistical data showed a considerable difference in achievements, which implies a significant difference in *mean* score. Students achieved better in Modules taught using an e-Learning program. These findings would therefore lead to the suggestion that teaching methods can greatly affect student performance, and consequently quality of learning can be improved through an e-Learning strategy.

5.6 CONCLUSIONS

This chapter dealt with the analysis of the data from two survey instruments, and a secondary data source. Data was presented using descriptive and inferential statistics and displayed using uni-variate charts and tables. Findings from the research were highlighted and conclusions were drawn.

In Chapter 6, recommendations necessary to mitigate the research problem will be proffered.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

"The task is not to turn the world upside down but in a given place to do what, from the perspective of reality, is necessary objectively and to really carry it out."
— Dietrich Bonhoeffer

6.1 INTRODUCTION

This chapter concludes the study on quality improvement at a University of Technology using Internet technologies and provides recommendations to mitigate the research problem. Attention is redirected to the research problem, and subsequent investigative questions and objectives. A brief overview of the research is exemplified. This chapter concludes with a set of recommendations to mitigate the research problem.

6.2 THE RESEARCH THUS FAR: A REFLECTIVE PERSPECTIVE

In the research thus far, the scope of the research was explained in Chapter 1. A holistic perspective on the research environment was provided in Chapter 2 and a review of relevant literature in Chapter 3.

Chapter 4 elaborated on the research design and methodology while chapter 5 reflected on the data analysis and interpretation of results. In this final chapter, the research will be concluded and final analogies will be drawn.

6.3 RESEARCH OBJECTIVES: SUMMARY OF FINDING AND CONCLUSIONS

The overall aim of this study was to create an awareness of the extent to which the quality of teaching and learning can be improved through a learning environment that engages an e-Learning program for leverage. The specific research objectives were, within the context of this UoT:

- To determine the extent to which faculty members associate method of teaching/instruction with the quality of students learning.
- To explore views on the capacity of an e-Learning program to enrich a learning environment for utmost results.
- To explore the extent to which the implementation of an e-leaning program in the curriculum will affect the way lecturers deliver instructions.
- To solicit lecturer's opinion on strategies that can be employed by which desired learning outcomes can be achieved through an e-Learning program at the UoT.

- To confirm that supplementing traditional methods of instruction with e-Learning can enhance student's learning; improve outcome, and increase the level of students' satisfaction with the method of instruction.

6.3.1 Research Objective 1: Teaching methods and quality of learning

Literature has it that teaching methods, styles of instruction and systems of dissemination of information to students have a direct effect on their performance. Researchers are in favour of teaching methods that are student-centred. This student-centred approach falls under the constructivism paradigm of learning, where the learner has a more active role; being not just the recipient of information but an active participant in the learning process. Authentic learning can be effectively achieved through the use of e-Learning features as possessed by Blackboard and other platforms.

This study examined certain factors for which methods of instruction account for; of which some lecturers indicate were insignificant in fostering learning. For example, some lectures do not believe that an instructional method that either accommodates different styles or team work (cooperative learning) among students or that encourages student to be independent learners cannot improve students' performance. This was sort of an area of conflict between the more experienced and less experienced lecturers in this study, more experienced lectures think otherwise.

In view of these findings, two conclusions can be drawn within this objective of the study. Firstly, it can be concluded that methods used to deliver instructions to students have implications on the quality of teaching and learning. Instruction methods that are student-centred have the capacity to enhance the performance of students. The second conclusion is that the difference in opinion (though minute) with regards to teaching methods, is related to teaching experience and teacher's training/education. Many lecturers have not had formal training in education, and may have been teaching the way they were taught or the way they used to learn or just teaching with the most convenient method.

The following statements extracted for the questionnaire shares opinions of lecturers which parallel the conclusion:

- *Lecturers should also be able to know what they are teaching and explain to students in more details. Reading slides on the projector is not teaching. Most lecturers have that tendency and don't know how to transfer their knowledge to students.*

- *Normal old style teaching must be done away with or be drastically reduced to get students to learn and learn to find information and become life-long learners.*
- *In some cases, formative tests are watered down (from what I have seen). Also, revision exercises in class are sometimes spilt-images of the summative assessment of some subjects.*

6.3.2 Research Objective 2: Enriched learning environment

The type of learning environments in which learning activities take place have been found to impact on the learning outcomes (Struyven et al., 2008). Many authors are of the opinion that the quality of learning outcome attained is determined by the learning activities in which students engage largely (Struyven et al., 2008). To this effect, literature abounds with suggestions that an increasing number of educators are sure that providing better technology support for learning environments can improve the outputs of HEI that match the needs of societies and the needs of individual students (Newhouse, 2002). The goal of such an environment is to provide the most efficient and effective learning experience by combining instructional environments (Aytaç, 2009). This study attest to the significant role a learning environment enhanced with e-Learning will play (or rather, plays) in students' learning experience and consequently improved achievements. An academic staff member who participated in the study made the observation that "the above learning environments support the *Universal Design for Learning* principles that are of the utmost importance for academic success". Another staff member also noted that learning environments should be designed to encourage students to develop self-regulation skills as they mature.

The overwhelming extent of agreement to all variables that describe the dividends of a blended learning environment by the academic staff points to this conclusion: powerful learning environments that meet the needs and enhances the learning of students would be in place if academic staffs are duly aware of the benefits of an e-Learning program to them and their students; and if they have the necessary resources and capacity.

6.3.3 Research Objective 3: e-Learning effect on how lecturers teach

Effective use of technology in education requires pedagogical intervention from teachers, which involves a conceptual change of teaching and learning from a teacher-centred approach to a student-centred approach (Newhouse, 2002). Introduction of e-Learning in curriculum will require a shift of lecturers 'focus from traditional curricular and administrative tasks in the direction of working with data and providing more individualized support to

students (Armes, 2013). The new role as a learning facilitator is very challenging and could be a daunting task. This role can expand in challenging and stimulating ways (Armes, 2013).

Understanding how to teach using e-Learning does not just entail learning new technology, which, but it also involves a deepening knowledge of how students respond to and learn in online settings (Hewett and Powers, 2007, cited in Worley & Tesdell, 2009). As a result, there must be willingness for faculty to explore, probe, and test, test, test to create practices that do support student learning (Worley & Tesdell, 2009); since lecturers' effectiveness in this new role will require new skills of which professional development is essential. In many cases, collaboration and team work among lecturers and experts are a way to ensure best practices and continued support for sustainability.

This particular objective in this study encountered considerable cautious and pessimistic responses to the underlying factors that pinpoint changing roles of instructors in a blended learning environment. However the greater percentage of academic staff surveyed seems greatly aware that their roles will change, and that they will need to make drastic changes to conform to the requirements for an effective technology-enhanced learning environment.

The conclusion made to this regard is that some academic staff appreciate the responsibility that is required of them in a blended learning environment, while others are cautious and pessimistic. Furthermore, the cautiousness and pessimism could be attributed to individual resistance to change, ignorance of the potential of an e-Learning program, focus on pending challenges, remaining in comfort zone and fear of the unknown.

6.3.4 Research Objective 4: Strategies for e-Learning

The difference in outcome between fully e-Learning course and the face-to-face instructional method has been a subject of contention. Most of the studies conducted have revealed that there is no significant difference in outcome between the two. But studies have repeatedly shown that there is a greater effect when both e-Learning and face-to-face methods are combined to deliver instructions as evidenced in this study. In other words, higher achievements in outcomes have been recorded when the method of instruction is a combination of both e-Learning and the traditional face-to-face instruction methods. This combination of approaches has been referred to as blended or hybrid learning.

As with any new venture, achieving desired success with blended learning require strategic approaches. Strategic implementation procedures guiding the use of blended learning have

potentially large impacts on the learning achieved (Oliver, 2005). Well executed and supported e-Learning strategies can be richly rewarding to both instructors and students.

The importance of strategic implementation for success is underscored by this study; however some scepticism still exists as some academic staff members are still cautious or concerned about the success of an e-Learning program. Nevertheless, an overwhelming majority do believe that strategically implementing e-Learning will produce desired results.

If a comparison is made between the findings in objective 2 (enriched learning environment) and the findings in this objective (strategies for e-Learning), a conclusion can be drawn that many academic staff members are biased against the term “e-Learning”. It is obvious that some lecturers have misconstrued the meaning of e-Learning, or may not have a strong view of what e-Learning entails. The current practice of e-Learning at the institution in which the e-Learning platform is chiefly used for course notes distribution coupled with the negative experiences with the network may have informed their opinion.

This conclusion is buttressed by sceptic comments made by respondents in the questionnaire. Sample comments are presented below:

- *Provided the tool is user friendly. Most part time students have their hands full with their day jobs and find that the current Blackboard is not that user friendly.*
- *Many students are also not that confident when using Blackboard and often claim that the information that they need is not "visible" on their screens.*
- *Modern students are so tech savvy that a gradual integration is more of an annoyance than a relatively fast change over.*
- *Again, I feel all lecturers at the UoT would agree with all your statements... The issue is not really that, maybe rather access, training or Internet speed access by students?*
- *Sometimes students get distracted by online applications that they tend to go "off-road" when it comes to e-Learning. Moreover, teaching and learning stems from the lecturer's unique style of lecturing - e-Learning is a tool to assist in teaching and learning; not a driving force.*
- *…there is never enough time for lecturers to attend such courses without it being to the detriment of something else.*
- *My concerns are rather students' access off campus, their ability to use Blackboard, the Internet speed, and more training on Blackboard to use tools such as "Grammarly".*
- *No policy is going to make e-Learning successful. This is something that needs to be organically developed through access to resources (and time!) and a supportive environment.*

- *Innovative use of technology certainly changes the students' learning experience. Whether this change is an improvement depends on how it is implemented. It could be an improvement but it could also be a distraction.*
- *Lectures should be transformed over a period of say 5 years - you cannot develop material overnight.*
- *Sometimes students who are enrolled for courses are not 'on par' with admission criteria; hence it is seldom the case that you will have "equally abled" students in one class (consisting of 50 to 150 students at a time).*
- *It is very challenging addressing all individual learning styles in class groups that are large, especially in a technical field of study.*
- *Not all lecturers feel comfortable using e-Learning and the benefits of it - this will take years to accomplish. The institution must force this - NOT just in a policy document.*
- *There are too many stories of e-Learning initiatives getting in the way of good education - check out (google) "No significant difference" ...*
- *The introduction of e-Learning does not necessarily increase opportunities for collaboration, nor encourage a research-based ethic. Some lecturers have a very superficial grasp of the e-Learning potential. It SHOULD encourage greater collaboration!*
- *The UoT's server is so unreliable that I reverted back to manual methods of teaching. How can I depend on a platform which is built on an unstable foundation?*
- *Furthermore, Blackboard is mostly used to upload notes and subject guides - that is it; despite the potential Blackboard really has.*

The above comments deeply express some academic staffs' frustration with the current e-Learning approach of the university; these underpin their scepticism and negativity towards e-Learning. However, the researcher is of a firm belief that with innovative approach and commitment all these challenges can be surmounted or worked-around.

In view of the conclusions made above, it is can be speculated that the policy makers (the elite staff) of the institution do not have a clear vision for e-Learning at the university, and that they have a vague understanding of what e-Learning really is and what the university could benefit from it. It seems obvious that the institution is trying to be "trendy" by acquiring an enterprise e-Learning platform, but with no vision or strategic plan in place to harness the full potentials of this acquisition. The process of integration of e-Learning at the university was not carefully thought through and drawn out, and the implementation was not strategically executed.

6.3.5 Research Objective 5: Increased student satisfaction and outcome

It has been proven that a blended learning approach improves learning outcome in general. One factor which researchers have reported to contribute to the success of blended approach to learning is student satisfaction. As this study suggests, the more satisfied students are, the more they are motivated to learn, and ultimately achieve desired outcomes. This research has verified this claim as shown by statistically significant relationship between students' satisfaction with a teaching method and high levels of achievement.

Therefore, in drawing a conclusion to the research objective, it can be authoritatively stated that students' satisfaction with a learning environment should be at the heart of every instructional design process. 'The "quality" concept places the satisfaction of an end-user (or the customer) as a measure of *quality.* Quality teaching can only be determined by quality learning.

Figure 6.1 below summaries this conclusion.

Figure 6.1: The progression to success

6.4 RECOMMENDATIONS TO MITIGATE THE RESEARCH PROBLEM

The recommendations made hereby are linked to the conclusion made with regards to the objectives of this study.

6.4.1 Recommendations resulting from conclusion

Two conclusions were drawn from the first objective. The first conclusion states that methods used to deliver instruction to students have implications on the quality of teaching and learning. The first recommendation is that the university's teaching and learning plan should be cascaded down to departmental levels. In other words, the universal teaching and learning plan should be adapted on faculty bases, where emphasis should be laid with regards to faculty uniqueness. The faculty teaching and learning plan should birth departmental teaching and learning plans; specific to each department. And within each department, every course or subject should implement this plan. This system would ensure that every lecturer follows the established and proven pattern of instruction, rather than relying on instincts, gut feelings and convenience. In this regard, it is assumed that the teaching and learning plans were created based on research and best education practices.

From the second conclusion which states that the difference in opinion with regards to teaching methods, is related to teaching experience and teacher's training, it is recommended that a system of mandatory teacher-education or training should be implemented for new and existing lecturers who have not yet undergone such training. In addition, there should be plan for continuous professional development for all lecturers. Benefits of continuous education of lecturers are enormous, as they would be constantly updated with new development in their respective fields and practice. Training and professional development should not be left to individual's choice.

The third conclusion made in this study states that powerful learning environments that meet the needs and enhances the learning of students would be in place if the academic staff are duly aware of the benefits of an e-Learning program to them and their students; and if they are well resourced and capacitated. The recommendation made from this conclusion is that an effective communication process should be in place to educate the academic staff of the advantages/benefits of using technology as an effective tool for learner engagement. They should know that e-Learning tools go beyond the current teaching and learning practices that are based on the information transfer paradigm, where information is transferred to learner. They ought to be aware that e-Learning has the potential to transform the student from being a consumer of information to becoming a builder of knowledge. This will require well-structured training programs that focus on pedagogical relevance.

The fourth conclusion drawn within the third objective of this study is that some academic staff members appreciate the responsibility that is required of them in a blended learning environment, while others are cautious and pessimistic. The recommendation following this conclusion is that academic staff should receive meaningful pedagogical training with the

specific aim of preparing them for integrating e-Learning into their teaching. The training should cover topics such as benefits of e-Learning, practical advice on the changing roles of lecturers and students, including supporting structures as well as guidance on what works and what does not work.

The recommendations made from the third and fourth conclusions are all applicable to the fifth conclusion which states that many academic staffs are biased against the term “e-Learning”. Further recommendations from this conclusion will be highlighted in the general recommendations.

The final conclusion made in this study states that students’ satisfaction with a learning environment should be at the heart of every instructional design process, and there follows the recommendation that it is important for instructors to know which course or learning characteristics are important for students' satisfaction. A rich learning environment which accounts for high learner satisfaction can be established by identifying learning objectives and learning processes that can best be supported by either e-Learning components or face-to-face, or by both.

6.4.2 General Recommendations

Further to the aforementioned recommendations, a more general recommendation which is relevant to a successful implementation of e-Learning is listed as follows:

- A dedication department with sole responsibility of researching and developing e-Learning strategies that is unique to the vision, needs and corporate objectives of the institution should be established. In this regard, there would be some form of collaborations between faculty members with a whole range of other university staffs e.g. course managers, web designers, instructional/pedagogical designers, cognitive scientist etc. to produce course material (Larsen & Vincent-Lancrin, 2005).
- Research on educational technologies should be included in the UoTs research portfolio. The university’s research output has focussed on other areas other than how technology can be used to enhance teaching and learning. Owing to the fact that education places a prominent role in societies, and the enablement which technologies offer, it is of utmost importance that attention should be given to research in educational technologies.
- In order to avoid conflict and strong resistance to change, new organisational innovations, new knowledge management practices, and more team working are therefore necessary (Larsen & Vincent-Lancrin, 2005).

- More strategic e-Learning planning at the institutional and/or faculty level and to tie this to the overall goals of the institution is needed (Larsen & Vincent-Lancrin, 2005).
- There should be a paradigm shift in the way academics think of university teaching, e.g. a shift away from 'scepticism about the use of technologies in education' and 'teacher-centred culture' towards 'a role as a facilitator of learning processes', 'team worker', and 'learner-centred culture' (Larsen & Vincent-Lancrin, 2005).
- The UoT should engage in targeted e-Learning training relevant for the faculty's teaching programme as well as ownership of the development process of new e-Learning material by academics (Larsen & Vincent-Lancrin, 2005). To this regard, it would be appropriate for each faculty to have trained and dedicated staff(s) with the sole responsibility of supporting faculty members in the quest to fulfill the e-Learning demands.
- Providing professional teachers development courses and training via e-Learning is a way to show lecturers how e-Learning works and how it could be applied in education. They could be inspired and understand what works and what may not work.
- Regular focus group should be held, where faculty members who use Blackboard or other platforms innovatively can share their experiences and information on how it helps in teaching or how they have engaged blackboard to improve delivery of knowledge. This will enlighten, encourage and motivate more people to be involved in e-Learning.
- Communication between e-Learning system custodians and faculty members needs to be improved drastically. In other to improve IT network and systems availability perception, there should be regular consultations in order to determine system availability needs of faculty members, and also getting faculty members aware of what is possible within the limits of the current available resources. This process will lead to an establishment of a Service Level Agreement (SLA). Such effort as an SLA can increase academic staff confidence in the network and the ICT infrastructure of the University, and thereby eliminating the bias against e-Learning.
- A system is of no use if it is not available to the user. Users' requirements take pre-eminence over all other requirements. As a result all needed investment should be made to satisfy the need user (Piedad & Hawkins, 2001, p.1). Resources should be made available by the relevant authority to sustain the availability requirement of the end-users as contained in the SLA.
- Improved end-user support should include use of web tools such as web video tutorials for quick access, wikis, frequently asked question (FAQ), blogs and online Blackboard community forums. This will facilitate quick access to relevant information and peer-to-peer assistance. Online collaboration is one quick way to get problems solved faster.
- There should be a clear and defined support structure that details the correct department/unit or individual to contact for different types of problems or difficulties encountered in the process of using Blackboard. Currently, all problems are channelled

to the Centre for e-Learning, but they do not have the capacity to handle issues relating to technical, desktop or web client.

- Faculty members with special needs (such as those advanced in age and those not tech-savvy) should be identified, and singled out for superior or specialised e-Learning platform assistance. With the conviction that e-Learning is implemented to assist in and improve the delivery of learning, no stone should be left unturned to ensure that a return of investment (ROI) is fully achieved.
- A form of incentive programme can be drawn up to reward faculty members who effectively participate in the e-Learning initiative. This could be in the form of implementing of a performance management system that recognizes and rewards innovative use of technology in teaching and learning, and/or a workload allocation that takes into account time for designing and implementing e-Learning contents
- There should be an implementation of quality initiatives such as reengineering, benchmarking and the PDCA cycle etc.

6.4.3 Recommendations based on quality management principles

Principles are needed to help us determine the right things to do and understand why we do what we do (Hoyle, 2006, p.34). The Word Power dictionary (2001, p.768) defines a principle as “the fundamental truth or proposition serving as the foundation for belief or action”.

A quality management principle is defined by the International Standards Organisation (ISO/TC 176) as a comprehensive and fundamental rule or belief, for leading and operating an organization, aimed at continually improving performance over the long term by focusing on customers while addressing the needs of all other interested parties (Hoyle, 2006). It enables all the people with different abilities and priorities to communicate readily with one another, in pursuit of a common goal (Oakland, 1999, p.59).

Cobb (2003, p.1), comments on the emerging approach to quality management. According to him, this new approach integrates quality into a broader spectrum known as business (or services) excellence. In this way, quality becomes an integral part in the way a business (in our context, teaching and learning) is designed. Quality therefore should go beyond the quality of service and take a broader meaning of maximizing the effectiveness of the teaching and learning process in meeting or exceeding the stakeholder value expectations and using continuous improvement to drive academic success (Cobb, 2003, p.1).

Therefore for an academic environment to be designed for teaching and learning excellence, a management approach and an organizational environment that supports ongoing

improvements must be developed. (Cobb, 2003, p.34). This involves the development and implementation of a learning quality management system (LQMS) which embodies the following fundamental principles for quality management:

1. **Student focus** – All design of academic environment should have the students as the foremost aim for all processes and activities. This will involve increased effectiveness in the use of the university's IT resources (which includes information technology and systems) to enhance learning environments with the aim of achieving high students' satisfaction. It will also require research by academic staff on best ways to serve the diversity of students and meet their most essential expectations. It is also expected that activities to measure student's satisfaction with a learning environment should be engaged in, and the results acted upon. This will ensure a system of continual improvement. To this regard, it is also expected that there should be a balanced approach between satisfying students and other interested parties (industry employers, local communities and society as a whole).

2. **Leadership –** According to ISO (2012), leaders establish unity of purpose and direction of the organisation. They should create and maintain the internal environment in which people can become fully involved in achieving the organisation's objectives. It is leadership responsibility to have all faculty members (and stakeholders) well informed about the potentials of an e-Learning program and leave them motivated towards achieving the university's academic goals and objectives through educational technologies. Leadership ensures that all learning activities are evaluated, aligned and implemented in a unified way.

   Furthermore, the following roles (as adapted from ISO) are expected to be played by the concerned or appropriate strata of leadership:

   - Considering the needs of all interested parties with regards to e-Learning including students, lecturers and support staff.
   - Establishing a clear vision for e-Learning at the university.
   - Setting challenging -Learning goals and targets.
   - Creating and sustaining with regards to e-Learning, shared values, fairness and ethical role models at all levels of the university.
   - Providing faculty members and students with the required resources, training and allowing academic staff some freedom to act with responsibility and accountability
   - Inspiring, encouraging and recognizing people's contributions.

3. **Involvement of people (academic and support staff)** – People at all levels are the essence of an organization and their full involvement enables their abilities to be used for the organization's benefit (ISO, 2012). In this case, stakeholder (including end-users and support personnel) should be involved in decisions pertaining to planning for, acquisition and implementation of educational systems.

4. **Process approach –** Desired results can be achieved more efficiently when learning activities and related resources are managed as a process. According to ISO (2012), applying the principle of process approach typically leads to:
   - Systematically defining the learning activities necessary to obtain a desired learning outcome.
   - Establishing clear responsibility and accountability for managing key learning activities.
   - Analysing and measuring of the capability of key learning activities.
   - Focusing on factors such as resources, methods, and materials that will improve learning at the faculty.
   - Evaluating risks, consequences and impacts of learning activities on students and lecturers and support staff.

5. **System approach –** According to ISO (2012), this principle suggests that identifying, understanding and managing interrelated processes as a system will contribute to the university's effectiveness and efficiency in achieving its academic objectives. To this regard, a culture of systems thinking should be introduced at all levels.

6. **Continual improvement –** This involves moving from lower to higher levels of academic excellence. Continual improvement of the individual faculty overall performance should be a permanent objective of the university. Applying the principle of continual improvement according to ISO (2012) leads to:
   - Employing a consistent institution-wide approach to continual improvement of the academic performance.
   - Providing all academic staff with training in the methods and tools of continual improvement. Such quality tools should include benchmarking, flow charting, Ishikawa diagram, the Demin's PDCA cycle etc.
   - Making continual improvement of resources, processes and systems an objective for every academic and support staff in the university.
   - Establishing goals to guide, and measures to track, continual improvement.

7. **Factual approach to decision-making** – This involves using data and statistics effectively. Accurate analysis of data and information can form the basis of effective decisions. Using data in instructional decisions has been shown by research to lead to improved student performance (Wayman et al., 2007). Through data, students' diverse needs could be addressed and academic improvement fostered. The following are benefits that could accrue through the principle of factual approach to decision making as contained in ISO documentation (ISO, 2012).
    - Informed decisions
    - An increased ability to demonstrate the effectiveness of past decisions through reference to factual records.
    - Increased ability to review, challenge and change opinions and decisions.
    - Ensuring that data and information are sufficiently accurate and reliable.
    - Making data accessible to those who need it.
    - Analysing data and information using valid methods.
    - Making decisions and taking action based on factual analysis, balanced with experience and intuition.

8. **Mutually beneficial support service relationships** – The faculties and supplier of services are interdependent and a mutually beneficial relationship enhances the ability of both to create value. The application of this eight principle according to ISO (2012) characteristically leads to:
    - Increased ability to create value for all parties involved in e-Learning.
    - Flexibility and speed of joint responses to changing needs and expectations of the parties involved.
    - Establishing relationships that balance short-term gains with long-term considerations.
    - Pooling of expertise and resources with partners.
    - Clear and open communication.
    - Sharing information and future plans.
    - Establishing joint development and improvement activities.
    - Inspiring, encouraging and recognizing improvements and achievements by support services.

6.5 THE RESEARCH QUESTION REVISITED

The research question which was formulated in Chapter 1 reads as follows:

"Can an effective e-Learning program implementation result in the transformation of teaching and learning at a University of Technology towards greater quality and quality management of teaching and learning imperatives"?

The research has attempted to answer the question through deduction made from acquired data. Through thorough review of literature and the empirical study, it is conclusively clear that an effective e-Learning program implementation can and will result in the transformation of teaching and learning at the University of Technology for maximum learner satisfaction, learner success, learner empowerment and faculty members' productivity. The key word is *effective implementation*. The much needed effort to facilitate buy-in by majority of the faculty members and process of organizational transformation needs to be initiated.

Recommendations based on standard and proven practices have been made in this research report. This recommendations are the result of extensive research of authorities in the field of e-Learning as contained in the literature review (see Chapter 3), and have been proven by leading universities.

6.6 FINAL CONCLUSION

As it appears, the institution is investing greatly in technology to enhance the learning environments it provides and to live up to its vision of being at the forefront of technology development in Africa. This is evident in the investment on e-resources (electronic resources) such e-books sites and the acquisition of an enterprise e-Learning platform - Blackboard. This investment in such ventures should spark off an e-revolution at the university. In order to efficiently employ all these resources made available to provide the most effective educational opportunities for students, it is therefore necessary for an e-Learning *quality* culture at faculty levels to ensure sufficient ROI.

Quality of products or services is a function of the process engaged. It can also be applicable in the education sector. One of the definitions of quality is *fitness for purpose*. And one purpose for education is to develop in individual students, the ability to solve problems and add value to themselves, their organisations and societies. The inability of an institution with all necessary resource to produce such a student raises questions of productivity. Productivity is in terms of how effectively and efficiently the available resources are used to transform (process) students (inputs) into capable individuals (outputs) in their respective fields. Figure 6.2 below shows a model for assessing improving productivity in education.

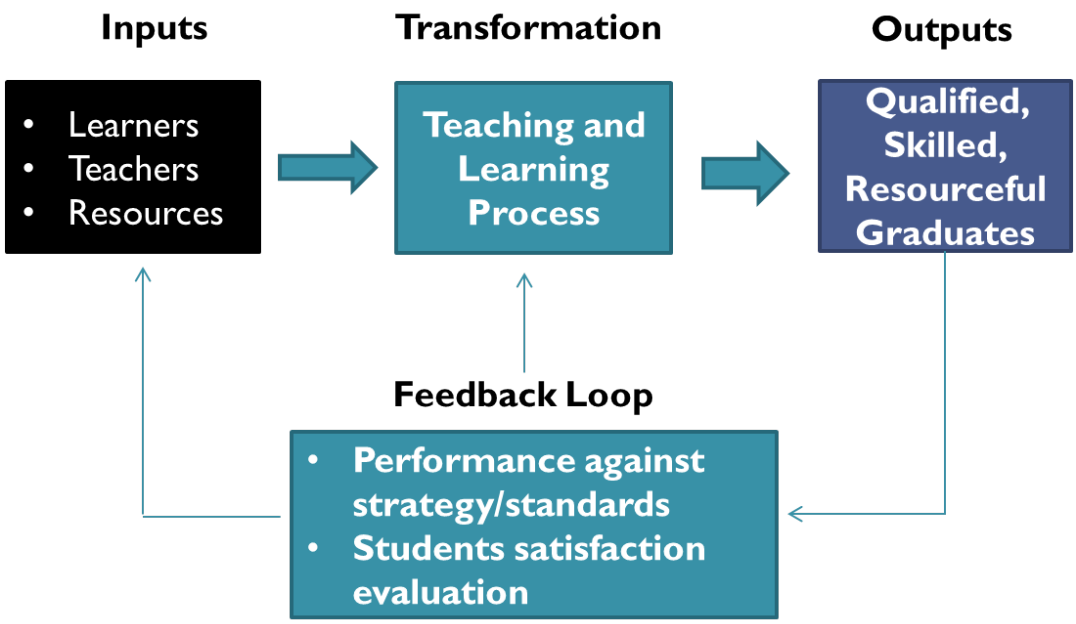

Figure 6.2: Productivity system for learning resources engagement (adapted from Heizer $ Render (2011, p.45)

Finally, the research has achieved the underlining objective. The critical research question has been successfully answered, and the research objectives were achieved. Future research projects should focus on how the current e-Learning platform (Blackboard) can be optimally used to support learning of individual subjects or courses, and what specialist e-Learning programs can be engaged for specific purposes. In addition, research on how mobile/smart phones applications can support students would be a worthwhile venture.

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APENDIX A: Reliability testing results

Scale: The effects of teaching methods on students' learning

Case Processing Summary

		N	%
Cases	Valid	44	100.0
	Excluded[a]	0	.0
	Total	44	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.776	.809	8

Item Statistics

	Mean	Std. Deviation	N
BQ09	4.32	.561	44
BQ10	4.57	.501	44
BQ11	4.61	.538	44
BQ12	4.32	.708	44
BQ13	3.95	.888	44
BQ14	4.36	.838	44
BQ15	4.52	.762	44
BQ16	4.07	1.043	44

Inter-Item Correlation Matrix

	BQ09	BQ10	BQ11	BQ12	BQ13	BQ14	BQ15	BQ16
BQ09	1.000	.500	.417	.559	.263	.342	.309	.280
BQ10	.500	1.000	.834	.265	.216	.549	.361	.369
BQ11	.417	.834	1.000	.208	.206	.577	.504	.172
BQ12	.559	.265	.208	1.000	.357	.193	.159	.379
BQ13	.263	.216	.206	.357	1.000	.304	.002	.229
BQ14	.342	.549	.577	.193	.304	1.000	.606	.343
BQ15	.309	.361	.504	.159	.002	.606	1.000	.188
BQ16	.280	.369	.172	.379	.229	.343	.188	1.000

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	.346	.002	.834	.832	533.828	.030	8

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
BQ09	30.41	11.596	.563	.463	.744
BQ10	30.16	11.579	.655	.781	.737
BQ11	30.11	11.591	.596	.777	.741
BQ12	30.41	11.364	.461	.416	.754
BQ13	30.77	11.296	.332	.257	.782
BQ14	30.36	10.004	.633	.563	.722
BQ15	30.20	11.283	.430	.494	.760
BQ16	30.66	10.183	.419	.336	.774

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
34.73	14.063	3.750	8

Scale: e-Learning features that enhance learning

Case Processing Summary

		N	%
Cases	Valid	40	90.9
	Excluded[a]	4	9.1
	Total	44	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.863	.868	7

Item Statistics

	Mean	Std. Deviation	N
BQ17	4.43	.549	40
BQ18	4.33	.694	40
BQ19	4.38	.705	40
BQ20	4.35	.662	40
BQ21	4.35	.700	40
BQ22	4.15	.864	40
BQ23	4.25	.630	40

Inter-Item Correlation Matrix

	BQ17	BQ18	BQ19	BQ20	BQ21	BQ22	BQ23
BQ17	1.000	.570	.571	.426	.337	.511	.574
BQ18	.570	1.000	.583	.583	.446	.558	.572
BQ19	.571	.583	1.000	.591	.455	.537	.534
BQ20	.426	.583	.591	1.000	.614	.354	.338
BQ21	.337	.446	.455	.614	1.000	.378	.203
BQ22	.511	.558	.537	.354	.378	1.000	.447
BQ23	.574	.572	.534	.338	.203	.447	1.000

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	.485	.203	.614	.411	3.019	.012	7

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
BQ17	25.80	10.267	.661	.479	.844
BQ18	25.90	9.272	.744	.575	.828
BQ19	25.85	9.259	.732	.554	.830
BQ20	25.88	9.804	.640	.552	.843
BQ21	25.88	10.061	.528	.421	.859
BQ22	26.08	8.994	.609	.423	.852
BQ23	25.98	10.179	.577	.461	.852

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
30.23	12.897	3.591	7

Scale: Effect of e-Learning on how lecturers teach

Case Processing Summary

		N	%
Cases	Valid	40	90.9
	Excluded[a]	4	9.1
	Total	44	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.873	.874	6

Item Statistics

	Mean	Std. Deviation	N
BQ24	4.08	.797	40
BQ25	4.18	.813	40
BQ26	4.03	.974	40
BQ27	3.68	.997	40
BQ28	3.53	1.012	40
BQ29	4.03	.947	40

Inter-Item Correlation Matrix

	BQ24	BQ25	BQ26	BQ27	BQ28	BQ29
BQ24	1.000	.494	.757	.548	.585	.575
BQ25	.494	1.000	.545	.325	.477	.361
BQ26	.757	.545	1.000	.484	.533	.667
BQ27	.548	.325	.484	1.000	.732	.606
BQ28	.585	.477	.533	.732	1.000	.360
BQ29	.575	.361	.667	.606	.360	1.000

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	.537	.325	.757	.432	2.330	.016	6

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
BQ24	19.43	13.789	.760	.633	.840
BQ25	19.33	14.892	.537	.362	.872
BQ26	19.48	12.717	.757	.698	.836
BQ27	19.83	12.969	.691	.697	.848
BQ28	19.98	12.948	.679	.679	.851
BQ29	19.48	13.538	.644	.622	.856

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
23.50	18.923	4.350	6

Scale: E-Learning strategies for achieving desired outcomes

Case Processing Summary

		N	%
Cases	Valid	40	90.9
	Excluded[a]	4	9.1
	Total	44	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.901	.909	8

Item Statistics

	Mean	Std. Deviation	N
BQ30	4.03	.862	40
BQ31	4.08	.694	40
BQ32	4.15	.864	40
BQ33	3.95	.846	40
BQ34	3.80	.992	40
BQ35	4.28	.554	40
BQ36	4.20	.608	40
BQ37	3.93	.888	40

Inter-Item Correlation Matrix

	BQ30	BQ31	BQ32	BQ33	BQ34	BQ35	BQ36	BQ37
BQ30	1.000	.468	.615	.529	.486	.415	.627	.438
BQ31	.468	1.000	.494	.662	.581	.745	.572	.550
BQ32	.615	.494	1.000	.607	.365	.233	.625	.550
BQ33	.529	.662	.607	1.000	.721	.577	.519	.575
BQ34	.486	.581	.365	.721	1.000	.709	.493	.623
BQ35	.415	.745	.233	.577	.709	1.000	.594	.564
BQ36	.627	.572	.625	.519	.493	.594	1.000	.599
BQ37	.438	.550	.550	.575	.623	.564	.599	1.000

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	.555	.233	.745	.512	3.198	.012	8

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
BQ30	28.38	18.753	.643	.517	.893
BQ31	28.33	19.353	.731	.685	.886
BQ32	28.25	18.808	.633	.703	.894
BQ33	28.45	17.997	.778	.692	.880
BQ34	28.60	17.374	.718	.694	.888
BQ35	28.13	20.522	.691	.774	.892
BQ36	28.20	19.959	.731	.651	.888
BQ37	28.48	18.153	.707	.561	.887

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
32.40	24.297	4.929	8

APPENDIX B: Frequency Distribution- Impact of e-Learning on teaching and learning quality instrument

Table 5.21 Descriptive statistics for all the categorical demographic variables

Variable Code and description		Category	Percentage	Frequency
AQ1.	In which campus of the university are you based?	Athlone	4%	2
		Bellville	58%	26
		Cape Town	27%	12
		Granger Bay	2%	1
		Groote Schuur	2%	1
		Mowbray	0%	0
		Wellington	4%	2
2.	Please indicate your faculty	Applied Sciences	2%	1
		Business	20%	9
		Education and Social Sciences	4%	2
		Engineering	42%	19
		Health and Wellness Sciences	7%	3
		Informatics and Design	4%	2
		Non-academic/Support	20%	9
3.	Position held at Faculty/Department	Dean	0%	0
		Deputy Dean	0%	0
		HOD	2%	1
		Lecturer	62%	28
		Administration	7%	3
		Other, (please specify)	29%	13
4.	Years of teaching/lecturing experience.	Below 5 years	18%	8
		5 to 10 years	24%	11
		over 10 years	38%	17
		Not a lecturer	20%	9
5.	How often do you use Blackboard (University's e-Learning Platform) for your lecturing activities	Daily	11%	5
		1 - 3 times/week	24%	11
		every other week	11%	5
		Rarely	7%	3
		Only when it is required	20%	9
		Never	20%	9
		Not a lecturer	7%	3
6.	Do you use Blackboard beyond the distribution of class notes and course contents?	Yes	44%	20
		No	49%	22
		I am not a lecturer	7%	3
7.	Do you engage other web platforms such as Facebook, Google Docs, Twitter and Blog Sites in your teaching and learning activities?	Yes	53%	24
		No	47%	21
8.	How would you rate your proficiency in ICT (Internet/Web) and Computer Skills?	Expert	38%	17
		Intermediate	49%	22

		Basic	13%	6
		Novice	0%	0
9.	A style of instruction/teaching that accommodates individual styles of learning improves students learning experience.	Strongly disagree	0%	0
		Disagree	0%	0
		Uncertain	0%	0
		Agree	58%	25
		Strongly Agree	35%	15
10.	A teaching method that increasingly engages students enhances students' learning experience.	Strongly disagree	0%	0
		Disagree	0%	0
		Uncertain	0%	0
		Agree	42%	18
		Strongly Agree	58%	25
11.	A teaching method that allows active and responsible participation of students in the learning process improves outcomes.	Strongly disagree	0%	0
		Disagree	0%	0
		Uncertain	2%	1
		Agree	35%	15
		Strongly Agree	63%	27
12.	A system of continuous assessment and prompt feedback on assessment results improves how students learn.	Strongly disagree	0%	0
		Disagree	5%	2
		Uncertain	0%	0
		Agree	57%	24
		Strongly Agree	38%	16
13.	Lecture activities that involve students working in teams to accomplish an assigned task fosters their learning process.	Strongly disagree	0%	0
		Disagree	10%	4
		Uncertain	14%	6
		Agree	50%	21
		Strongly Agree	26%	11
14.	Teaching methods that encourage and allow students to become independent learners improves their academic performance.	Strongly Disagree	0%	0
		Disagree	5%	2
		Uncertain	10%	4
		Agree	33%	14
		Strongly Agree	52%	22
15.	Assessments that require students to deeply understand the concept being taught, rather than memorize the content improves the way students learn.	Strongly Disagree	2%	1
		Disagree	0%	0
		Uncertain	2%	1
		Agree	36%	15
		Strongly Agree	60%	25
16.	A learning environment that involves the innovative use of technology in teaching and learning improves students' learning experience.	Strongly Disagree	2%	1
		Disagree	10%	4
		Uncertain	10%	4
		Agree	40%	17
		Strongly Agree	38%	16
17.	Students' learning experience is improved by a learning environment that incorporates different types of interactivity and direct feedback.	Strongly Disagree	0%	0
		Disagree	0%	0
		Uncertain	2%	1
		Agree	55%	23
		Strongly Agree	43%	18
18.	A learning environment that allows for active and flexible learning has the ability to improve students learning experience.	Strongly Disagree	0%	0
		Disagree	5%	2
		Uncertain	5%	2
		Agree	49%	20
		Strongly Agree	41%	17
19.	A learning environment that encourages continuous study and revision through a system of continuous [formative] assessment contributes to students ' success in the final test/exams.	Strongly Disagree	0%	0
		Disagree	5%	2
		Uncertain	5%	2
		Agree	43%	17
		Strongly Agree	48%	19

20.	A learning environment that takes into account the individual learning styles and needs of the students improves the way students learn.	Strongly Disagree	0%	0
		Disagree	3%	1
		Uncertain	3%	1
		Agree	53%	21
		Strongly Agree	43%	17
21.	A learning environment in which the instruction methods match students' needs increases their motivation to learn.	Strongly Disagree	0%	0
		Disagree	3%	1
		Uncertain	3%	1
		Agree	50%	20
		Strongly Agree	45%	18
22.	A learning environment that provides students with ample opportunities for interaction, communication, and cooperation with peers and instructors leads to authentic knowledge construction.	Strongly Disagree	0%	0
		Disagree	8%	3
		Uncertain	8%	3
		Agree	49%	19
		Strongly Agree	36%	14
23.	A learning environment that encourages students to development self-regulation skills improves the way they learn.	Strongly Disagree	0%	0
		Disagree	0%	0
		Uncertain	10%	4
		Agree	54%	21
		Strongly Agree	36%	14
24.	A lecturer understanding of the possibilities and potentials of an e-Learning program increases their motivation to be more effective in the delivery of instructions.	Strongly Disagree	0%	0
		Disagree	5%	2
		Uncertain	13%	5
		Agree	53%	20
		Strongly Agree	29%	11
25.	The implementation of a curriculum that includes e-Learning requires lecturers to improve on their instruction delivery skills.	Strongly Disagree	0%	0
		Disagree	5%	2
		Uncertain	11%	4
		Agree	45%	17
		Strongly Agree	39%	15
26.	The introduction of e-Learning in the curriculum increases the efficiency of lecturers in their role as learning facilitators.	Strongly Disagree	3%	1
		Disagree	5%	2
		Uncertain	13%	5
		Agree	42%	16
		Strongly Agree	37%	14
27.	The introduction of e-Learning in the curriculum brings about increased collaboration among lecturers and experts.	Strongly Disagree	5%	2
		Disagree	5%	2
		Uncertain	26%	10
		Agree	45%	17
		Strongly Agree	18%	7
28.	Introduction of e-Learning into the curriculum encourages research-based instruction techniques.	Strongly Disagree	5%	2
		Disagree	8%	3
		Uncertain	32%	12
		Agree	39%	15
		Strongly Agree	16%	6
29.	A teaching method that involves innovative use of an e-Learning platform provokes and engages lecturers' creativity.	Strongly Disagree	3%	1
		Disagree	5%	2
		Uncertain	13%	5
		Agree	45%	17
		Strongly Agree	34%	13
30.	Gradual and systematic integration of e-Learning with traditional instruction methods boosts students acceptance and confidence in use of e-Learning	Strongly Disagree	3%	1
		Disagree	3%	1
		Uncertain	11%	4
		Agree	55%	21

	platforms.	Strongly Agree	29%	11
31.	An e-Learning environment that provides self-directed activities increases students' motivation to learn and improve learning outcome.	Strongly Disagree	0%	0
		Disagree	0%	0
		Uncertain	18%	7
		Agree	53%	20
		Strongly Agree	29%	11
32.	An instructional method that provides a greater variety of interactions and richer media (video, audio) and self-directed activities improves learning outcome.	Strongly Disagree	0%	0
		Disagree	8%	3
		Uncertain	5%	2
		Agree	47%	18
		Strongly Agree	39%	15
33.	The adaptation of best practices for teaching in an e-Learning environment results in achievement of desired learning outcomes.	Strongly Disagree	0%	0
		Disagree	5%	2
		Uncertain	21%	8
		Agree	45%	17
		Strongly Agree	29%	11
34.	The redesign of the curriculum to include the use of e-Learning as an instructional (teaching and learning) method can improve the quality of teaching and learning.	Strongly Disagree	3%	1
		Disagree	11%	4
		Uncertain	13%	5
		Agree	50%	19
		Strongly Agree	24%	9
35.	Well-designed e-Learning activities in which learners play active roles engages and motivates them to learn more effectively.	Strongly Disagree	0%	0
		Disagree	0%	0
		Uncertain	5%	2
		Agree	61%	23
		Strongly Agree	34%	13
36.	Identifying instructional problems and then designing, developing and implementing hybrid instructional solutions improves teaching and learning experiences.	Strongly Disagree	0%	0
		Disagree	0%	0
		Uncertain	11%	4
		Agree	58%	22
		Strongly Agree	32%	12
37.	An informed understanding of students' approaches to learning by lecturers leads to the design of highly engaging e-Learning environment.	Strongly Disagree	3%	1
		Disagree	3%	1
		Uncertain	18%	7
		Agree	50%	19
		Strongly Agree	26%	10

APPENDIX C: Spearman's rho rank-order coefficient

Table 5.0.1: Correlation

	BQ10	BQ11	BQ12	BQ13	BQ14	BQ15	BQ16	BQ17	BQ18	BQ19	BQ20	BQ21	BQ22	BQ23	BQ24	BQ25	BQ26	BQ27	BQ28	BQ29	BQ30	BQ31	BQ32	BQ33	BQ34	BQ35	BQ36	BQ37
BQ09	.556**	.480**	.587**	.328*	.429**	.388**	.389**	.420**	.466**	.648**	.723**	.343*	.504**	.344*	.481**	.210	.252	.331*	.313*	.291	.425**	.372*	.420**	.425**	.288	.432**	.315*	.441**
BQ10		.862**	.453**	.301*	.628**	.421**	.427**	.602**	.585**	.480**	.468**	.477**	.459**	.560**	.251	.041	.108	0.000	-.032	.220	.202	.185	.323*	.274	.229	.356*	.212	.354*
BQ11			.367*	.291	.551**	.385**	.275	.495**	.526**	.344*	.374*	.422**	.443**	.496**	.157	-.016	.077	.068	-.026	.153	.111	.097	.267	.211	.188	.212	.088	.320*
BQ12				.358*	.382*	.314*	.441**	.419**	.462**	.604**	.625**	.463**	.421**	.400**	.377*	.131	.107	.251	.209	.373*	.385*	.284	.314*	.253	.299	.438**	.224	.223
BQ13					.378*	.080	.218	.408**	.480**	.484**	.402**	.408**	.605**	.554**	.172	.019	.024	.073	.069	.045	.355*	.181	.407**	.267	.106	.138	.494**	.170
BQ14						.588**	.442**	.522**	.449**	.342*	.294	.236	.616**	.604**	.314*	.214	.182	.027	.024	.310	.174	.345*	.286	.392*	.385*	.360*	.186	.256
BQ15							.262	.268	.358*	.377*	.321*	.157	.325*	.228	.314*	.067	.245	.055	-.040	.307	.224	.194	.239	.253	.364*	.239	.223	.300
BQ16								.523**	.608**	.307*	.518**	.345*	.266	.382*	.589**	.334*	.443**	.620**	.448**	.489**	.376*	.418**	.411**	.553**	.536**	.469**	.251	.410**
BQ17									.691**	.529**	.603**	.480**	.575**	.594**	.287	.441**	.280	.256	.065	.452**	.307	.453**	.317*	.257	.334*	.584**	.328*	.238
BQ18										.537**	.581**	.480**	.539**	.660**	.435**	.246	.294	.402*	.110	.398*	.354*	.401*	.327*	.384*	.460**	.462**	.310	.338*
BQ19											.588**	.438**	.618**	.502**	.494**	.295	.306	.222	.219	.345*	.490**	.488**	.584**	.523**	.475**	.499**	.558**	.458**
BQ20												.556**	.465**	.398*	.418**	.328*	.219	.391*	.383*	.324*	.513**	.412**	.453**	.367*	.206	.433**	.375*	.377*
BQ21													.401**	.288	.073	.095	.049	.319*	.183	.241	.523**	.230	.500**	.325*	.317*	.352*	.468**	.243
BQ22														.555**	.147	.145	.169	.168	.112	.252	.304	.380*	.416**	.420**	.353*	.374*	.433**	.299
BQ23															.484**	.207	.250	.248	.217	.367*	.140	.438**	.339*	.441**	.333*	.431**	.278	.386*
BQ24																.548**	.725**	.584**	.581**	.580**	.466**	.585**	.345*	.621**	.636**	.606**	.327*	.555**
BQ25																	.680**	.456**	.526**	.560**	.370*	.411**	.172	.336*	.459**	.551**	.248	.246
BQ26																		.487**	.470**	.658**	.405**	.478**	.251	.632**	.736**	.688**	.331*	.496**
BQ27																			.701**	.615**	.379*	.424**	.504**	.476**	.508**	.373*	.265	.563**
BQ28																				.365*	.434**	.490**	.442**	.566**	.417**	.337*	.287	.491**
BQ29																					.313*	.454**	.377*	.457**	.594**	.649**	.235	.415**
BQ30																						.530**	.561**	.505**	.541**	.525**	.709**	.441**
BQ31																							.503**	.689**	.654**	.753**	.558**	.583**
BQ32																								.682**	.486**	.305	.633**	.672**
BQ33																									.753**	.567**	.517**	.584**
BQ34																										.701**	.500**	.578**
BQ35																											.567**	.526**
BQ36																												.601**

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

APPENDIX D: Reliability testing – Success with SAM instrument

Scale: Success with SAM

Case Processing Summary

		N	%
Cases	Valid	111	93.3
	Excluded[a]	8	6.7
	Total	119	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.878	.883	15

Item Statistics

	Mean	Std. Deviation	N
STUD_BQ3	4.28	.844	111
STUD_BQ4	4.36	.861	111
STUD_BQ5	4.46	.711	111
STUD_BQ6	4.47	.685	111
STUD_BQ7	4.60	.607	111
STUD_BQ8	4.23	.934	111
STUD_BQ9	4.26	.860	111
STUD_BQ10	4.56	.670	111
STUD_BQ11	4.32	.753	111
STUD_BQ12	4.20	.784	111
STUD_BQ13	4.32	.726	111
STUD_BQ14	4.46	.644	111
STUD_BQ15	3.95	.898	111
STUD_BQ16	4.30	.758	111
STUD_BQ17	4.42	.930	111

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Inter-Item Correlations	.334	.023	.619	.596	27.112	.013	15

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
STUD_BQ3	60.92	44.693	.497	.397	.872
STUD_BQ4	60.84	45.610	.401	.292	.877
STUD_BQ5	60.74	44.504	.633	.568	.866
STUD_BQ6	60.73	44.963	.608	.570	.867
STUD_BQ7	60.59	45.898	.577	.386	.869
STUD_BQ8	60.96	43.381	.550	.390	.870
STUD_BQ9	60.94	44.751	.480	.317	.873
STUD_BQ10	60.64	45.269	.588	.512	.868
STUD_BQ11	60.87	43.402	.710	.625	.862
STUD_BQ12	61.00	46.127	.401	.317	.876
STUD_BQ13	60.88	44.541	.614	.476	.867
STUD_BQ14	60.74	47.267	.377	.352	.876
STUD_BQ15	61.24	44.004	.521	.376	.871
STUD_BQ16	60.90	43.745	.668	.512	.864
STUD_BQ17	60.77	44.267	.476	.342	.873

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
65.20	51.015	7.142	15

APPENDIX E: Frequency Distribution- The effectiveness of SAM as an e-Learning program survey

Table 2 Descriptive statistics for all the categorical demographic variables

Variable	Category	Relative frequency	Frequency
1. Was computer studies part of your high school curriculum?	Yes	38%	**56**
	NO	62%	**91**
2. If yes, which of the following software packages did you work with or learn at high school? Select all possible options.	Microsoft Word	37%	**56**
	Microsoft Excel	30%	**45**
	Microsoft PowerPoint	29%	**44**
	Microsoft Project	3%	**5**
3. Before studying Computer skills or End User Computing at the university, how will you rate your skills in these software packages?	**Microsoft Word**		
	Expert	28%	**41**
	Intermediate	28%	**41**
	Basic	31%	**45**
	Novice	12%	**17**
	Microsoft Excel		
	Expert	11%	**15**
	Intermediate	28%	**40**
	Basic	35%	**50**
	Novice	26%	**37**
	Microsoft PowerPoint		
	Expert	22%	**31**
	Intermediate	22%	**31**
	Basic	31%	**44**
	Novice	25%	**35**
	Microsoft Project		
	Expert	4%	**5**
	Intermediate	11%	**15**
	Basic	29%	**40**
	Novice	57%	**79**
	Using the Web and Internet		
	Expert	34%	**47**
	Intermediate	36%	**51**
	Basic	24%	**33**
	Novice	6%	**9**
4. How will you rate your skills level on completion of the subject?	**Microsoft Word**		
	Expert	55%	**78**
	Intermediate	38%	**54**
	Basic	6%	**9**
	Novice	1%	**2**
	Microsoft Excel		
	Expert	28%	**40**
	Intermediate	51%	**72**
	Basic	20%	**29**
	Novice	1%	**1**
	Microsoft PowerPoint		
	Expert	45%	**64**
	Intermediate	38%	**54**

		Basic	15%	**22**
		Novice	1%	**2**
		Microsoft Project		
		Expert	13%	**19**
		Intermediate	32%	**46**
		Basic	41%	**58**
		Novice	13%	**19**
		Using the Web and Internet		
		Expert	61%	**86**
		Intermediate	33%	**46**
		Basic	5%	**7**
		Novice	1%	**1**
5.	Select the range that best places you final mark for the assessment of each software package.	**Microsoft Word**		
		0 - 30	4%	**5**
		31 - 49	4%	**5**
		50 - 74	28%	**39**
		75 - 89	28%	**38**
		90 - 100	37%	**51**
		Microsoft Excel		
		0 - 30	1%	**2**
		31 - 49	8%	**11**
		50 - 74	31%	**42**
		75 - 89	38%	**51**
		90 - 100	21%	**29**
		Microsoft PowerPoint		
		0 - 30	3%	**4**
		31 - 49	6%	**8**
		50 - 74	27%	**37**
		75 - 89	35%	**48**
		90 - 100	29%	**40**
		Microsoft Project		
		0 - 30	19%	**25**
		31 - 49	20%	**27**
		50 - 74	39%	**52**
		75 - 89	17%	**23**
		90 - 100	5%	**6**
6.	Please indicate the semester or year of study of the subject	2012 Semester 1 (CMS)	6%	**9**
		2012 Semester 2 (CMS)	3%	**4**
		2013 Semester 1 (CMS)	23%	**32**
		2012 (EUC)	11%	**16**
		2013 (EUC)	56%	**79**
7.	What was your overall level of satisfaction with SAM 2007 or SAM 2010	Very satisfied	66%	**78**
		Somewhat Satisfied	28%	**33**
		Somewhat Unsatisfied	5%	**6**
		Very Unsatisfied	2%	**2**

8.	How valuable was SAM 2007/2010 to your learning of Microsoft Office software packages?	Very Useful	84%	**100**
		Somewhat Useful	13%	**16**
		Not Very Useful	3%	**3**
		Never liked it	0%	**0**
9.	SAM has helped me develop comfort in the use of the web and the internet.	Strongly Agree	48%	**58**
		Agree	39%	**47**
		Neutral	8%	**10**
		Disagree	5%	**6**
		Strongly Disagree	0%	**0**
10.	SAM reduces test anxiety because students are better prepared through practice tests	Strongly Agree	55%	**66**
		Agree	34%	**41**
		Neutral	6%	**7**
		Disagree	3%	**3**
		Strongly Disagree	2%	**2**
11.	Using SAM made learning Microsoft Office Word, Excel and PowerPoint enjoyable.	Strongly Agree	56%	**66**
		Agree	34%	**40**
		Neutral	9%	**11**
		Disagree	1%	**1**
		Strongly Disagree	0%	**0**
12.	SAM helped me to achieve better understanding of the use of Microsoft Office Word, Excel and PowerPoint	Strongly Agree	57%	**67**
		Agree	34%	**40**
		Neutral	8%	**9**
		Disagree	1%	**1**
		Strongly Disagree	0%	**0**
13.	I recommend continued use of SAM	Strongly Agree	67%	**77**
		Agree	27%	**31**
		Neutral	6%	**7**
		Disagree	0%	**0**
		Strongly Disagree	0%	**0**
14.	I wish my other subjects were taught using a program like SAM	Strongly Agree	50%	**59**
		Agree	33%	**39**
		Neutral	12%	**14**
		Disagree	3%	**4**
		Strongly Disagree	2%	**2**
15.	SAM helped me achieve a higher grade than I would have otherwise	Strongly Agree	48%	**57**
		Agree	35%	**41**
		Neutral	14%	**16**
		Disagree	3%	**3**
		Strongly Disagree	1%	**1**
16.	SAM practice sessions helped me to prepare for exams	Strongly Agree	65%	**77**
		Agree	29%	**35**
		Neutral	4%	**5**
		Disagree	2%	**2**
		Strongly Disagree	0%	**0**
17.	SAM helped me understand the subject matter	Strongly Agree	46%	**54**
		Agree	41%	**48**
		Neutral	11%	**13**
		Disagree	2%	**2**
		Strongly Disagree	0%	**0**
18.	SAM was easy to use	Strongly Agree	39%	**47**
		Agree	43%	**51**
		Neutral	16%	**19**

		Disagree	2%	**2**
		Strongly Disagree	0%	**0**
19.	SAM made the course more visual and interactive	Strongly Agree	47%	**56**
		Agree	39%	**46**
		Neutral	14%	**17**
		Disagree	0%	**0**
		Strongly Disagree	0%	**0**
20.	The immediate result and feedback offered by SAM was very useful	Strongly Agree	53%	**63**
		Agree	38%	**45**
		Neutral	8%	**10**
		Disagree	1%	**1**
		Strongly Disagree	0%	**0**
21.	Simulations (video trainings) of the software packages was useful	Strongly Agree	29%	**35**
		Agree	45%	**54**
		Neutral	20%	**24**
		Disagree	3%	**4**
		Strongly Disagree	3%	**3**
22.	The flexibility offered by SAM was useful to my learning style	Strongly Agree	45%	**54**
		Agree	41%	**49**
		Neutral	13%	**15**
		Disagree	2%	**2**
		Strongly Disagree	0%	**0**
23.	I would have performed better in Microsoft project if it was taught using SAM	Strongly Agree	67%	**80**
		Agree	17%	**20**
		Neutral	13%	**16**
		Disagree	2%	**2**
		Strongly Disagree	2%	**2**

APPENDIX F: Cross tabulation results for Success with SAM questionnaire

STUD_AQ1 * STUD_AQ2EXCEL

Crosstab

			STUD_AQ2EXCEL		Total
			Did not	Worked with Ms Excel	
STUD_AQ1	No	Count	76	0	76
		% within STUD_AQ1	100.0%	0.0%	100.0%
	Yes	Count	9	34	43
		% within STUD_AQ1	20.9%	79.1%	100.0%
Total		Count	85	34	119
		% within STUD_AQ1	71.4%	28.6%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	.841	.047	10.567	.000
	Kendall's tau-c	.730	.069	10.567	.000
N of Valid Cases		119			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

STUD_AQ1 * STUD_AQ2PWPOINT

Crosstab

			STUD_AQ2PWPOINT		Total
			Did not	Worked with Ms PwPoint	
STUD_AQ1	No	Count	76	0	76
		% within STUD_AQ1	100.0%	0.0%	100.0%
	Yes	Count	11	32	43
		% within STUD_AQ1	25.6%	74.4%	100.0%
Total		Count	87	32	119
		% within STUD_AQ1	73.1%	26.9%	100.0%

STUD_AQ1 * STUD_AQ2_MSPROJECT

Crosstab

			STUD_AQ2_MSPROJECT		Total
			Did not	Worked with Ms Project	
STUD_AQ1	No	Count	76	0	76
		% within STUD_AQ1	100.0%	0.0%	100.0%
	Yes	Count	41	2	43
		% within STUD_AQ1	95.3%	4.7%	100.0%
Total		Count	117	2	119
		% within STUD_AQ1	98.3%	1.7%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	.174	.061	1.444	.149
	Kendall's tau-c	.043	.030	1.444	.149
N of Valid Cases		119			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

STUD_AQ1 * STUD_AQ3WD

Crosstab

			STUD_AQ3WD				Total
			Novice	Basic	Intermediate	Expert	
STUD_AQ1	No	Count	14	31	14	17	76
		% within STUD_AQ1	18.4%	40.8%	18.4%	22.4%	100.0%
	Yes	Count	1	9	20	13	43
		% within STUD_AQ1	2.3%	20.9%	46.5%	30.2%	100.0%
Total		Count	15	40	34	30	119
		% within STUD_AQ1	12.6%	33.6%	28.6%	25.2%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	.271	.075	3.558	.000
	Kendall's tau-c	.314	.088	3.558	.000
N of Valid Cases		119			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

STUD_AQ1 * STUD_AQ3EX

Crosstab

			STUD_AQ3EX				Total
			Novice	Basic	Intermediate	Expert	
STUD_AQ1	No	Count	28	24	20	4	76
		% within STUD_AQ1	36.8%	31.6%	26.3%	5.3%	100.0%
	Yes	Count	3	20	14	6	43
		% within STUD_AQ1	7.0%	46.5%	32.6%	14.0%	100.0%
Total		Count	31	44	34	10	119
		% within STUD_AQ1	26.1%	37.0%	28.6%	8.4%	100.0%

STUD_AQ1 * STUD_AQ3PP

Crosstab

			STUD_AQ3PP				Total
			Novice	Basic	Intermediate	Expert	
STUD_AQ1	No	Count	27	24	15	10	76
		% within STUD_AQ1	35.5%	31.6%	19.7%	13.2%	100.0%
	Yes	Count	3	15	14	11	43
		% within STUD_AQ1	7.0%	34.9%	32.6%	25.6%	100.0%
Total		Count	30	39	29	21	119
		% within STUD_AQ1	25.2%	32.8%	24.4%	17.6%	100.0%

STUD_AQ1 * STUD_AQ3MP

Crosstab

			STUD_AQ3MP				Total
			Novice	Basic	Intermediate	Expert	
STUD_AQ1	No	Count	45	24	6	1	76
		% within STUD_AQ1	59.2%	31.6%	7.9%	1.3%	100.0%
	Yes	Count	25	13	4	1	43
		% within STUD_AQ1	58.1%	30.2%	9.3%	2.3%	100.0%
Total		Count	70	37	10	2	119
		% within STUD_AQ1	58.8%	31.1%	8.4%	1.7%	100.0%

STUD_AQ1 * STUD_AQ3WEB

Crosstab

			STUD_AQ3WEB				Total
			Novice	Basic	Intermediate	Expert	
STUD_AQ1	No	Count	7	22	25	22	76
		% within STUD_AQ1	9.2%	28.9%	32.9%	28.9%	100.0%
	Yes	Count	1	9	16	17	43
		% within STUD_AQ1	2.3%	20.9%	37.2%	39.5%	100.0%
Total		Count	8	31	41	39	119
		% within STUD_AQ1	6.7%	26.1%	34.5%	32.8%	100.0%

STUD_AQ1 * STUD_AQ4WD

Crosstab

			STUD_AQ4WD				Total
			Novice	Basic	Intermediate	Expert	
STUD_AQ1	No	Count	2	7	26	41	76
		% within STUD_AQ1	2.6%	9.2%	34.2%	53.9%	100.0%
	Yes	Count	0	2	16	25	43
		% within STUD_AQ1	0.0%	4.7%	37.2%	58.1%	100.0%
Total		Count	2	9	42	66	119
		% within STUD_AQ1	1.7%	7.6%	35.3%	55.5%	100.0%

STUD_AQ1 * STUD_AQ4EX

Crosstab

			STUD_AQ4EX				Total
			Novice	Basic	Intermediate	Expert	
STUD_AQ1	No	Count	1	15	41	19	76
		% within STUD_AQ1	1.3%	19.7%	53.9%	25.0%	100.0%
	Yes	Count	0	8	23	12	43
		% within STUD_AQ1	0.0%	18.6%	53.5%	27.9%	100.0%
Total		Count	1	23	64	31	119
		% within STUD_AQ1	0.8%	19.3%	53.8%	26.1%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	.038	.087	.440	.660
	Kendall's tau-c	.040	.092	.440	.660
N of Valid Cases		119			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

STUD_AQ1 * STUD_AQ4PP

Crosstab

			STUD_AQ4PP				Total
			Novice	Basic	Intermediate	Expert	
STUD_AQ1	No	Count	1	13	28	34	76
		% within STUD_AQ1	1.3%	17.1%	36.8%	44.7%	100.0%
	Yes	Count	1	8	12	22	43
		% within STUD_AQ1	2.3%	18.6%	27.9%	51.2%	100.0%
Total		Count	2	21	40	56	119
		% within STUD_AQ1	1.7%	17.6%	33.6%	47.1%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	.032	.088	.358	.720
	Kendall's tau-c	.034	.095	.358	.720
N of Valid Cases		119			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

STUD_AQ1 * STUD_AQ4MP

Crosstab

			STUD_AQ4MP				Total
			Novice	Basic	Intermediate	Expert	
STUD_AQ1	No	Count	9	33	27	7	76
		% within STUD_AQ1	11.8%	43.4%	35.5%	9.2%	100.0%
	Yes	Count	8	15	14	6	43
		% within STUD_AQ1	18.6%	34.9%	32.6%	14.0%	100.0%
Total		Count	17	48	41	13	119
		% within STUD_AQ1	14.3%	40.3%	34.5%	10.9%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	-.002	.088	-.020	.984
	Kendall's tau-c	-.002	.100	-.020	.984
N of Valid Cases		119			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

STUD_AQ1 * STUD_AQ4WEB

Crosstab

			STUD_AQ4WEB				Total
			Novice	Basic	Intermediate	Expert	
STUD_AQ1	No	Count	1	4	24	47	76
		% within STUD_AQ1	1.3%	5.3%	31.6%	61.8%	100.0%
	Yes	Count	0	2	13	28	43
		% within STUD_AQ1	0.0%	4.7%	30.2%	65.1%	100.0%
Total		Count	1	6	37	75	119
		% within STUD_AQ1	0.8%	5.0%	31.1%	63.0%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	.037	.088	.417	.676
	Kendall's tau-c	.036	.085	.417	.676
N of Valid Cases		119			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

STUD_AQ1 * STUD_AQ5WD

Crosstab

			STUD_AQ5WD					Total
			0 - 30	31 - 49	50 - 74	75 - 89	90 - 100	
STUD_AQ1	No	Count	3	2	24	17	30	76
		% within STUD_AQ1	3.9%	2.6%	31.6%	22.4%	39.5%	100.0%
	Yes	Count	2	2	8	16	14	42
		% within STUD_AQ1	4.8%	4.8%	19.0%	38.1%	33.3%	100.0%
Total		Count	5	4	32	33	44	118
		% within STUD_AQ1	4.2%	3.4%	27.1%	28.0%	37.3%	100.0%

STUD_AQ1 * STUD_AQ5EX

Crosstab

			STUD_AQ5EX					Total
			0 - 30	31 - 49	50 - 74	75 - 89	90 - 100	
STUD_AQ1	No	Count	1	3	28	26	18	76
		% within STUD_AQ1	1.3%	3.9%	36.8%	34.2%	23.7%	100.0%
	Yes	Count	1	5	11	17	7	41
		% within STUD_AQ1	2.4%	12.2%	26.8%	41.5%	17.1%	100.0%
Total		Count	2	8	39	43	25	117
		% within STUD_AQ1	1.7%	6.8%	33.3%	36.8%	21.4%	100.0%

STUD_AQ1 * STUD_AQ5PP

Crosstab

			STUD_AQ5PP					Total
			0 - 30	31 - 49	50 - 74	75 - 89	90 - 100	
STUD_AQ1	No	Count	3	6	17	30	20	76
		% within STUD_AQ1	3.9%	7.9%	22.4%	39.5%	26.3%	100.0%
	Yes	Count	1	1	14	13	13	42
		% within STUD_AQ1	2.4%	2.4%	33.3%	31.0%	31.0%	100.0%
Total		Count	4	7	31	43	33	118
		% within STUD_AQ1	3.4%	5.9%	26.3%	36.4%	28.0%	100.0%

STUD_AQ1 * STUD_AQ5MP

Crosstab

			STUD_AQ5MP					Total
			0 - 30	31 - 49	50 - 74	75 - 89	90 - 100	
STUD_AQ1	No	Count	14	17	31	12	2	76
		% within STUD_AQ1	18.4%	22.4%	40.8%	15.8%	2.6%	100.0%
	Yes	Count	8	8	16	7	2	41
		% within STUD_AQ1	19.5%	19.5%	39.0%	17.1%	4.9%	100.0%
Total		Count	22	25	47	19	4	117
		% within STUD_AQ1	18.8%	21.4%	40.2%	16.2%	3.4%	100.0%

STUD_AQ1 * STUD_AQ6

Crosstab

			STUD_AQ6					Total
			2012 Semester 1 (CMS)	2012 Semester 2 (CMS)	2013 Semester 1 (CMS)	2012 (EUC)	2013 (EUC)	
STUD_AQ1	No	Count	4	1	17	8	46	76
		% within STUD_AQ1	5.3%	1.3%	22.4%	10.5%	60.5%	100.0%
	Yes	Count	2	2	9	6	24	43
		% within STUD_AQ1	4.7%	4.7%	20.9%	14.0%	55.8%	100.0%
Total		Count	6	3	26	14	70	119
		% within STUD_AQ1	5.0%	2.5%	21.8%	11.8%	58.8%	100.0%

STUD_AQ1 * STUD_BQ1

Crosstab

			STUD_BQ1			
			Very Unsatisfied	Somewhat Unsatisfied	Somewhat Satisfied	Very sat
STUD_AQ1	No	Count	1	3	23	
		% within STUD_AQ1	1.4%	4.1%	31.1%	
	Yes	Count	1	3	10	
		% within STUD_AQ1	2.3%	7.0%	23.3%	
Total		Count	2	6	33	
		% within STUD_AQ1	1.7%	5.1%	28.2%	

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	.022	.091	.245	.806
	Kendall's tau-c	.021	.087	.245	.806
N of Valid Cases		117			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

STUD_AQ1 * STUD_BQ2

Crosstab

			STUD_BQ2			Total
			Not Very Useful	Somewhat Useful	Very Useful	
STUD_AQ1	No	Count	1	12	61	74
		% within STUD_AQ1	1.4%	16.2%	82.4%	100.0%
	Yes	Count	2	4	37	43
		% within STUD_AQ1	4.7%	9.3%	86.0%	100.0%
Total		Count	3	16	98	117
		% within STUD_AQ1	2.6%	13.7%	83.8%	100.0%

STUD_AQ1 * STUD_BQ3

Crosstab

			STUD_BQ3				Total
			Disagree	Neutral	Agree	Strongly Agree	
STUD_AQ1	No	Count	4	6	27	39	76
		% within STUD_AQ1	5.3%	7.9%	35.5%	51.3%	100.0%
	Yes	Count	2	4	19	18	43
		% within STUD_AQ1	4.7%	9.3%	44.2%	41.9%	100.0%
Total		Count	6	10	46	57	119
		% within STUD_AQ1	5.0%	8.4%	38.7%	47.9%	100.0%

STUD_AQ1 * STUD_BQ4

Crosstab

			STUD_BQ4					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
STUD_AQ1	No	Count	1	3	5	25	42	76
		% within STUD_AQ1	1.3%	3.9%	6.6%	32.9%	55.3%	100.0%
	Yes	Count	1	0	2	16	24	43
		% within STUD_AQ1	2.3%	0.0%	4.7%	37.2%	55.8%	100.0%
Total		Count	2	3	7	41	66	119
		% within STUD_AQ1	1.7%	2.5%	5.9%	34.5%	55.5%	100.0%

STUD_AQ1 * STUD_BQ5

Crosstab

			STUD_BQ5				Total
			Disagree	Neutral	Agree	Strongly Agree	
STUD_AQ1	No	Count	1	6	26	43	76
		% within STUD_AQ1	1.3%	7.9%	34.2%	56.6%	100.0%
	Yes	Count	0	5	14	23	42
		% within STUD_AQ1	0.0%	11.9%	33.3%	54.8%	100.0%
Total		Count	1	11	40	66	118
		% within STUD_AQ1	0.8%	9.3%	33.9%	55.9%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	-.024	.089	-.269	.788
	Kendall's tau-c	-.024	.091	-.269	.788
N of Valid Cases		118			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

STUD_AQ1 * STUD_BQ6

Crosstab

			STUD_BQ6				Total
			Disagree	Neutral	Agree	Strongly Agree	
STUD_AQ1	No	Count	0	4	22	49	75
		% within STUD_AQ1	0.0%	5.3%	29.3%	65.3%	100.0%
	Yes	Count	1	5	18	18	42
		% within STUD_AQ1	2.4%	11.9%	42.9%	42.9%	100.0%
Total		Count	1	9	40	67	117
		% within STUD_AQ1	0.9%	7.7%	34.2%	57.3%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	-.224	.088	-2.500	.012
	Kendall's tau-c	-.226	.090	-2.500	.012
N of Valid Cases		117			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

STUD_AQ1 * STUD_BQ7

Crosstab

			STUD_BQ7			Total
			Neutral	Agree	Strongly Agree	
STUD_AQ1	No	Count	6	15	52	73
		% within STUD_AQ1	8.2%	20.5%	71.2%	100.0%
	Yes	Count	1	16	25	42
		% within STUD_AQ1	2.4%	38.1%	59.5%	100.0%
Total		Count	7	31	77	115
		% within STUD_AQ1	6.1%	27.0%	67.0%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	-.090	.092	-.980	.327
	Kendall's tau-c	-.084	.086	-.980	.327
N of Valid Cases		115			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

STUD_AQ1 * STUD_BQ8

Crosstab

			STUD_BQ8					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
STUD_AQ1	No	Count	1	3	8	22	41	75
		% within STUD_AQ1	1.3%	4.0%	10.7%	29.3%	54.7%	100.0%
	Yes	Count	1	1	6	17	18	43
		% within STUD_AQ1	2.3%	2.3%	14.0%	39.5%	41.9%	100.0%
Total		Count	2	4	14	39	59	118
		% within STUD_AQ1	1.7%	3.4%	11.9%	33.1%	50.0%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	-.101	.086	-1.172	.241
	Kendall's tau-c	-.109	.093	-1.172	.241
N of Valid Cases		118			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

STUD_AQ1 * STUD_BQ9

Crosstab

			STUD_BQ9					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
STUD_AQ1	No	Count	0	0	12	24	40	76
		% within STUD_AQ1	0.0%	0.0%	15.8%	31.6%	52.6%	100.0%
	Yes	Count	1	3	4	17	17	42
		% within STUD_AQ1	2.4%	7.1%	9.5%	40.5%	40.5%	100.0%
Total		Count	1	3	16	41	57	118
		% within STUD_AQ1	0.8%	2.5%	13.6%	34.7%	48.3%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	-.114	.087	-1.299	.194
	Kendall's tau-c	-.122	.094	-1.299	.194
N of Valid Cases		118			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

STUD_AQ1 * STUD_BQ10

Crosstab

			STUD_BQ10				Total
			Disagree	Neutral	Agree	Strongly Agree	
STUD_AQ1	No	Count	2	4	19	51	76
		% within STUD_AQ1	2.6%	5.3%	25.0%	67.1%	100.0%
	Yes	Count	0	1	16	26	43
		% within STUD_AQ1	0.0%	2.3%	37.2%	60.5%	100.0%
Total		Count	2	5	35	77	119
		% within STUD_AQ1	1.7%	4.2%	29.4%	64.7%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	-.041	.089	-.460	.646
	Kendall's tau-c	-.039	.085	-.460	.646
N of Valid Cases		119			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

STUD_AQ1 * STUD_BQ11

Crosstab

			STUD_BQ11				Total
			Disagree	Neutral	Agree	Strongly Agree	
STUD_AQ1	No	Count	1	8	28	39	76
		% within STUD_AQ1	1.3%	10.5%	36.8%	51.3%	100.0%
	Yes	Count	1	5	20	15	41
		% within STUD_AQ1	2.4%	12.2%	48.8%	36.6%	100.0%
Total		Count	2	13	48	54	117
		% within STUD_AQ1	1.7%	11.1%	41.0%	46.2%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	-.125	.087	-1.434	.152
	Kendall's tau-c	-.131	.092	-1.434	.152
N of Valid Cases		117			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

STUD_AQ1 * STUD_BQ12

Crosstab

			STUD_BQ12				Total
			Disagree	Neutral	Agree	Strongly Agree	
STUD_AQ1	No	Count	2	12	31	31	76
		% within STUD_AQ1	2.6%	15.8%	40.8%	40.8%	100.0%
	Yes	Count	0	7	20	16	43
		% within STUD_AQ1	0.0%	16.3%	46.5%	37.2%	100.0%
Total		Count	2	19	51	47	119
		% within STUD_AQ1	1.7%	16.0%	42.9%	39.5%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	-.010	.086	-.122	.903
	Kendall's tau-c	-.011	.093	-.122	.903
N of Valid Cases		119			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

STUD_AQ1 * STUD_BQ13

Crosstab

			STUD_BQ13			Total
			Neutral	Agree	Strongly Agree	
STUD_AQ1	No	Count	11	28	37	76
		% within STUD_AQ1	14.5%	36.8%	48.7%	100.0%
	Yes	Count	6	18	19	43
		% within STUD_AQ1	14.0%	41.9%	44.2%	100.0%
Total		Count	17	46	56	119
		% within STUD_AQ1	14.3%	38.7%	47.1%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	-.031	.087	-.358	.721
	Kendall's tau-c	-.033	.092	-.358	.721
N of Valid Cases		119			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

STUD_AQ1 * STUD_BQ14

Crosstab

			STUD_BQ14				Total
			Disagree	Neutral	Agree	Strongly Agree	
STUD_AQ1	No	Count	1	7	27	41	76
		% within STUD_AQ1	1.3%	9.2%	35.5%	53.9%	100.0%
	Yes	Count	0	3	18	22	43
		% within STUD_AQ1	0.0%	7.0%	41.9%	51.2%	100.0%
Total		Count	1	10	45	63	119
		% within STUD_AQ1	0.8%	8.4%	37.8%	52.9%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	-.007	.088	-.079	.937
	Kendall's tau-c	-.007	.090	-.079	.937
N of Valid Cases		119			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

STUD_AQ1 * STUD_BQ15

Crosstab

			STUD_BQ15					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
STUD_AQ1	No	Count	2	3	13	33	25	76
		% within STUD_AQ1	2.6%	3.9%	17.1%	43.4%	32.9%	100.0%
	Yes	Count	1	1	11	20	10	43
		% within STUD_AQ1	2.3%	2.3%	25.6%	46.5%	23.3%	100.0%
Total		Count	3	4	24	53	35	119
		% within STUD_AQ1	2.5%	3.4%	20.2%	44.5%	29.4%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	-.090	.084	-1.074	.283
	Kendall's tau-c	-.101	.094	-1.074	.283
N of Valid Cases		119			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

STUD_AQ1 * STUD_BQ16

Crosstab

			STUD_BQ16				Total
			Disagree	Neutral	Agree	Strongly Agree	
STUD_AQ1	No	Count	2	11	28	35	76
		% within STUD_AQ1	2.6%	14.5%	36.8%	46.1%	100.0%
	Yes	Count	0	4	21	18	43
		% within STUD_AQ1	0.0%	9.3%	48.8%	41.9%	100.0%
Total		Count	2	15	49	53	119
		% within STUD_AQ1	1.7%	12.6%	41.2%	44.5%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	.008	.085	.100	.921
	Kendall's tau-c	.009	.091	.100	.921
N of Valid Cases		119			

a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis.

STUD_AQ1 * STUD_BQ17

Crosstab

			STUD_BQ17					Total
			Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
STUD_AQ1	No	Count	2	2	11	10	51	76
		% within STUD_AQ1	2.6%	2.6%	14.5%	13.2%	67.1%	100.0%
	Yes	Count	0	0	5	10	28	43
		% within STUD_AQ1	0.0%	0.0%	11.6%	23.3%	65.1%	100.0%
Total		Count	2	2	16	20	79	119
		% within STUD_AQ1	1.7%	1.7%	13.4%	16.8%	66.4%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Kendall's tau-b	.016	.085	.187	.852
	Kendall's tau-c	.016	.083	.187	.852
N of Valid Cases		119			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.