A MODEL FOR MEASURING E-LEARNING SYSTEMS SUCCESS IN SOUTH AFRICAN UNIVERSITIES: A CASE STUDY OF THE UNIVERSITY OF KWAZULU-NATAL (UKZN)

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DECLARATION

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DEDICATION

This thesis is dedicated to God Almighty and my two families. My husband, Mdumiseni Deliwe and son, Sibabalwe Deliwe, my parents, Mr and Mrs Msomi, my sister, Thembeka Msomi and my brother, Njabulo Msomi. Thank you for your constant prayers devoted to me, encouragement during the time of my PhD journey and ensuring that I stay motivated throughout the journey.

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ABSTRACT

The fourth industrial revolution is upon us and one of the questions that higher education institutions (HEIs) should be asking is: *Is the current education system preparing us for the fourth industrial revolution?* The answer could be 'yes' to some extent as most of the HEIs around the world have introduced electronic learning as part of their teaching and learning method. The introduction and implementation of e-learning, however, has come with a number of challenges. These challenges are hindering the successful implementation of e-learning. It is for this reason that continuous research should be conducted to find ways in which the challenges associated with e-learning can be minimised. This study's main focus was on measuring e-learning systems to identify the gaps within the systems and to recommend how best these gaps can be minimised for institutions to gain the maximum benefits from e-learning. The study utilised an evaluation methodology model to measure the e-learning system known as MOODLE that is currently in use at the University of KwaZulu-Natal. A variable was added to the model, namely stakeholder analysis. The study of stakeholder analysis revealed that there are a number of stakeholders who have a role in ensuring that e-learning is successful. A mixed methods approach was used to answer the research questions. Management, support staff and quality assurance staff were interviewed on a one-on-one basis and students, ICS staff and academics were issued with a questionnaire they were requested to complete. The results of the qualitative study revealed a number of new issues to be taken into account, as they are essential for the successful implementation of e-learning. The quantitative method tested the validly of the results using exploratory factor analysis (EFA). The results led to a rotated factor matrix where a number of factors were grouped together and others separated. This resulted in a new model being formulated to be utilised for measuring the success of e-learning systems in future. Regression analysis was undertaken and recommendations were made based on the results. One of the recommendations was that for institutions to achieve customer and organisational value, they should focus on the independent variables. Overall, e-learning systems were perceived in a positive light by all stakeholders.

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ABBREVIATIONS

CET	-	Centre for Educational Technology
CHED	-	Centre for Higher Education Development
CIECT	-	Centre for Innovative and Communication Technologies
CILT	-	Centre for Innovation in Learning and Technology
CSF	-	Critical Success Factors
DE	-	Distance Education
DGBL	-	Digital Game-Based Learning
DHED	-	Department of Higher Education
EFQUEL	-	European Foundation for Quality in e-Learning (EFQUEL)
ELQ	-	e-Learning Quality
HEIs	-	Higher Education Institutions
HELAM	-	Hexagonal E-learning Assessment Model
ICS	-	Information Communication Services
ICT	-	Information Communication Technology
IT	-	Information Technology
ITS	-	Intelligence Tutoring System
LA	-	Learning Analytics
LAN	-	Local Area Network
LMS	-	Learner Management System
MOOCs	-	Massive open online courses
MOODLE	-	Modular Object Oriented Dynamic Learning Environment
MoU	-	Memorandum of Understanding
NGO	-	Non Government Organisation
NMMU	-	Nelson Mandela Metropolitan University
ODL	-	Open Distance Learning
OSS	-	Open Source Software
QMS	-	Quality Management System
SA	-	South Africa
SERVQUAL	-	Service Quality

TAM	-	Technology Acceptance Model
TEL	-	Technology-enhanced learning
TIPS	-	Technology-Innovation-Pedagogy-Support
TUT	-	Tshwane University of Technology
UCT	-	University of Cape Town
UJ	-	University of Johannesburg
UKZN	-	University of KwaZulu-Natal
UNISA	-	University of South Africa
UP	-	University of Pretoria
US	-	University of Stellenbosch
UTLO	-	University Teaching and Learning Office
UWC	-	University of Western Cape

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Chapter one introduces the topic and provides the background and the rationale of the study. The research problem and the research objectives, which highlight the purpose of the study, are presented and the research questions are formulated. The chapter briefly explains the research methodology, which focused on the way in which the data were collected, from which population, using what sample and the way in which the data were analysed. The expected contribution of the study is expressed and the content of each chapter is outlined.

1.2 BACKGROUND

The world is moving into the fourth industrial revolution, which concerns the digitalisation and automation of work and is seen as a societal and economic trend that is of importance, as it will change the way humans and businesses function (Hirschi, 2018). According to Xing and Marwala (2017), the fourth industrial revolution is driven by artificial intelligence and cyber-physical systems and results from technological innovations and technologies that are said to replace lower-skilled workers and complement higher-skilled workers (Naudé, 2017). This highlights the importance of higher education institutions as a means to empower society to be more highly skilled. Education is one of the most effective means of empowering individuals in a society and enables a number of social aspects, such as public health, economic growth, sustainable development and poverty reduction, particularly in today's knowledge society (Lim, Tinio, Smith and Bhowmik, 2018). Xing and Marwala (2017) hold that as the fourth industrial revolution is about the convergence of man and machine, there will be a need for more interdisciplinary teaching, innovation and research. There is a need for rapid changes in physical, digital and biological technologies and the way in which people work and live to maintain economic competitiveness and social development. The fourth industrial revolution sees the emergence of a new form of university, where teaching, research and service is conducted differently (Xing and Marwala, 2017). For universities to keep up and adapt to the upcoming fourth industrial revolution, their e-learning systems should be in order. Information and communication technology is said to be one of the pathways that has gained currency over the past two decades (Lim et al., 2018).

Post 1994 the South African Government drafted education policies to promote access to educational opportunities, especially for those that were previously disadvantaged. The South African Government views information communication technology (ICT) as a priority in teaching and learning. This is seen in the policy on e-Education, which states*: "Every South African manager, teacher and learner in the general and further education and training bands will be ICT capable (that is, use ICTs confidently and creatively to help develop the skills and knowledge they need as lifelong learners to achieve personal goals and to be full participants in the global community) by 2013"* (Department of Education South Africa, 2004:17). Education has been transformed as a priority to ensure that there is equality in education among all races (Dumbrajs et al., 2013). According to Msomi (2016), one of the processes for the transformation of education is the introduction of e-learning in higher education institutions (HEIs). Using ICT to enhance the quality and quantity of education has become an important facet of education related projects (Karunaratne, Peiris and Hansson, 2018).

Gupta, Marsden, Oluka, Sharma and Lucas (2017) stated that investing in e-learning has the benefit of providing high quality teaching, although the initial costs may be high. Technology has an important role in education (Ventayen, Estira, De Guzman, Cabaluna and Espinosa, 2018). The internet and technology has enhanced the education system in numerous countries, including South Africa. Gupta et al. (2017) indicated that there is an argument that the internet has provided opportunities for developing a global classroom, as individuals are able to learn from a distance, in different places, at different times and at their own pace, as e-learning enables borderless education. Computer technology will become an important skill for education in the future, when technology is used effectively (Al-Omari, Cater and Chiclana, 2015). There is a worldwide demand for higher education with an estimate that more than 150 million people will seek tertiary education by 2025 (Gupta et al., 2017). Gupta et al. (2017) further indicated that in environments that have poor resources, e-learning may provide the means to satisfy this demand.

Web-based learning technologies have affected learning environments and the online environment is seen to have matched, and in some instances possibly exceeded, face-to-face based learning (Czerkawski and Lyman III, 2016). There is however, a possibility of students being at risk of achieving poor academic results in an online environment. The use of e-learning will assist universities to remain competitive in teaching and learning and possibly lead to universities being able to attract new learners, as the quality of their activities will improve (Bagarukayo and Kalema, 2015). South African universities have recognised the need to introduce e-learning in order to compete internationally.

1.3 RATIONALE OF STUDY

The main purpose of this study was to use the model for measuring e-learning system success practically at the University of KwaZulu-Natal, with the aim to identify and minimise the factors that are hindering the success of e-learning systems. E-learning is viewed as the future of education and vast sums of money have been invested in e-learning systems to ensure their success. According to Georgina and Olson (2008), e-learning systems' successful implementation is essential to universities because of the finances that have been invested in them. There are authors who have raised an argument that institutions need to evaluate their teaching processes to ascertain if the course and institutional goals have indeed been achieved by the educational systems (Hadullo, Oboko and Omwenga, 2018). The main purpose of this study was to ensure that the e-learning objectives are achieved. The study allowed for a deeper understanding of the e-learning stakeholders and the role each stakeholder should be performing to ensure success. The study allowed insight into which variable within the proposed evaluation methodology model is the dependent variable and which are the independent variables. This will assist higher education institutions to improve their e-learning systems, as they will understand the challenges of implementing e-learning and ways in which these challenges can be minimised.

1.4 PROBLEM STATEMENT

South African higher education institutions are under immense pressure to increase the participation of various groups of students in order to produce the skills that are required in a rapidly changing labour market (Jaffer, Ng'ambi and Czerniewicz, 2007).

There is a social demand for improved access to higher education and e-learning systems have become critical, as competition among higher education institutions is increasing with most institutions needing to reduce costs while attracting more students (El-Masri and Tarhini, 2017). The University of Pretoria (UP) was the first of South Africa's universities to introduce e-learning in 1998 (Bagarukayo and Kalema, 2015). Other South African universities followed and the University of KwaZulu-Natal (UKZN) introduced a learning management system (LMS) known as MOODLE, in 2010. The introduction of e-learning brought numerous challenges for South African HEIs. Simelane (2011) posits that these challenges are not limited to South African HEIs but are experienced by HEIs throughout the world. The challenges faced by South African HEIs include, but are not limited to, inadequate technical support and curriculum design, infrastructural constraints, limited resources, no institutional support, academic ability, low computer and internet access and a lack of ICT skills (Msomi, 2016). These challenges are no different from those found in other developing countries. Karunaratne, Peiris and Hansson (2018) confirmed that as much as ICT is used to enhance education, it has not always been successful for several reasons that include a lack of funds and skills and limited motivation among stakeholders.

According to Hadullo, Oboko and Omwenga (2018), recent studies have shown that through the integration of ICT in education as an introduction to e-learning, numerous challenges associated with the quality of learning have arisen. For example, Kenya is facing quality issues related to an inadequate ICT and e-learning infrastructure, high internet costs, financial constraints, lack of technical skills, lack of course support, as well as a lack of commitment from the teaching staff. These same challenges are faced in South Africa and are threatening the success of e-learning systems' implementation. Lim et al. (2018) stated that there is a lack of research pertaining to digital learning in developing countries. According to Karunaratne, Peiris and Hansson (2018), measuring the success of ICT based solutions remains challenging. There is a need for research to ascertain the challenges associated with implementing e-learning systems using the evaluation methodology model. According to Hadullo, Oboko and Omwenga (2018), HEIs need to focus on investigating whether or not their e-learning systems are providing information quality, user satisfaction, service quality and academic achievement. This study was undertaken to explore the gaps to minimise the challenges and maximise the benefits of implementing e-learning.

1.5 RESEARCH OBJECTIVES

The purpose of this research was to use the evaluation methodology model combined with an analysis of e-learning stakeholders in HEIs to measure the success of e-learning systems. This research explored the following research objectives.

- To investigate the way in which the learner management system (LMS) is used for delivering and promoting teaching and learning.
- To ascertain which factors are essential for the successful and sustainable implementation of e-learning in HEIs.
- To conduct a stakeholder analysis with the aim of determining each stakeholder’s role in the success of e-learning implementation in higher education institutions.
- To make use of the evaluation methodology model for assessing e-learning systems’ success.

1.6 RESEARCH QUESTIONS

The following are the research questions that this study attempted to answer.

- How is the learner management system utilised in teaching and learning?
- Which factors are necessary for the successful and sustainable implementation of e-learning?
- What are the stakeholders’ roles in ensuring that e-learning implementation is a success?
- How can universities use the evaluation methodology model to assess e-learning systems’ success?

The first three questions were answered using data collected by means of a qualitative research method, where three stakeholders, namely management, support staff and quality assurance staff members were interviewed and asked one-on-one questions to gain an in-depth understanding. The last question was answered using data collected by means of a quantitative research method, where a questionnaire was distributed among students, academic staff and ICS staff members.

1.7 RESEARCH METHODS

Research methodology is important, as it guides the way in which a study is conducted in order to meet the objectives and answer the research questions. It indicates which research tools to employ. Examiners review the researcher's selection of tools to ascertain if the methods that were used to answer the research objectives met the quality requirements and if they were appropriate for the study. There are two types of research, namely applied research and pure research (Du Plooy-Cilliers, Davis and Bezuidenhout, 2014). Applied research is conducted so that real life solutions to real life problems can be found and implemented. Pure research involves mainly the generation of knowledge with the aim of adding to existing knowledge. This study followed an applied research method as it assisted in finding a solution to the problems encountered with e-learning in higher education institutions. Recommendations were presented and new areas to be researched were identified.

1.7.1 Research Paradigm

This research followed the pragmatists' paradigm. Debate, re-negotiation and interpretation were used to solve problems. The main method used in the pragmatism paradigm is the mixed methods, which combines qualitative and quantitative methods to generate new knowledge. Using mixed methods provides a broader understanding of the research problem than would be possible using only one approach. The 1980s witnessed the emergence of mixed methods as a third methodological movement in the social and behavioural sciences (Tashakkori and Teddlie, 2003). Creswell and Plano Clark (2007) defined mixed methods as a philosophical method that combines qualitative and quantitative models to increase knowledge. According to Creswell et al. (2003), mixed methods assists in obtaining various perspectives and reduces the gap in the existing knowledge by adding the information/data that is collected.

1.7.2 Research Approach

The study was conducted using mixed methods to collect data, meaning it utilised a combination of qualitative and quantitative research methods. According to Bryman (2006), using both qualitative and quantitative techniques allows for significant data collection, as it includes more than one worldview. In this study, using only one of the methods would not have been sufficient to address the research objectives. Qualitative research allowed the researcher to develop a holistic picture while the quantitative research depended on numerical data for generalising the findings.

1.7.3 Population and Sample

The total number of participants for this study was drawn from the number of students who are registered at UKZN, which is approximately 30 000, 1335 academic staff, 113 ICT staff members and support staff, including a representative of the accreditation bodies and executive, as well as senior management numbering 1707. The sample size for the quantitative study was the entire population of students, academic staff and ICT staff, as the researcher employed the online survey system where the questionnaire was posted on the UKZN notice board. For the qualitative study, the researcher interviewed people from three different stakeholder groups (management, support staff and quality assurance staff members). The researcher interviewed two members from each group.

1.7.4 Data Collection

The researcher utilised a questionnaire with open ended questions where the participants were free to air their opinions for the collection of qualitative data. For the quantitative data collection, the researcher used a questionnaire that had clear options from which to choose. These options were provided in accordance with a five-point Likert scale. According to Bishop and Herron (2015), the five-point Likert scale has answers ranging from strongly agree and agree to neither agree nor disagree, disagree and strongly disagree. Three different but similar questionnaires were drawn up, one for the students, the second for the academic staff and the last for the ICT staff. These questionnaires were web-based surveys loaded on QuestionPro and the link to the questionnaires was sent to the participants via the UKZN notice board. The web-based survey yielded slow responses and to ensure more speedy response the researcher distributed hard copy printouts to the participants to complete and return.

1.7.5 Data Analysis

The qualitative data were analysed by means of open coding. The information recorded during the interviews was transcribed and concepts that emerged from the transcripts were extracted. Each concept was assigned a code that represented an identical phenomenon. These were grouped into categories and relationships between the categories were established. Once the researcher had completed the open coding, the next step was axial coding, which is coding that formulates a story line of the events. The process led to the researcher gaining an in-depth understanding of the research objectives.

When conducting quantitative data analysis, the researcher used the online survey system, QuestionPro, and the data were exported to excel and from excel to the Statistica programme for analysis.

1.7.6 Ethical Considerations

Pre-agreements were entered into with the UKZN in the form of a signed gatekeeper's letter, which was sent to the UKZN registry granting approval for the researcher to conduct a study at the university. The researcher applied for, and received, ethical clearance to conduct the study from the university (UKZN). This approval allowed the researcher to initiate data collection. Participants were made aware that participation was voluntarily and should they feel a need to withdraw from participating at any stage, they were free to do so. A signed consent form was required from each participant indicating their informed consent to take part in the study. This consent form clearly explained that all records that could identify the participants would be held by the Graduate School of Business and Leadership at the University of KwaZulu-Natal to ensure confidentiality and anonymity.

1.8 EXPECTED CONTRIBUTION TO KNOWLEDGE

The study was undertaken with the aim of contributing to the existing body of knowledge in the ways described hereunder.

- Limited attention has been paid to conducting an e-learning stakeholders' analysis. A number of studies have ignored that there are numerous stakeholders in the implementation of e-learning, as these studies focused mainly on students as stakeholders. The stakeholder analysis was beneficial for identifying the stakeholders that have a role in implementing e-learning and what each stakeholder's role is in ensuring the success of e-learning. Al-Sabaway (2013) identified three stakeholders, namely students, academic staff and ICT staff but did not perform a thorough analysis of all stakeholders, which is what this study intended as a way of adding to the existing literature. This has not previously been undertaken, especially in relation to the proposed evaluation methodology model.

- There is an increase in the use of e-learning systems in universities and therefore a need for in-depth research to be conducted so that recommendations and solutions can be proposed on ways in which e-learning systems can be enhanced to ensure successful results.
- Although a study was conducted by Al-Sabaway (2013) using the methodology evaluation model to measure e-learning systems' success, there were too many limitations to the study and this highlighted the need for a more in-depth study that would fill the gap in that regard. Padayachee, Kotze and Van Der Merwe (2010) conducted a study that encompassed only one aspect of the model, which necessitated a more in-depth study to allow for a broader understanding and for better advice to be given to higher education institutions' policy makers.

1.9 RESEARCH OUTLINE

This study comprises eight chapters.

Chapter one introduces the research by providing the background and rationale of the study, followed by the problem statement and research objectives and questions. There is a brief indication of, and motivation for, the research methods that were chosen and an explanation of how the study was expected to contribute to the existing body of knowledge. The chapter concludes with an overview of the structure of the study.

Chapter two provides an in-depth analysis of the literature in the field of e-learning. E-learning is defined and a discussion pertaining to the different types of e-learning is included. The literature review includes an in-depth analysis of e-learning in higher education institutions in both developed and developing countries, including South Africa. The benefits of e-learning and the various learner management systems are discussed. The factors essential for the successful implementation of e-learning are presented and the chapter concludes with a discussion of e-learning readiness.

Chapter three discusses the application of theory and the development of a model. A number of e-learning systems measuring models are identified and explained. After a critical discussion of the various models one is chosen to be used in the study to measure the e-learning systems of a learner management system, MOODLE, which is used at the University of KwaZulu-Natal. The variables taken into account in the model include system quality, information quality, service delivery quality, perceived usefulness, user satisfaction, customer value, organisational value and system failure, all of which are discussed in detail. The chapter includes a stakeholder analysis to identify the various e-learning stakeholders and the role each stakeholder has in ensuring that e-learning implementation is a success. This chapter addresses a number of concerns stakeholders have raised.

Chapter four provides the overview of the research methodology implemented in the study. The research paradigm, research approach, population and sampling is discussed. The method used to collect and analyse data is discussed as well as the manner in which the researcher ensured reliability and validity, limited bias and addressed ethical considerations. The chapter concludes by highlighting the limitations that were encountered during the study.

Chapter five presents the qualitative results in the form of the responses from the one-on-one interview participants. The results are presented in answer to research questions one, two and three.

Chapter six reports the quantitative results. The chapter begins with a reliability and validly analysis of the measurement that was used in the study followed by a presentation of the demographic results and the variables that loaded on the factor matrix. The chapter concludes with a comparison of the stakeholders' quantitative results.

Chapter seven discusses both the qualitative and quantitative results. These results are analysed and discussed using literature to support some arguments.

Chapter eight concludes the research using the literature reviewed as well as the empirical results to draw conclusions. Based on the results, a new model for measuring e-learning systems at higher education institutions is recommended. New information that came to light is mentioned as adding to the existing body of knowledge. The chapter concludes with recommendations.

1.10 CONCLUSION

This chapter introduced the study and discussed the way in which the study was conducted. Several topics were covered, including the introduction of the study, the background, the rationale for the study, the problem statement, research objective and questions to be answered by the study, a brief description of the research methodology and the way in which this study was expected to contribute to the existing body of knowledge. The next chapter provides the literature review that was undertaken with the aim of exploring the research objectives.

CHAPTER 2

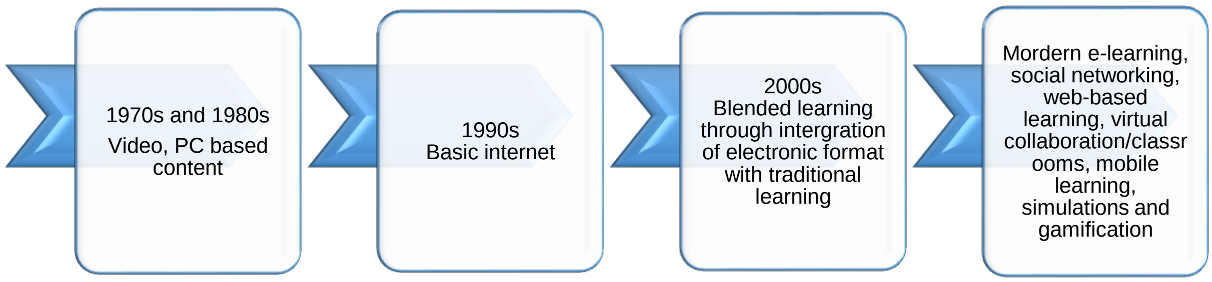
LITERATURE REVIEW

2.1 INTRODUCTION

This chapter provides the literature review in conjunction with the objectives of the study. The main purpose of a literature review is to provide a foundation of knowledge pertaining to the topic of interest. The literature was examined with the aim of gaining an in-depth understanding of the objectives and exploring the definition of e-learning to understand what e-leaning entails, the evolution of learning to indicate the way in which the education system has evolved over the years, various types of e-learning with a discussion of the advantages and disadvantages of each, e-learning in developed vs developing countries, e-learning in a number of South African institutions, benefits and challenges of e-learning, e-learning policies and procedures, learner management systems and factors essential for successful e-learning implementation.

2.2 E-LEARNING

The term e-learning was introduced in the 1990s with the emergence of new technology-based education, where information was transferred via the internet (Bystrova, Larionova, Osborne and Platanov, 2015). Online learning is used for the enhancement of the education experience (Shamsuddin, Bakar, Makhtar, Isa, Rozaimee and Yusof, 2016). It is important to note that e-learning did not change the education system completely but enhanced it by introducing easier ways of teaching and learning. According to Queiros and de Villiers (2016), e-learning was introduced in South Africa to reach disadvantaged and side-lined students. This statement is however debatable, as the disadvantaged are currently those who are the most disadvantaged when it comes to e-learning, as they do not have the means to access the internet, or even a computer, when they are away from the campus. E-Learning is achieved via electronic media and comprises all types of learning and teaching tools that are supported electronically (Blackburn, 2016). According to Rezai-Rad, Vaezi and Nattagh (2012), technology may contribute to solving problems with the possibility of ensuring the improvement of the delivery of services in developed and developing countries. Shorey, Siew and Ang (2018) hold that e-learning is the effective use of multimedia technology in the learning process and that it has gained popularity in teaching and learning. According to Shorey et al. (2018), e-learning has the advantage of increasing the accessibility and distribution of educational material to students, as well as a shift from the teacher-centred education model to a student-centred model. There are however complications with e-learning in that some students feel isolated, as there is no face-to-face engagement with fellow students and lecturers, as well as students not being motivated enough to participate in e-learning in a home setting (Shorey et al., 2018). E-Learning system purchasing and installation is a strategic objective for a number of institutions due to the growth in the virtual learning environment (Thomson, 2016). This makes e-learning a strategic activity. For e-learning to be effective, it is vital that the users and instructors have suitable technical skills to utilise the tools of e-learning effectively (Tarus, Gichoya and Muumbo, 2015). Without the necessary technical skills, e-learning systems could be available for learners but not beneficial, as there will be no implementation. According to Alshaher (2013), e-learning has evolved since the 1970s and this evolution is represented in Figure 2.1.



Source: Adapted from Alshaher (2013)

Figure 2.1: Evolution of e-learning

Recent studies on the evolution of e-learning reveal slightly different results to e-learning's current position**.** According to Bari, Djouab and Hoa (2018), e-learning has evolved from the 'old' CD-ROM media to personalised tools, adaptive learning and personalised content. This evolution is the result of the advancement of e-learning technologies, specifically mobile technology, with the use of smart phones, mobile phones, personal digital assistants, tablets and a growing number of consoles and handheld or palmtop devices. The Evolution of E-Learning by Bari, Djouab and Hoa (2018), highlights that e-learning began with client service networks (CD-ROM) that were media text-based. This was followed by Internet, intranet and extranet (LMS and CMS) text-based and multi-timed. Thirdly, wireless broad band access technologies, including visual communities' interactive whiteboard, MOOC learning objects and ipad. Fourthly, game authorising tools such as smartphones and online games and lastly, personalised tools, adaptive learning and personalised context.

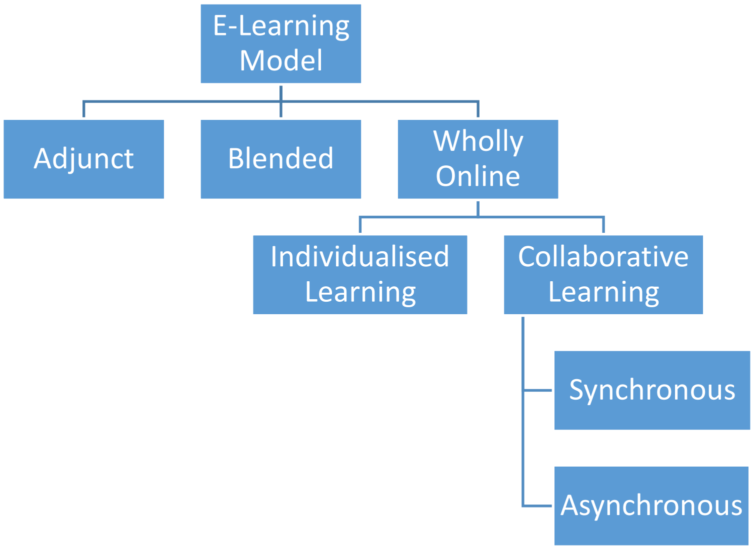
2.3 TYPES OF E-LEARNING

Tarus et al. (2015) refer to e-learning as being divided into two categories, namely synchronous and asynchronous. Synchronous e-learning occurs by means of various technological media and requires that all participants be available at the same time, as it takes place in real time. Asynchronous e-learning is technology based and participants have access to the course at any time and can pace themselves without having to be online at the same time as others.

Asynchronous learning, synchronous learning and blended learning are the three types of e-leaning. Asynchronous learning is student-centred and the lecturers use online research resources to facilitate teaching and learning. Students can learn in their own time, as the lectures are not in real-time (Pradana and Amir, 2016). With asynchronous learning lecturers and students are not online at the same time and learning is facilitated by means of discussion forums, blogs, eBooks, CDs, DVDs, email etc. (Yakaraju, 2014). According to Murphy, Rodríguez-Manzanares and Barbour (2011), as much as asynchronous learning has positive outcomes, it has been found that the dropout rate is high and the retention rate low. Synchronous learning is real time learning that is conducted by means of video conferencing, two-way live broadcasts and internet telephony (Pradana and Amir, 2016). Hadullo, Oboko and Omwenga (2018) indicated that synchronous learning provides learners with real time, collaborative interaction that includes activities such as video conferencing and group chats on condition that all parties are online simultaneously. Students and lecturers log into the system simultaneously to communicate with one another directly online from various locations (Yakaraju, 2014). Synchronous learning has poor quality representation of classroom instruction, as it is inflexible with regard to scheduling and individual attention (Murphy et al., 2011). Bezuidenhout (2018) refers to synchronous and asynchronous learning as technology-enhanced learning (TEL). TEL requires increased integration, up-to-date course materials and opportunities for collaborative learning. Blended learning is the use of both e-learning and face-to-face time to facilitate learning (Pradana and Amir, 2016).

A number of authors describe the various types of e-learning differently. Arkorful and Abaidoo (2015) posit that the two types of e-learning are computer-based and internet-based e-learning. Computer-based e-learning comprises the full range of hardware and software available for ICT use. These can be used in two ways, namely instruction that is computer-managed and that which is computer-assisted. According to Arkorful and Abaidoo (2015), the difference between the two is that with computer-managed instruction computers are used for storing and retrieving information whereas computer-assisted learning is using computers as opposed to the traditional methods of teaching and learning where interactive software is provided as a supporting tool for self-learning outside the classroom. Computer-based instruction involves a curriculum delivered via computer that relies primarily on computer-learner interaction for fostering learning (Hao, 2016). This type of learning is advantageous in situations where challenges are evident with the student-to-teacher ratio, geography and a number of other factors. Internet-based learning enhances computer-based learning by ensuring that the content is available on the internet (Arkorful and Abaidoo, 2015). Internet-based learning allows a large number of learners to be reached as there are fewer logistical barriers than encountered with traditional methods of teaching and learning (Lanken, Novack, Daetwyler, Gallop, Landis, Lapin, Subramaniam and Schindler, 2015).

Arkorful and Abaidoo (2015) described a model for e-learning education that allows for three ways of using e-learning technologies. These include adjunct, blended and wholly online. The model is represented in Figure 2.2.



Source: Adopted from Arkorful and Abaidoo (2015)

Figure 2.2: A model for using e-learning in education

Adjunct e-learning is when traditional classroom learning is assisted or enhanced by e-learning (Algahtani, 2011). According to Kazakoff, Macaruso and Hook (2018), blended learning combines face-to-face learning with student-led digital activities. Wholly online learning is both collaborative and individualised learning that includes synchronous and asynchronous learning (Arkorful and Abaidoo, 2015). Wholly online, collaborative learning and individualised learning was referred to as asynchronous and synchronous learning in this section. Blended learning is discussed in detail in the following section.

2.4 BLENDED LEARNING

Blended learning can be defined as utilising a combination of face-to-face learning and technology (electronic learning) in an attempt to improve higher education (Graham, Woodfield and Harrison 2013). Lu, Huang, Huang, Lin, Ogata and Yang (2018) define blended learning as mixed-mode instruction, as it combines learning strategies with traditional classroom teaching. Lu et al. (2018) posit that a number of educators have benefitted from adopting Online Assessment Systems (OASs) or Massive Open Online Courses (MOOCs). Blended learning is a difficult concept to define, as the ways of understanding and defining blended learning differ (Crawford and Jenkins, 2018). This is because some authors define blended learning as mixing traditional face-to-face learning with innovation and technology whilst others argue that blended learning is more complicated and driven by pedagogical considerations. One of the aims of blended learning is for the traditional face-to-face classroom learning and e-learning to complement each other so that students' perceptions will be influenced and the learning outcomes will be improved (Poon, 2013). According to Shorey et al. (2018), blended learning is a solution to the challenges encountered with e-learning and traditional face-to-face learning, as it combines both learning methods. Adams, Becker, Cummins, Davis, Hall, Giesinger and Ananthanarayanan (2017) postulate that the goal of blended learning is to foster models that will empower faculties with the tools needed to address the various needs of the students with their varied backgrounds. Blended learning is a learner centred approach in that it incorporates an understanding that students are different and seeks to understand three things (Schwenger, 2016). Firstly, the students' various preferences, as understanding these will assist with design decisions pertaining to blended learning. Secondly, understanding that students' demands and abilities differ and that students need to be supported accordingly. Lastly, the response of academic staff after taking the students' differences into consideration. The academic staff should respond with course designs that incorporate students' differences. This is in agreement with the views of Crawford and Jenkins (2018), who state that the complex perspective of blended learning highlights the importance of emphasising the roles of students and teachers with a focus on the experience rather than the context. It should go beyond focusing on only the technological component to include improving the pedagogic skills of the teachers. According to Poon (2013), blended learning has several advantages and disadvantages, as highlighted in Table 2.1.

Table 2.1: Advantages and disadvantages of blended learning

Advantages	Disadvantages
• Minimises costs and saves resources. • Flexible for both students and academic staff. • Has a lower dropout rate among students. • Learning outcomes are enhanced. • The learning environment is professional. • Improved research skills.	• Institutions face numerous technological problems. • Students face technological problems. • It is not easy to acquire new teaching and technological skills. • Students feel isolated. • Some students' expectations are unrealistic. • Limited support for course redesign. • Commitment pertaining to time is challenging.

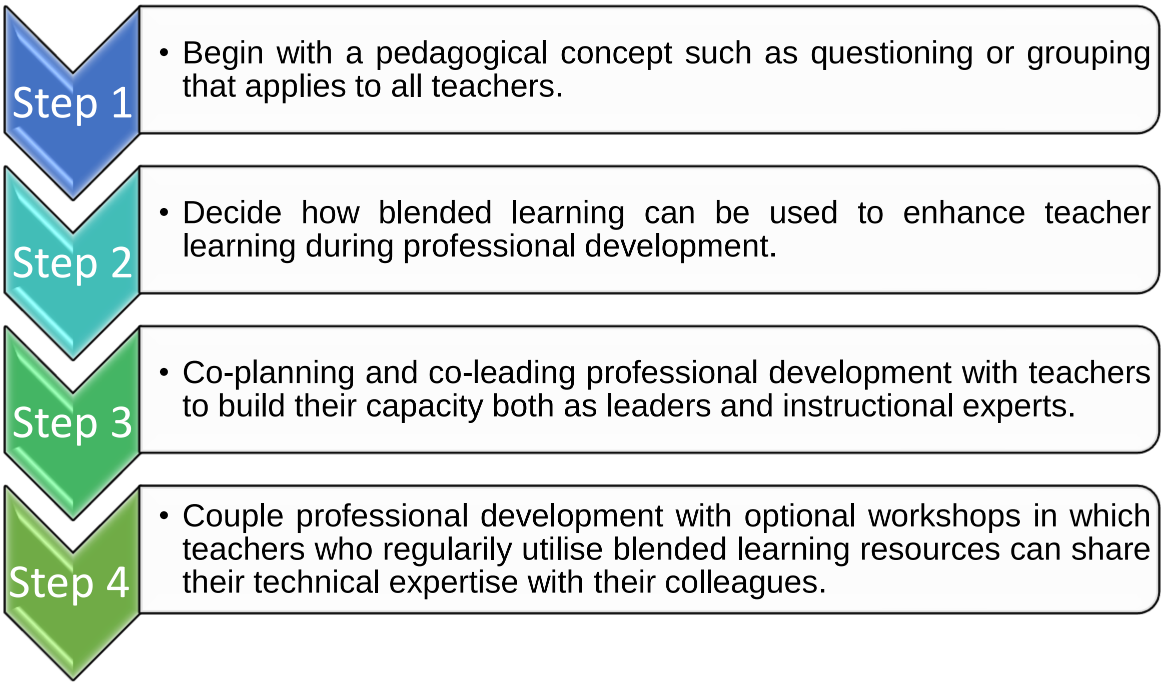
Source: Adapted from Poon (2013)

In as much as blended learning has the advantage of minimising costs and saving resources for the institution, in developing countries these costs are transferred to the student, because in numerous cases, when students are away from their campus, they do not have access to e-learning systems unless they can afford to buy broadband and have access to the necessary hardware. Bowyer and Cambers (2017) indicated that blended learning has had a positive impact at higher education institutions because of the following list of associated benefits.

- Improved outcome: better retention of students and higher pass rates, as blended learning improves attendance in face-to-face classes.
- Strategic use of classroom time: online learning can be used as a platform to introduce the work to be covered in class as a way of preparing students for what to expect from the next face-to-face lecture.
- Online discussion: there is an additional opportunity for students and lecturers to engage in online discussions, allowing reticent students a chance to participate in online discussions. This can be achieved through asynchronous and synchronous methods.

Blended learning has undeniably had a positive impact at higher education institutions. Lu et al. (2018) raised a concern that numerous researchers have found that blended learning makes it difficult to monitor students' behaviours and habits because of the complexity of the learning environment. With blended learning it is not easy to implement timely interventions to facilitate successful learning because it is difficult to identify students that are at risk.

According to Mekhitariam (2016), for blended learning to be effective, the steps listed hereunder should be adopted.



Source: Adapted from Mekhitarian (2016)

Figure 2.3: Steps to be taken for effective blended learning

The steps, as explained by Mekhitarian (2016), involve beginning with a pedagogical concept such as questioning or grouping that applies to all teachers. Secondly, deciding how blended learning can enhance teachers' learning during professional development. Thirdly, co-planning and co-leading professional development with teachers to build their capacity as instructional experts and leaders. Lastly, coupling professional development with optional workshops in which teachers who regularly utilise blended learning resources can share their technical expertise with colleagues.

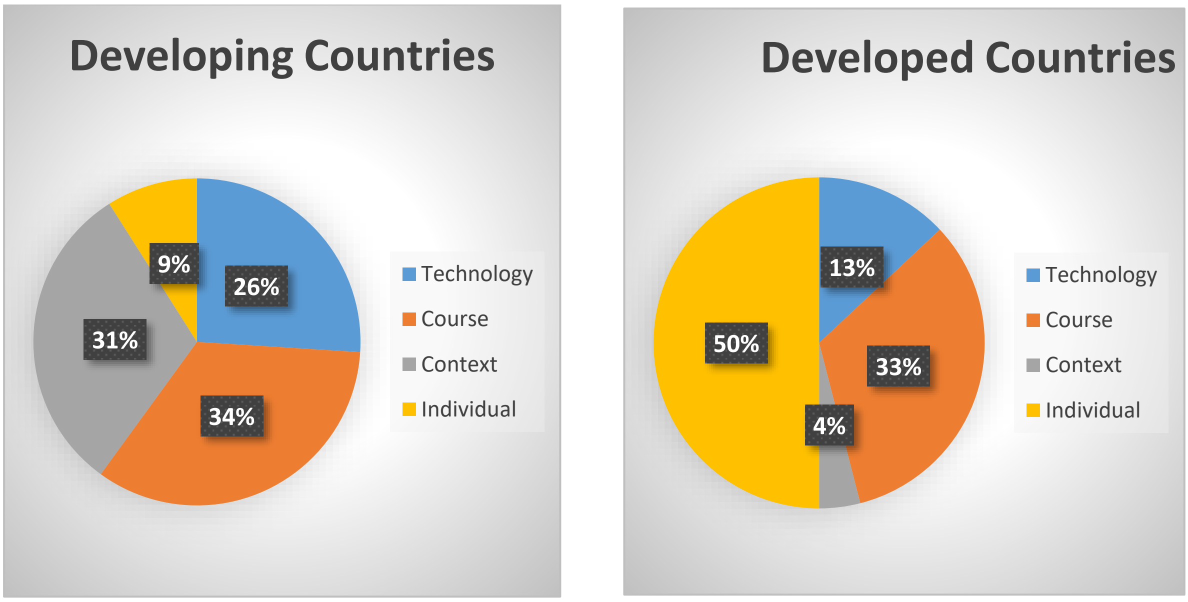
Crawford and Jenkins (2018) stated that for blended learning to be effective the curriculum should be re-shaped and the re-shaping has to capacitate students for independent learning. The students are central for planning, and critical and creative thinking should be the aim. Educators must ensure that they develop those skills. It is the educators' duty to ensure that they experiment and change their pedagogy accordingly, as this will increase the effectiveness of blended learning (Crawford and Jenkins, 2018).

2.5 E-LEARNING IN HIGHER EDUCATION INSTITUTIONS IN DEVELOPING AND DEVELOPED COUNTRIES

According to Ssekakubo, Suleman, and Marsden (2011), countries that operate with limited ICT resources and where the majority of the population does not have a basic understanding and knowledge of ICT, are referred to as developing countries. The term that is used to describe these situations in developing countries is the digital divide. This is when there is a substantial gap between the people who can afford and the people who cannot afford ICT resources. Douglas, Imran and Turner (2016) hold that developing countries see e-learning as attractive, despite developed countries experiencing numerous challenges in the implementation of e-learning. These challenges include the efficient use of ICT, cultural differences and adapting to new training methods. In developing countries it is important for e-learning developers to have an in-depth understanding of how to contextualise the technological and functional tool in a way that will assist them to meet their needs (Douglas et al., 2016). This implies that when developing countries implement e-learning, they must take all the challenges that these countries have faced into consideration and learn from them. According to Andersson and Grönlund (2009), the challenges that developing countries face when implementing e-learning include not having enough e-learning components, such as computers, electricity and technological skills. It is crucial for developing countries to understand the learners' background before developing training programmes for them because a one size fits all approach is seldom appropriate (Douglas et al., 2016). The danger with a one size fits all approach is that not all countries experience the same challenges with regard to technology. What works for one country does not necessarily work for another, which is why e-learning strategies should be country-specific.

Queiros and de Villiers (2016) indicated a need for an awareness of students' concerns and opinions and the barriers they face with e-leaning, as there is an increase in the use of e-learning. Students are the main users of the e-learning systems and institutions should ensure that they obtain the students' approval through engagement, thus indicating that their ideas and concerns have value. This should ensure decreased resistance to using e-learning systems. This approach should be followed with all students, irrespective of their level of access to the internet. The digital divide is closing in developing countries, leading to increased use of mobile computing and social networking and students being in a better position to benefit from e-learning (Douglas et al., 2016). Studies have been conducted in a number of developing countries' universities that adopted e-learning in the early stages and have found that e-learning has been beneficial for students (Bhuasiri, Xaymoungkhoun, Zo, Rho and Ciganek, 2012; Pandey, 2013; Quimno, Imran and Turner, 2013). In a study conducted by Mtebe and Raisamo (2014) titled *"Investigating Perceived Barriers to the Use of Open Educational Resources in Higher Education in Tanzania",* findings revealed that in Africa there is a lack of interest in the use of online platforms as a means of teaching and learning, as there is a shortage of suitable materials. This has highlighted the importance of finding strategies that will ensure that online learning is utilised to its maximum capacity.

A study was conducted to review academic papers with the purpose of comparing the challenges faced in developing and developed countries (Douglas et al., 2016). The challenges were grouped into four categories, namely technological, course content, contextual and individual. The results revealed that extensive research has been undertaken into context and technology in developing countries, which could imply that context and technology challenges are more prevalent in developing than in developed countries. Challenges relating to course content are similar in both developing and developed countries and there are fewer individual challenges in developing countries. These results are illustrated in Figure 2.4 (Douglas et al., 2016).



Source: Adapted from Douglas et al. (2016)

Figure 2.4: E-Learning research focus in developed versus developing countries

Figure 2.4 illustrates that in developing countries the main challenge is related to the course, as the figure indicates that 34% of the challenges are related to course while in developed countries 50% of the challenges relate to individuals.

According to Lim et al., (2018), there are four emerging modes of digital learning that can be used in developing countries.

2.5.1 Massive Open Online Courses (MOOCs)

Lim et al., (2018) define MOOCs using four elements, which are: *massive,* as there is no limit in terms of enrolment; *open,* as anyone who has access can participate; *online,* as learning activities take place on the web and *course,* as it is structured according to learning goals and defined areas of study. The authors added that as MOOCs are open in terms of participation and scalability features, they have the potential to address the challenges of equity, quality and efficiency in education. MOOCs are interactive online courses that are free and open to all on the World Wide Web (Boga and McCreal, 2014). MOOCs are a strategy that can be used by developing countries to cater for more learners at lower costs whilst facilitating the spread of knowledge (Daniel, Cano and Cervera, 2015). Boga and McCreal (2014) indicated that MOOCs, through the facilitation of collaboration between people, places and technology, can potentially enhance online education in developing countries. The challenge for policymakers in developing countries with MOOCs, is that MOOCs originated in urban environments in developed countries and are often forced to fit in with a developing country without considering that the challenges faced in the developing country could differ from those in developed countries (Trucano, 2013). According to Mak, Williams & Mackness (2010), there is a need to adopt the culture to ensure that all participants are included in intellectual debates and forums and that unacceptable cultural posts are avoided while using MOOCs. This has led to the suggestion that when offering MOOCs in a developing country that country should adapt to the local setting and contextualise the courses in a way that is in line with the competencies and skills in that country (Daniel, Cano and Cervera, 2015). According to Castillo, Lee, Zahra and Wager (2015), in order for MOOCs to reach a wider group of learners in developing countries, the instructors and providers need to be aware of, and sensitive to, the barriers that prevent certain populations from gaining access. These barriers include but are not limited to gender, linguistic constraints, digital literacy and level of education. Lim et al. (2018) note that although MOOCs contribute to increased access to education, there remains a concern as to whether or not this access has extended to the previously disadvantaged groups marginalised by race, gender, culture, ethnicity, socio-economic status and geography. Christensen, Steinmetz, Alcorn, Bennett, Woods and Emanuel (2013) argue that for people to utilise MOOCs they must have the resources, implying that MOOCs are more beneficial and provide more opportunities and resources for the people who already have them. A study pertaining to the use of MOOCs that was conducted in developing countries including Colombia, the Philippines and South Africa revealed that low and middle income students make up 80% of MOOCs' users and that 80% of these users have only basic or intermediary ICT skills (Garrido, Koepke, Andersen, Mena, Macapagal and Dalvit, 2016).

2.5.2 Intelligent Tutoring Systems (ITSs)

Kulik and Fletcher (2016) referred to ITSs as the second generation of computer tutors. An intelligent tutoring system is computer-based and provides artificial intelligence that allows learners personalised educational experiences (Lim et al., 2018). According to Phobun and Vicheanpanya (2010), one of the reasons for the limited success with e-learning is that making lecture notes available on the internet does not guarantee that learning will take place. This has led to ITSs being potential solutions to the problem, as they have built-in artificial intelligence (Phobun and Vicheanpanya, 2010). ITSs were developed to model learners' psychological states, to provide individual instruction and for diverse subject areas to assist learners in acquiring domain-specific, metacognitive and cognitive knowledge (Ma, Adesope, Nesbit and Liu, 2014). According to Ma et al. (2014), an ITS is a computer system that:

- performs a tutoring function by presenting information to be learned, allocating learners' tasks and asking questions, providing feedback or hints, responding to the questions asked by students and offering responses that might provoke cognitive, motivational or metacognitive change;
- makes use of students' modelling functions so that one or more of the tutoring functions can be adopted.

Phobun and Vicheanpanya (2010) noted that one of the goals of an ITS is for learners to benefit from one-on-one instruction and enable the learner to practice skills by undertaking tasks in highly interactive learning environments. An ITS is useful for assessing the actions of learners within the interactive learning environment and can develop a model of a learner's knowledge, skills and expertise.

2.5.3 Digital game-based learning (DGBL)

Lim et al. (2018) define DGBL as learning facilitated by digital games.

According to Tsay, Kofinas and Luo (2018), the student learning experience could be enhanced by using gamification mediated by technology. There has been an increase in the use of digital game-based language learning and in computer-assisted language learning, DGBL has received a considerable amount of attention (Reinders and Wattana, 2015). Reinders (2012) argues that if the digital games are good, they incorporate learning principles, as digital games provide pathways to mastery through entertainment. According to Woo (2014), with DGBL there is a possibility of having a greater number of motivated students. A number of studies have hypothesised that games can enhance learning and motivate learners. The characteristics of the games attract learners. Chang and Hwang (2018) indicated that applying mobile learning utilising game-based instruction strategies has shown that learning, performance and motivation are improved. According to Chang and Hwang (2018), authors reviewed 139 papers from recognised journals between 2010 and 2014 and found that DGBL can increase a student's inner learning motivation. Hitosugi, Schmidt and Hayashi (2014) mentioned that most of the studies pertaining to DGBL focused on research undertaken outside the classroom or in a laboratory. This led to the researchers conducting studies within the DGBL unit and the results revealed similar outcomes to those of most scholars who conducted their research in a different setting. It remained evident that the use of video games offered students a deeper learning experience that a textbook could not easily accomplish (Hitpsugi, Schmidt and Hayashi, 2014). Developing countries are hesitant to adopt DGBL, as the cost of developing and deploying games and the cost of the technology resources needed to integrate these systems in the classroom are excessive (Lim et al., 2018).

2.5.4 Learning Analytics (LA)

Learning analytics involves collecting, analysing and reporting on data pertaining to learners and their contexts so that students' learning can be improved (Lim et al., 2018). Gašević (2015) defines learning analytics as literature that draws on research, techniques and methods from a number of disciplines including data mining, information visualisation, learning sciences and psychology. There has been an increase in the use of learning analytics as it assists educational institutions to increase students' learning and retention, it eases the burden of accountability and it improves the students' learning success (Maseleno, Sabani, Huda, Ahmad, Jasmi and Basiron, 2018). According to Lim et al. (2018), there are several ways in which analytics can be applied in the learning process and these are listed hereunder.

- Students' performance tracking
- Improving the retention of students
- Prediction of students' performances
- Curricula evaluation
- Selecting characteristics to disaggregate students' performance
- Identifying the outliers for early intervention
- Analysis of the assessment technique and instruments
- Improvement of instructional models

According to Gašević (2018), implementation capabilities have to be developed if the developing countries wish to adopt LA as a transformational tool and this includes developing data literacy among the stakeholders, protecting privacy, developing policies and ethics, developing analysis-based tools with active stakeholder involvement and algorithmic accountability. After gaining an in-depth understanding of e-learning in developing countries it was necessary to focus on an analysis of e-learning in South Africa, which is the country in which this study was conducted.

2.6 E-LEARNING IN HIGHER EDUCATION INSTITUTIONS IN SOUTH AFRICA

South Africa forms part of the developing global world and is required to provide quality education in line with social justice and maintain world class standards (Bezuidenhout, 2018). This is a challenge, as South Africa is ranked as the country with the highest level of inequality according to the Gini Index (World Bank, 2016; Czerniewicz and Rother, 2018). This has led to a number of protests. What is interesting to note is that technology has played an important role at HEIs in response to the protests. When faced with disrupted classes and the possibility of the HEIs shutting down during protests, several South African HEIs opted to introduce blended learning, where students were provided with the learning material online (Czerniewicz and Rother, 2018). Ischebeck (2017) holds that as at 2013, approximately 48% of the South African population was connected to the internet, according to a study conducted by the World Bank. The prediction is that this number will increase because of the global trend of increasing internet usage. According to Ischebeck (2017), an advantage in South Africa with regard to e-learning is the increase in the number of smartphone users, as the World Bank statistics indicated that there would be in excess of 16.1 million smartphone users by 2017. There is however an argument that blended learning in South Africa is associated with academic exclusion. Some have criticised blended learning on the grounds of equity (Czerniewicz and Rother, 2018). The South African Department of Higher Education and Training (DHET) adopted open learning as a strategy to ensure that education and training opportunities reach a larger number of students, even those in rural areas. One of the ways to achieve this is by making use of the benefits of online and electronic learning (Letseka, Letseka and Pitsoe, 2018). Mbatha (2017) posits that e-learning is seen as a transformational educational tool.

South Africa takes e-learning seriously and is involved in ICT events. For example, in the 2016 e-learning Africa conference that was held in Cairo in Egypt, more than half the delegates were from South Africa (Ischebeck, 2017). A number of the South African higher education institutions that have implemented e-learning are discussed in the sections that follow.

2.6.1 University of South Africa (UNISA)

The University of South Africa (UNISA), which has more than 400 000 students, is the largest open, distance learning (ODL) institution (Queiros and de Villiers, 2016). Letseka, Letseka and Pitsoe (2018) confirmed this statement by indicating that UNISA is the largest open distance e-learning (ODeL) university in Africa. UNISA utilises e-learning for facilitating interaction and the distribution of resources. The e-learning learner management platform used at UNISA is MyUNISA and it is utilised fully, meaning that it is used for teaching and learning as well as for administrative purposes (Msomi, 2016). MyUNISA is defined as the tool used to enhance and supplement academic interactions and improve the communication process between UNISA and its students (Letseka, Letseka and Pitsoe, 2018). According to information on the UNISA website, ODL is a different kind of learning in that students do not attend lectures and are responsible for their own studies. Information on the site emphasises that the "distance" in distance learning means that students interact with UNISA mostly through a digital format. The adoption of ICT has been slow in Africa, including in UNISA, which is the largest provider of distance education in Africa (Karunaratne, Peiris and Hansson, 2018).

2.6.2 University of Pretoria (UP)

This is one of the first universities in South Africa to have adopted e-learning in 1998 but it began introducing distance learning programmes as early as 1996. The distance programmes included the use of video conferencing, courses carried out on the web and multimedia, as well as broadcasting (Msomi, 2016). The university began using a learner management system in 1998 in an attempt to enhance and support student learning. The LMS system that is used by UP is branded as clickUP and is based on Blackboard products. The university is using Blackboard Learn, Blackboard Mobile, Blackboard Collaborate, Turnitin and Respondus technologies in support of blended learning (Hicks, 1993). According to Potgieter and Harding (2016), UP adopted blended learning, which comprises face-to-face and online learning, as their innovative approach to teaching and learning. This approach was to provide the best of both worlds in teaching and learning. Potgieter and Harding (2016) indicated that the face-to-face model of teaching is used where suitable and is complemented by a variety of virtual learning tools and products.

2.6.3 University of KwaZulu-Natal (UKZN)

E-Learning was introduced for teaching and learning in 2010, with MOODLE being used as the learner management system. The MOODLE system at UKZN is for instructors to upload announcements, notes and assignments and for discussion forums to be created. One of the challenges with this system is that UKZN is not using the system to its full potential, as the system does not offer additional support to students (Msomi, 2016). MOODLE is the official LMS used at UKZN to communicate with students and for uploading lecture notes and library resources (Ngubane, 2017). There are however challenges associated with MOODLE, the main one being accessing MOODLE, as it requires Wi-Fi, which is not always available for students off campus.

2.6.4 University of Cape Town (UCT)

The learner management system used at UCT is web-based communication technology (WebCT) and MOODLE, which was introduced in 2006. UCT designed its courses using e-learning. The challenge with e-learning at UCT is that it is mostly used for administrative purposes for submitting assignments rather than for teaching and learning (Msomi, 2016). UCT utilises Vula, which is a version of the open-source Sakai as the main LMS, as there were difficulties with data migration and this was frustrating for users. It was therefore necessary to find an LMS that would meet most of the institution’s requirements (Ssekakubo et al., 2011). This collaboration and learning environment is supported by the Centre for Innovation in Learning and Teaching (CILT) and the Centre for Educational Technology (CET) in the Centre of Higher Education Development (CHED). Vula means ‘to open’, which has the following connotations for the institution:

- opening the UCT community to networking, collaboration and learning opportunities;
- opening the space for innovation, explaration and discovery and
- open with 24 hours access a day, 7 days a week http://www.healthedu.uct.ac.za/learning-management-system-vula.

2.6.5 University of Stellenbosch (US)

E-Learning is part of their intake clause, making it compulsory (Msomi, 2016). According to Mlitwa (2007), the learner management system introduced at US was WebCT, which was chosen because of a decision made by top management and educators with learners having no choice. US introduced a new video-streaming solution in 2017, which had the goal of enabling students to partake in the lectures from anywhere via the video-streaming solution. This new video-streaming solution is integrated with SUNLearn, which is the university's current learner management system. http://www0.sun.ac.za/pgstudies/news/centre-for-learning-technologies-introduces-sunstream.html

2.6.6 Nelson Mandela Metropolitan University (NMMU), now known as Nelson Mandela University

NMMU uses the learner management system, MOODLE (ilearn), for the management of course activities such as reporting, grading assignments and tracking students. There is no flexibility in the system and limited interactivity (Msomi, 2016). The findings of research undertaken to study LMS implementation in the surveyed universities revealed that at NMMU the content and document management system that was used by the university to avail courses for sharing and collaboration in the blended learning environment was rigid, hence the introduction of MOODLE (Ssekakubo et al., 2011). Nelson Mandela University signed a Memorandum of Understanding (MoU) with Nelson Mandela Bay Municipality in April 2015 to allow students to access the university's online learning portal via the metro's Wi-Fi infrastructure from 17 public facilities (Wikivillage, 2016). The aim was to allow students to conduct research for assignments and to take online tests. This resulted from the **#feesMustFall** movement. It was an interim measure but is reported to have extended beyond the reopening of the university.

2.6.7 University of Western Cape (UWC)

UWC initiated e-learning to support staff and students and to promote LMS use at the university in 2000 (Leonad, Kies and Braaf, 2018). UWC uses Open Source Software (OSS) based on KWEL, which is an e-learning system that was developed in-house. The UWC e-learning platform is referred to as iKwamva (Sakai). The disadvantage is a lack of interactivity (Msomi, 2016). Due to dynamic education sector reforms, the UWC Centre for Innovative and Communication Technologies (CIECT) introduced and adopted technologies to enhance teaching and learning practices, research and administration and education management (Mayedwa, Talip and Stoltekamp, 2013). CIECTs main focus is on unique use and ground-breaking educational technologies, as well as the encouragement of sound teaching practices and online sharing of content (Leonad, Kies and Braaf, 2018).

2.6.8 Tshwane University of Technology (TUT)

TUT replaced its electronic campus with MyTutor in 2011 (Msomi, 2016). MyTutor is used by instructors for uploading student grades and assignments and allows students to access video tutorials online.

2.6.9 University of Johannesburg (UJ)

UJ uses the learner management system for offering extra support by providing online materials to large classes (Msomi, 2016).

There is however, a need to understand that as much as e-learning is being adopted in South Africa, there are issues of a digital divide (Msomi, 2016; Odunaike Olugbara, and Ojo, 2013). According to Kok and Esterhuizen (2018), there are numerous students from rural areas who have limited internet access and limited computer literacy, as they are technologically disadvantaged and this hampers the e-learning adoption process. If institutions wish to enforce the compulsory use of learner management systems (LMS), there must be acceptance from students and academic staff, as they will be using the system (Kok and Esterhuizen, 2018). One way to increase acceptance by students and academics is through engagement with these stakeholders. There are a number of benefits from which higher education institutions can benefit. These benefits are discussed in Section 2.7.

2.7 BENEFITS OF E-LEARNING

The introduction of e-learning has several benefits for higher education institutions. According to Arkorful and Abaidoo (2015), as well as Queiros and de Villiers (2016), a number of studies have highlighted the benefits of adopting e-learning technologies and these are listed hereunder.

- Accomplishment of objectives in a short space of time with limited effort.
- Access to a larger amount of information. Queiros and de Villiers (2016) hold that there is timeliness and more accessibility to information with online learning.
- Ease of studying from any location and accommodating people with disabilities. Students may choose a time and place that suits them.
- It is cost effective in that students do not have to travel and the institution can train a maximum number of students without needing buildings to accommodate them.
- Ethics are ensured, as with e-learning there is equal access to information.
- E-learning offers discussion forums that assist students who find it difficult to interact with others face-to-face, which could lead to more positive results with regard to participation.
- Students can work at their own pace, which should increase satisfaction and decrease stress.
- Ease of tracking students' progress online and collaboration and interactivity.
- Personal computing and internet skills could be enhanced.

The benefits of online learning include timeliness, convenience, learner-centricity, currency, cost-effectiveness, ease of tracking, collaboration and interactivity (Pollard and Hillage, 2001). For students, the benefits are flexibility, easy access to resources, convenience of electronic communication with educators, enhancement of personal computing and internet skills and participation and social presence (Bharuthram and Kies, 2013; Mbati, 2012). As much as e-learning is beneficial to higher education institutions, there are however a number of challenges the higher education institutions face in implementing e-learning. A discussion of these challenges is necessary to ascertain ways in which they can be minimised.

2.8 CHALLENGES OF E-LEARNING

Several challenges are associated with e-learning. Queiros and de Villiers (2016) hold that the disadvantages of e-learning are:

- that there is a need for human support, as there is a lack of social presence and interactivity;
- it can be time consuming in that some students find it difficult to manage their time (Geduld, 2013);
- learners are sometimes demotivated, as there could be inadequate technical support;
- lack of connectivity and access could lead to inadequate access to online materials;
- hardware and software problems;
- students not being sure how to study online, as some students lack experience in using technology (Geduld, 2013) and
- an excessive amount of time spent on the computer.

It is therefore important to understand the way in which students view online learning and the barriers they face (Queiros and de Villiers, 2016). This will assist institutions in improving what e-learning systems offer. E-learning, like any other form of learning and teaching, has to abide by a number of policies and procedures set out for higher education institutions. There are a number of e-learning policies and procedures, as reflected in the next section.

2.9 E-LEARNING POLICIES AND PROCEDURES

Most organisations and institutions are governed by policies. E-learning is no exception and this is why there are certain policies and procedures by which they must abide. A policy is a statement of the way in which an organisation intends to conduct business and provide services. Policy makers are important role players in formulating strategies to enhance the learning experience (El-Masri and Tarhini, 2017). Policies should be concise (McGrath, 2006). According to Waterhouse and Rogers (2004), policies pertaining to e-learning are there to assist instructors and students, as they make the management of e-learning easier. McGrath (2006) posits that e-learning policies should respond to the needs of online learners and teachers. Brown, Anderson and Murray (2007) hold that it is important to investigate different countries' e-learning policy experiences with the aim of understanding the consistent trends and tensions found in the policy implementation process. This will assist a country to draw up an e-learning policy that is likely to be successful, as it will take into consideration the experiences of other countries and fill in the gaps found in other countries' e-learning polices. Brown et al. (2007) developed a database where e-learning policy and strategy documents are summarised and a number of patterns were identified, as listed hereunder.

- Most strategies are focused on building and ensuring quality in e-learning.
- Most strategies aimed for sector efficiencies and embedded e-learning.
- The strategies are to be used to develop physical infrastructure.
- Most strategies create a system-wide approach to e-learning.

For e-learning to be effective, the policies that are designed departmentally for online teaching should be sustainable (McGrath, 2006). Waterhouse & Rogers (2004) advanced nine categories that instructors should consider as course policies. They are:

- course syllabus e-learning policy;
- intellectual property rights policy;
- e-mail policy;
- students' right to privacy policy;
- discussion policy;
- access to technical assistance policy;
- code of conduct for students policy;
- assignment policy and
- software standards policy.

In South Africa (SA) there is the National Integrated ICT Policy White Paper that aims to minimise the persistent inequality in the country. It is based on the assumption that efficiency of service delivery can be enhanced by digital transformation. The National Broadband Policy, "SA Connect", was introduced with the intention of extending the broadband infrastructure and services to the most marginalised communities in South Africa by 2020 (Kussango, Tucker and Pather, 2018). A number of policy documents from HEIs in SA are discussed in the following paragraphs.

- Strategy for the use of ICT in Learning and Teaching at Stellenbosch University (2013). A task team was assigned at Stellenbosch University to formulate a strategy and vision for the effective and efficient use of ICT in teaching and learning. The vision that was formulated is:

  > *“Stellenbosch University has a 21st Century ICT-enhanced learning and teaching environment that uses ICTs effectively and efficiently to extend the reach and richness of its academic offering.”*

  The university’s strategy includes firstly, redesigning selected academic programmes and ensuring that there is interactive learning during lectures, including taking into account e-learning content and copyright and applying ICT in short courses. Secondly, ensuring that students are empowered with ICT skills. Thirdly, supporting the academic staff, which includes presenting workshops for them and discussion forums. Lastly, ensuring that technological devices are available to students and academic staff and taking care of security issues linked to technology (Stellenbosch University, 2013).

- Open Distance Learning Policy from UNISA. UNISA accomplishes blended learning by utilising various teaching and learning strategies that encompass a range of technologies combined with face-to-face interaction. Technologies are used with minimal interaction. Firstly, the use of digital media, including video cassettes, DVDs, audio and CDs, distributing content online using myUnisa and corporate websites, satellite broadcasting and the possibility of using the radio and television to facilitate the process of teaching and learning. Secondly, using technologies that are asynchronous, which includes blogs, social network facilities, wikis and e-portfolio to facilitate teaching and learning (UNISA, 2008).
- The Institutional E-Learning Strategy (2009/10-2011/12) from Walter Sisulu University (WSU)
- The E-Learning Strategy and Tactics for the University of the Witwatersrand (Wits) (2009). Wits’ e-learning strategy was developed to guide the implementation of e-learning at Wits. The document was to lay a foundation for

progress in creating an e-learning support and innovation unit. The strategy's goals are firstly to support innovation through the creation of an intellectual framework according to the Technology-Innovation-Pedagogy-Support (TIPS) model. Secondly, to put Wits on the map by ensuring that the university is established as a leader in the field of e-learning and e-learning research. Lastly, to ensure that teaching, learning and research, the core operational areas, benefit from the capacity of e-learning within the university (Keats, 2009).

According to Moran, Harris and Moran (2007), culture is dynamic, gives people a sense of belonging and guides their actions and behaviour. South Africa is home to many different cultures and students are drawn from various cultural backgrounds. The diversity in the country is the reason that cultural differences need to be taken into consideration when designing teaching and learning strategies. Section 2.10 highlights the importance of considering cultural factors in education.

2.10 THE IMPORTANCE OF CULTURAL FACTORS AND CULTURE IN EDUCATION

Solesvik, Westhead and Matlay (2014) posit that there is no single definition of culture but numerous definitions indicate that culture is something that is shared amongst individuals or a group of people. The diverse nature of e-learning environments makes it important for instructors and instructional designers to understand and be aware of the importance of cultural factors in education, so that they can deliver instruction that is culturally adaptive (Gomez-Rey, Barbera and Fernandez-Navarro, 2016). Success in e-learning is mostly attributed to behavioural, social, individual, organisational and cultural factors, as these play a critical role in the development and use of the systems (El-Masri and Tarhini, 2017).

Although cultural diversity could be seen in a positive light as it leads to the enrichment of individuals, there are concerns that misunderstandings occur between people as a result of cultural differences that can affect educational discipline (Bozkurt and Aydın, 2018). Culture has an important role, as it influences social behaviour, the manner in which people communicate, thinking processes and educational technologies (Bozkurt et al., 2018). These elements are necessary variables for online learning, which is why cultural factors should be considered in online learning. According to Bozkurt et al.

(2018), culture has an important role in developing human thoughts and behaviour, making culture a powerful social concept. Cultural differences set a limit to the systematic evaluations of the impact of ICT approaches (Karunaratne, Peiris and Hansson, 2018).

There are a number of learner management systems that can be adopted by higher education institutions.

2.11 LEARNER MANAGEMENT SYSTEMS

Learning management systems (LMSs) are flexible tools for universities in the learning and teaching environment globally (Munoz, Lasheras, Capel, Cantabella and Caballero, 2015). Munoz et al. (2015) defined an LMS as a working environment that plays a supportive role for the management of content and academic processes for online and on-campus students and lecturers. According to Parathnandh, Sing, Lalloo, Pillay and Nadesanreddy (2014), LMSs make it easier to monitor tools of material usage, to perform evaluation and testing online and to facilitate communication between learners and teachers. The LMS provides the academic staff and the students with the tools needed for the improvement and management of the learning process (Stantchev, Colomo-Palacios, Soto-Acosta and Misra, 2014). Ssekakubo et al. (2011) stated that an LMS as a learning tool is viewed as being the most basic and reliable for carrying out blended learning and is the origin of web-based programmes. Numerous LMSs are used in South African universities, including WebCT (World Wide Web Course Tool), Sakai and MOODLE (Bagarukayo and Kalema, 2015). UKZN introduced the LMS, MOODLE, in 2010 and it can be found on the UKZN website as e-learning@ukzn. This LMS is available to students and lecturers and is mainly used by lecturers to upload all their learning and teaching materials and to initiate discussion forums (Sibanda and Donnelly, 2014). ATutor, Eliademy, Forma LMS and MOODLE are discussed in the sections that follow.

2.11.1 ATutor

The first release of aTutor was in 2002. The developers in the years prior to the release of aTutor conducted two studies that focused on the accessibility of online learning systems for people with disabilities. The results of the research revealed that there were no popular learner management systems available at the time that provided accessibility guidelines, as it was difficult at the time for a person who was blind to fully benefit from participating in online courses. As a result, aTutor was introduced with various features, including one where a blind person could listen to the entire interface of the system without the assistance of the screen reader (Jump up ^). According to Lengyel et al. (2006), aTutor promises that it is easy to install, provides good documentation and has strong potential for development, as well as a development team that is committed to maintaining high standards. It includes numerous features that provide accessibility for learners with disabilities. ATutor is an open-source, web-based learning system with content management and a social networking environment that was designed to include adaptability and accessibility features. This is where the instructors can install and update the system in the minimum amount of time. It allows for students to learn in a user-friendly environment where they utilise the communicative tools that are part of the software (Lofti, Gazerani and Nasaruddin, 2010).

2.11.2 Eliademy

Sotiris Makrygiannis and Sergey Gerasimenko founded Eliademy in 2012 in Finland (Zancanaro, Nunes and Domingues, 2017). This LMS is available in more than 19 languages and is used by universities and schools for creating and delivering online courses. Eliademy is an LMS that could include several teachers for a course. It is said to have good tools for interaction, is easy to use, has relevant privacy controls, provides a quick registration process and has a user-friendly layout (Annala, Fopma and Leikomaa, 2017). Although Eliademy comes with certain benefits, such as ease of use, it does have several limitations that affect its implementation (Annala, Fopma and Leikomaa, 2017). According to Perwonegoro and Syafei (2016), Eliademy provides the freedom for users to design or produce tailor-made material rather than using the available materials. It is a collaborative tool. Teachers and students can share, create and manage online courses with Eliademy and it can be accessed at any time from anywhere (Perwonegoro and Syafei, 2016).

2.11.3 Forma LMS

Forma LMS was created for the corporate world and accommodates both medium sized and large organisations. It was created by a number of companies that worked together sharing their experience of corporate training and software development, keeping corporate needs in mind. Forma LMS's focus is on flexibility and reliability (http://www.formalms.org).

2.11.4 MOODLE

Modular Object-Oriented Dynamic Learning Environment (MOODLE) is an open course management system that is also known as an LMS. MOODLE was introduced to assist lecturers to create online courses that focus on interaction and collaboration, with the first version of MOODLE being released in August 2002 (Parathnandh et al., 2014). According to Costello (2013), MOODLE was started by a computer science graduate, Martin Dougiamas, in a computer server room in an Australian university in 1999. Since the first version of MOODLE was released, its source code has been available and open to anyone. The MOODLE platform is a type of e-learning platform used in the teaching process (Ianos and Oproiu, 2014). According to Coll and Treagust (2018), MOODLE provides students with significant scope for independence, which in turn promotes learning, social interaction and the social construction of knowledge. Students' learning outcomes can be achieved through integrated learning using MOODLE (Coll and Treagust, 2018). MOODLE is available on Andriod and iOs platforms (Sarrab, Hafedh and Bader, 2015). There are numerous other support tools for distance learning that are similar to MOODLE, namely eCollege, ATutor, Derire2Learn and Dokeos (Lara, Lizcano, Martinez, Pazos and Riera, 2014). According to Chicioreanu and Cosma (2017), MOODLE provides access to several resources for academic staff, such as:

- URL link to a web page;
- text and images in the course sections can be introduced through labels/messages;
- an IMS content pack that allows for visualisation within the course of content packs and it is in accordance with the specifications of IMS content packaging;
- a downloadable document that can be utilised and

- a web page that makes it possible to edit within the course.

Chung and Ackerman (2015), Jakshylykov and Nurmatov (2016), Jebari, Boussedra and Ettouhami (2017) and Zainuddin, Idrus and Jamal, (2016) hold that MOODLE is a network for interaction between academic staff and students and numerous resources and activities are offered, namely those listed hereunder.

- Forums: where students and academic staff can engage in discussions and the sharing of ideas.
- Chat: is available for a certain day or week (specific time).
- Wiki: comments by the academic staff, space for collaborative work.
- Glossary: for creating and maintaining a list of definitions.
- Groups: students can be separated into groups based on their chosen modules of study.
- Assignment: allows the academic staff to collect work from students.
- Lesson: questions can be asked for evaluation purposes.
- Database: custom field records for the sharing and collection of data.
- Workshop: student evaluation, peer assessment.
- Quiz: in the form of multiple choice, true or false questions.

Students using MOODLE have the advantage of access to a wide range of educational material and interaction with other students and academic staff (Jebari et al., 2017).

Table 2.2: Advantages and disadvantages of MOODLE

Advantages of Moodle presented by Chicioreanu and Cosma (2017)	Disadvantages of Moodle presented by Petrovici and Ciobanu (2016)
• Academic staff and student interaction is in real time and students receive answers quickly. • Easy to manage and edit documents on MOODLE. Students find MOODLE easy to use (Chung and Ackerman, 2015). • Creation of backup copies and information restoration is simple. • Keeps a register of grades and downloads to spread sheets. • Ease of access to archived information from other academic staff.	• There are no guarantees of the results of the final tests. • There is no real guarantee that the students really studied what they were supposed to study. • It is difficult for academic staff to assess the abilities and competencies of students when it comes to creativity and critical thinking. • Solving tasks can be achieved by copying and pasting.

Source: Adapted from Chicioreanu and Cosma (2017) and Petrovici and Ciobanu (2016)

According to Jakshylykov and Nurmatov (2016), a study was conducted at the international Tataturk Ala-Too University (IAAU) on the integration challenges of university and information management systems (UIMS) and MOODLE. A segment of the results revealed that the MOODLE system poses a number of challenges, namely:

- a lack of resources and infrastructure;
- no experts in an integration area;
- no training on MOODLE;
- limited awareness of e-learning and
- some students prefer face-to-face learning to e-learning.

UKZN adopted MOODLE in 2010. Sibanda and Donnelly (2014) hold that although MOODLE has benefits for universities for teaching and learning, it also has limitations, as MOODLE does not offer additional support to students, only the demonstration of lecturers encouraging students to use the online platform.

Patel and Patel (2017) conducted a study that included the comparison of various learner management systems. These systems included MOODLE, ATutor, Eliademy and Forma LMS. The results of the comparison are presented in Table 2.3.

Table 2.3: Comparison of learner management systems

No	Feature	MOODLE	ATutor	Eliademy	Forma LMS
1.	Software type used with the LMS	Stand alone, Cloud, Software as a service	Stand alone, Cloud	Stand alone, Cloud	Stand alone, On premises
2.	Discussion forum	Online forum for groups or sub-groups of students	Private mail facility	Online forum for groups or sub-groups of students	Online forum for third party plug-ins
3.	Online journal	It is possible	It is not possible	It is not possible	It is possible
4.	Video services	It is possible	It is not possible	It is possible	It is possible
5.	Student portfolio	Effectively conducted	It is not possible	Done but not too effective	Done but not too effective
6.	Implementati on	Easy	Difficult	Difficult	Difficult
7.	Strength of community	High	Low	Low	Low
8.	Functionalitie s	More than all others	Less than MOODLE	Less than MOODLE	Less than MOODLE
9.	Architecture	Simple with solid design	Complex	Complex	Complex
10.	Authorisation	Good	Good	Not good	Not good

Source: Adapted from Patel and Patel (2017)

The results revealed that MOODLE was the more effective and efficient learner management system when compared to the other three LMSs.

Once organisations have adopted their chosen LMS it is necessary to understand what it takes to maintain an effective e-learning system. This will assist the higher education institutions to identify ways in which they can make their e-learning systems successful.

2.12 EFFECTIVENESS OF E-LEARNING

There is a need for new methods to be employed in the field of education, especially in the information society, which is ICT based (Kim, 2016). According to Blackburn (2016), e-learning improves opportunities for critical thinking, develops better problem-solving abilities and assists in improving employees' productivity and efficiency. He also stated that for e-learning to be effective, investment must be made in teachers as facilitators rather than teachers as lecturers. E-Learning offers transformation and new opportunities for teaching and learning. It is essential to note that using technology does not guarantee a difference being made in teaching and learning. What is important is how well technology is used in support of teaching and learning (Blackburn, 2016). Institutions can employ improved technological systems but this does not guarantee the actual use of those systems, as it is the stakeholders that must use the system. If they do not wish to use it, e-learning will not be implemented. With e-learning students have an opportunity to combine their learning experience with information technology advancement (Tarus et al., 2015). Promoting e-learning allows for developing countries to advance in the knowledge economy and this is viewed as the most cost-effective way of facilitating learning for large groups with the use of ICT (Tarus et al., 2015).

It is important to provide suitable infrastructure and to overcome social and gender inequalities for e-learning to be effective. These are all needed to enhance e-learning so that the benefits of traditional face-to-face learning are not lost (Blackburn, 2016). Bari et al. (2018) hold that students' levels of ICT skills can influence the effective use of various technologies. There is a need to promote relevant ICT skills that will ensure that the learning process is effective. Students should be comfortable using computers, as this will minimise a number of barriers to social interaction. Blackburn (2016) recommended top down and bottom up approaches to e-learning. The top down approach involves the legal environment, governance, strategy and finance and the bottom up approach includes hands on experience, observation, knowledge and research. Bezuidenhout (2018) argued that for e-learning to be effective the impact and role of the distance educator (DE) needs to be identified. Distance educators should be prepared to accept their appropriate roles in the ever changing digital environment, meaning that they should have the appropriate competencies. DEs need to unlearn their old-fashioned/outdated habits and behaviours and learn new skills and behaviours that will help them cope with the digital era. Rothmann and Cooper (2015) highlighted the need for training as a strategy that should be linked to the business needs, measurements of results and performance effectiveness of HEIs.

Noesgaard and Orngreen (2015) advanced their view on the effectiveness of e-learning. They began by stating that the effectiveness of e-learning can be judged by measuring the success of e-learning. They indicated that the effectiveness of e-learning can be explained using six distinctions. Firstly, transfer, which is application to practice and implies that learners can practice or apply what they have learnt. Secondly, learning outcome, how and if learners have acquired new understanding. Thirdly, perceived learning skills or competency, highlighting the ability to apply the content. Fourthly, completion, where the course has to be completed. Fifthly, application to simulated work practice. Is the learner able to apply the skills acquired through e-learning in the workplace? Lastly, skills acquired. Has the learner gained the skill that was envisaged?

Vasile and Teodorescu (2015) had a different vision of ways in which the effectiveness of e-learning can be assessed. Their argument was based on a tool developed by Donald Kirkpatrick to ascertain the level of learning that can be used to assess the effectiveness of e-learning. These levels of learning are referred to as Kirkpatrick's model. The Kirkpatrick model comprises the levels described hereunder.

Level 1: Reactions. The learning programme is reviewed and information is gathered on learners' perceptions of the effectiveness of the learning. The aim is to improve learning.

Level 2: Learning. Ascertaining if the required knowledge and skills that were meant to be transferred were transferred successfully. Tests, online self-assessments and formal interviews with learners are conducted and the learners are observed.

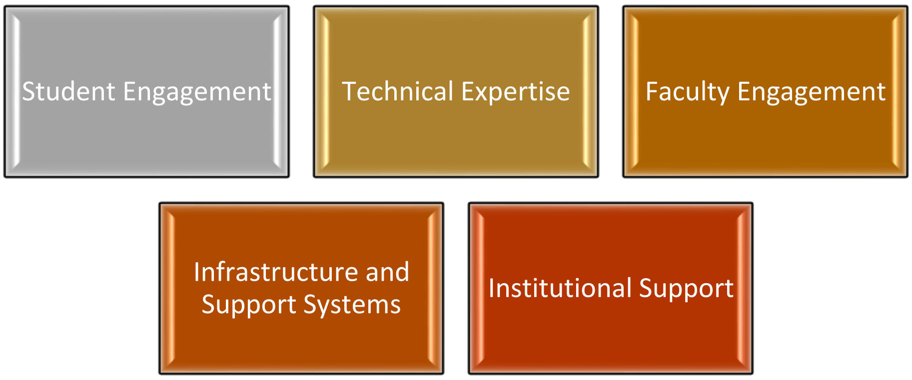
Level 3: Transfer. Are the learners able to transfer the knowledge and skills acquired in the workplace? This is not easy to measure immediately after an e-learning course and the assessment should be delayed. For example, once the learner has completed his/her studies and found a job, the evaluation can be undertaken in the workplace.

Level 4: Results. Measuring if the quality has improved and if e-learning has led to a reduction in costs. Vasile and Teodorescu (2015) posit that results are not easy to measure as there could be a number of other factors that contribute to the results and performance.

2.13 FACTORS ESSENTIAL FOR SUCCESSFUL E-LEARNING IMPLEMENTATION

Karunaratne, Peiris and Hansson (2018) identified a number of factors essential for the successful implementation of e-learning. These factors include focusing on the educator's perspective, commitment from all the stakeholders, having the relevant resources, backup policies/strategies and guidelines, collaborating with both local and international ICT organisations and developing the educators professionally. Several authors have written about factors that are essential for the successful implementation of e-learning. They hold different but similar views to those depicted in the figures that follow.

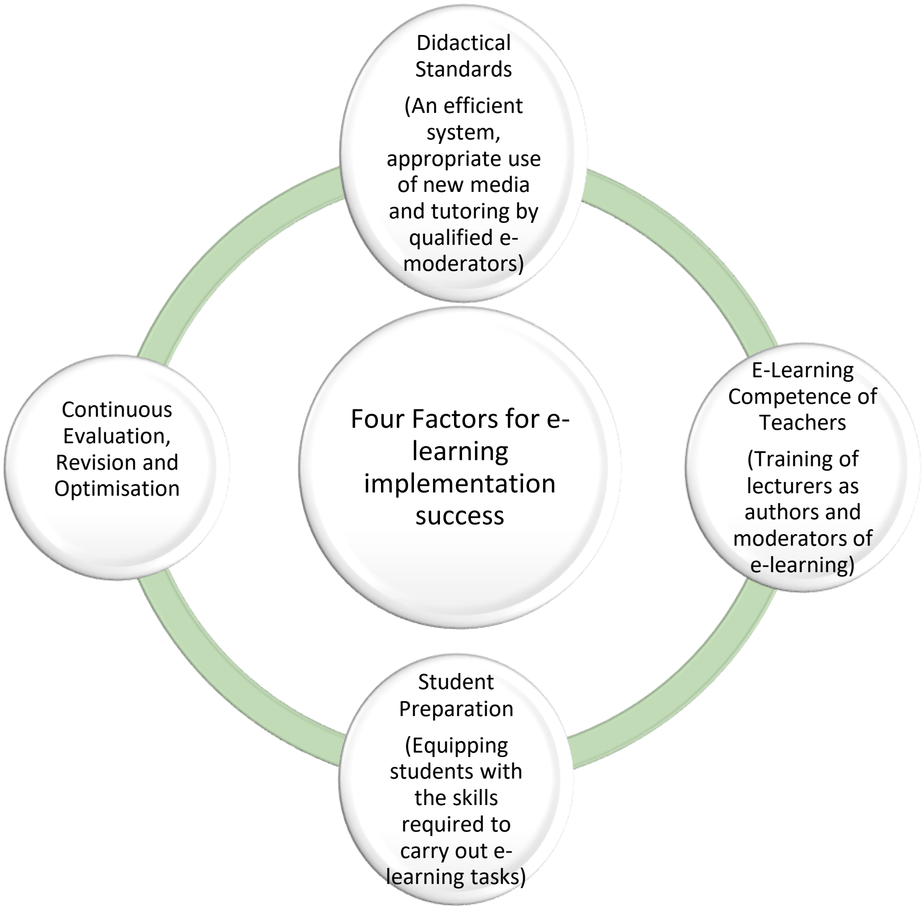
Vovides et al. (2014) highlighted that student engagement, technical expertise, faculty engagement, infrastructure and support systems, as well as institutional support are factors that are essential for the successful implementation of e-learning. These are depicted in Figure 2.5.



Source: Adapted from Vovides et al. (2014)

Figure 2.5: Factors essential for successful implementation of e-learning

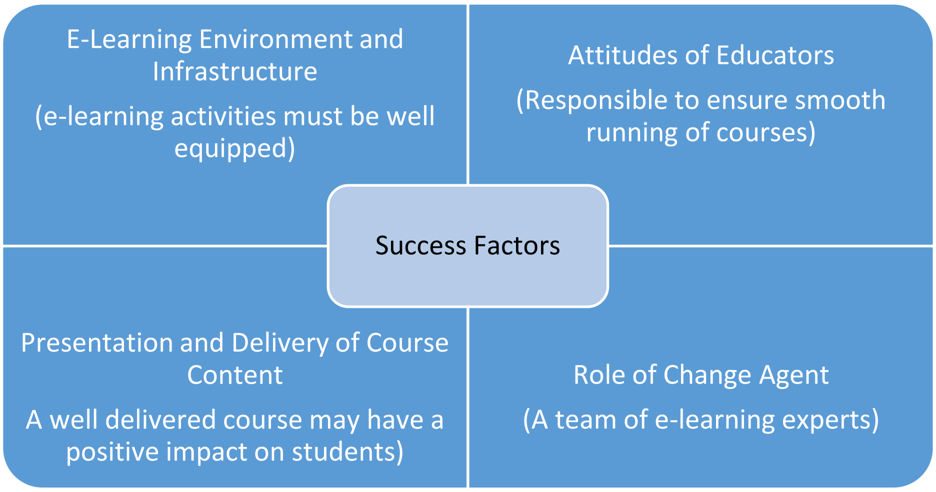
Bruhn-Suhr (2004) identified four main areas as being important for the successful implementation of e-learning. These are firstly, having an efficient system with appropriate use of new media and tutoring by qualified e-learning moderators. Secondly, training lecturers as authors and moderators of e-learning. Thirdly, equipping students with the skills required to carry out e-learning tasks. Lastly, continuous evaluation, revision and optimisation. These four main areas are depicted in Figure 2.6.



Source: Adapted from Bruhn-Suhr (2004)

Figure 2.6: Factors essential for successful e-learning implementation

According to Yew and Jambulingam (2015), there are a number of factors that are important for the successful implementation of e-learning. These include the e-learning environment and infrastructure, the attitudes of the educators, presentation and delivery of the course content and the role of the change agent. These are depicted in Figure 2.7.



Source: Adapted from Yew and Jambulingam (2015)

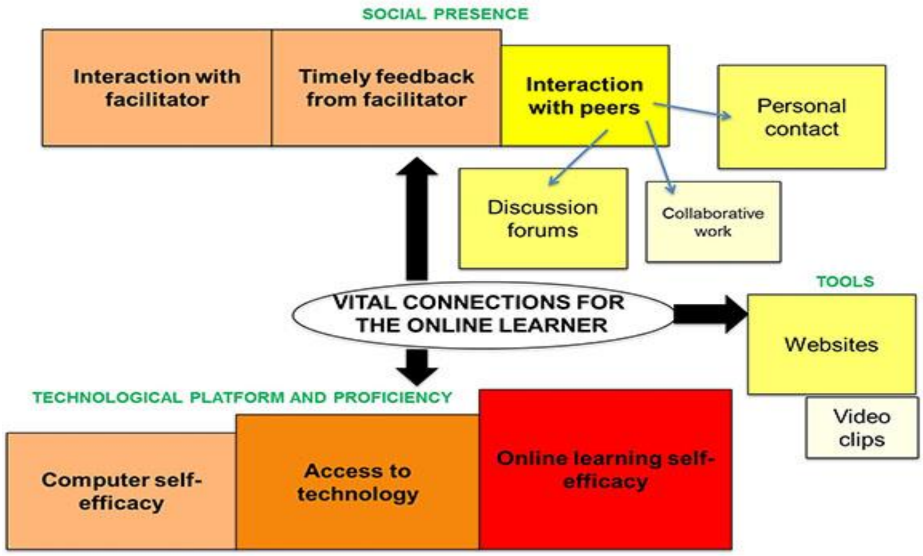
Figure 2.7: Factors for successful e-learning implementation

Alhomod and Shafi (2013) hold that a number of literary works have summarised the success factors of e-learning as institutional support, course development, teaching and learning, faculty support, course structure, evaluation and assessment and student support. These are depicted in Figure 2.8.

Source: Adapted from Alhomod and Shafi (2013)

Figure 2.8: Success factors of e-learning

Queiros and de Villiers (2016) conducted a study that investigated the opinions of South African students with regard to online learning. This study led to the authors proposing a model that contained important connections. The model includes technological aspects, learning tools and social presence as important factors to consider when assessing the effectiveness of e-learning in higher education institutions. This model was proposed for South Africa and other developing countries. Figure 2.9 depicts the proposed model.



Source: Adapted from Queiros and de Villiers (2016)

Figure 2.9: Model of vital connections for the online learner

Figures 2.5, 2.6, 2.7, 2.8 and 2.9 clearly indicate the essential factors needed for an e-learning system to be successful. A comparison of these factors that were advanced by various authors follows.

- Student engagement: The following authors had similar views on issues relating to student engagement, Vovides et al. (2014) and Queiros and de Villiers (2016).
- Technical expertise: The following authors had similar views on the importance of technical expertise, Vovides et al. (2014) and Queiros and de Villiers (2016).

- Faculty engagement: The following authors agreed on the role of faculty engagement, Vovides et al. (2014) (faculty support - Alhomod and Shafi (2013)) (teaching and learning - Alhomod and Shafi (2013)).
- Infrastructure and support systems: The following authors agree that infrastructure and support systems are needed for the successful implementation of e-learning, Vovides et al. (2014) (e-learning environment and infrastructure - Yew and Jambulingam (2015)) and Queiros and de Villiers (2016).
- Institutional support: The following authors are in agreement with regard to the role of institutional support in e-learning, Vovides et al. (2014) and Alhomod and Shafi (2013).
- Didactical standards: Didactical standards were highlighted by Bruhn-Suhr (2004).
- E-learning - competence of teachers: Having competent teachers, the right attitude of educators, well presented and delivered course content, proper course development and course structure were factors advanced by authors including Bruhn-Suhr (2004), (attitude of educators - Yew and Jambulingam (2015)); (presentation and delivery of course content - Yew and Jambulingam (2015)); (course development - Alhomod and Shafi (2013)) ;(course structure - Alhomod and Shafi (2013)).
- Students' preparation: Students should be prepared and supported with regard to the use of e-learning. This was stated by Bruhn-Suhr (2004), Alhomod and Shafi (2013) and Queiros and de Villiers (2016).
- Continuous evaluation and revision: A number of authors have stressed the importance of monitoring and evaluation. These authors include Bruhn-Suhr (2004) and Alhomod and Shafi (2013).
- Role of change agents: Advanced by Yew and Jambulingam (2015).

E-learning introduced numerous benefits for both students and instructors, as well as challenges for HEIs implementing e-learning. These challenges hinder the success and benefits of e-learning. One of the challenges of e-learning is that the roles of HEI stakeholders are not clearly defined and there is no clear understanding of the needs and concerns of all HEI stakeholders. If the needs and concerns are not known and addressed, the implementation of e-learning will not be efficient or effective.

2.14 E-LEARNING SYSTEM READINESS ASSESSMENT

A number of organisations are failing in the implementation of e-learning systems. One of the contributing factors is no appropriate assessment for organisational readiness for e-learning (Alshaher, 2013). To minimise the risk of failure, it is the responsibility of all organisations to assess their readiness. According to Odunaike et al. (2013), readiness can be defined as the presence of the factors that are needed for the successful implementation of e-learning. Alshaher (2013) proposed a model to be used when assessing e-learning system readiness. The author proposed the McKinsey 7S Model developed by Tom Peters and Robert Waterman in the early 1980s when they worked at the McKinsey and Company consulting firm. The model comprises seven variables that all begin with the letter S, namely structure, strategy, systems, skills, style, staff and shared values/super-ordinate goals.

Structure: According to Hanafizadeh and Ravasan (2011), structure encompasses the size of the strategy and the diversity of the organisation. Singh (2013) indicated that the structure provides an indication of the various roles, responsibilities and accountabilities and usually has numerous layers. The method of communication is the top down approach.

Strategy: According to Singh (2013), strategy assists in the transformation of the organisation from the current position to the desired position and it should be aligned with the company's objectives. It is the way in which the organisation will respond to the ever-changing environment (Hanafizadeh and Ravasan, 2011).

Systems: Hanafizadeh and Ravasan (2011) posit that systems support the strategy and structure through formal and informal procedures. Systems are used by employees daily to achieve the desired goals and objectives (Singh, 2013).

Skills: The company's ability to perform the work that it wishes to undertake (Singh, 2013). It is what companies do best and what they excel at doing (Hanafizadeh and Ravasan, 2011).

Style/Culture: Style can be broken down into organisational culture and management style. Organisational culture encompasses the beliefs, values and norms that become a way of life in the company. It is the way in which the people in the company interact

(Singh, 2013). Management style is the way in which managers manage and spend their time and the area of their focus. It is important that in current times leaders change their management style to promote a more open, friendly and innovative environment.

Staff: The people who perform the work within the company; the human resources. Employees desire job security and it is therefore important that companies instil confidence in their employees regarding the safety of their jobs, as their insecurity could have a detrimental effect on productivity.

Shared Values: What the organisation believes in, including the company's mission and vision (Singh, 2013). These are important because if the values are not in line with e-learning initiatives, it would be difficult for e-learning to be implemented successfully.

Like any other education mode, quality standards are important to ensure that the courses offered by the higher education institutions are in line with national and international standards. It is therefore important to consider the quality standards of e-learning.

2.15 QUALITY STANDARDS OF E-LEARNING

The quality of education highlights the relationship between learning, the standards of education, the demands and the requirements that are outlined by organisations, the state, businesses and individuals (Grifoll, Huertas, Prades, Rodríguez, Rubin, Mulder and Ossiannilsson, 2010). According to Grifoll et al. (2010), the quality of education can be explained as the quality of the academic staff, the programme, the institution and research, as well as the quality of the equipment. It is important that HEIs provide quality education, training and learning even if the courses are offered online. This is the reason that quality standards are also relevant for e-learning. Quality standards have to reveal the best practices in e-learning (Barker, 2007). Quality standards in e-learning have been developed by a number of organisations in Europe and these include the European Foundation for Quality in e-Learning (EFQUEL), the British Council for Quality in an Open System and the European Association of Distance Learning. The quality certificates for implementing e-learning and the main focus of ensuring that the online studies offered are of good quality is the responsibility of the

EFQUEL (Neacsu and Adascalitei, 2014). Ellis and Kuznia (2014) hold that there is a need for accurate evaluation tools to be used to analyse the quality of e-learning. Andronie and Andronie (2014) agree with using evaluation tools and indicated that there are four levels of credibility that can be used for assessing quality standards. These are: accreditation, which is mostly enforced by government institutions as it implies minimal standards; certification of products and services, which serves to ensure that guaranteed products/services are offered; certification of quality management used by institutions that obtain the products and services and quality awards, which is only offered to a limited number of institutions that have to constantly prove that they can achieve outstanding results.

Organisations should have a quality management system (QMS) in place. According to Abrusch, Marienhagen, Bockers and Gerhardt-Szep (2015), it is important that the QMS meets international standards applicable to learning institutions. There are a number of specific features that the QMS should include, as noted by Abrusch et al. (2015). These features include certifying e-learning through the quality assessment of educational programmes. There should be an assessment of the entire training module. Deutsches Institut fur Normung e.V: Publicly Available Specifications (DIN-PAS 1032-1), which was introduced by a group of German institutes for standardisation and is referred to as quality in e-learning. This emphasises the processes of planning, developing, conducting and evaluating educational programmes that are offered by means of e-learning. Qualitatsintiative eLearning in Deutschland focuses mainly on improving the quality of work. It is process oriented e-learning based on quality standards in Germany and the Qualitatssiegel eLearning for certifying and documenting the practical application of quality models. These models complement the approaches and processes of quality management and the concepts of e-learning already in existence. The Technical University of Darmastadt employs a system that serves as a quality standard for ensuring the improvement of quality information and the Nordrhein-West-falen prescribes the method to be used for authorising educational modules for continuous education.

There are a number of models that institutions can utilise for quality assurance. The researchers, Neacsu and Adascalitei (2014), identified a number of models that are useful for quality assurance. These models are discussed briefly hereunder.

- The e-Learning Quality (ELQ) Model was developed by the Swedish National Agency for Higher Education. It is used for assessing the quality of e-learning development and refers to the ten steps of quality assessment in e-learning, namely material selection, the virtual environment assessment, communication importance, interaction and cooperation, assessment of students, the adaptability and flexibility of e-learning, supporting staff and learners, competence and qualifications of staff, the institution's vision, allocating resources according to needs and the entire e-learning process.
- Wang and Strong launched the Conceptual Framework for Data Quality Model in 1996. This model includes four groups that encompass accessibility, ease of interpretation, relevance to the end user and accuracy. Another perspective of a strong data quality framework is that it can be categorised into four groups, namely intrinsic, contextual, presentational and accessible.

Vilceanu, Herban and Grecea (2015) hypothesised that the quality assurance model should be designed using the general framework that was recognised by the European Association for International Education as a guideline. This model's main aim was to present the factors that explain quality. This model includes the goals and objectives of the educational programme and incorporates the objectives into the curriculum. The content of the syllabus is reflected in the examinations and projects and the accumulation of graduates' skills, attitudes and knowledge.

Despa (2014) holds that quality planning is a necessity, as it involves the process of defining the standards that apply when estimating and measuring. This author states that checking compliance, security, reliability, availability, repeatability and usability are all necessary for analysing e-learning quality.

There are other scholars who view quality standards differently. They emphasise the importance of benchmarking the e-learning with other institutions. According to Balm (1996), benchmarking can be defined as an ongoing activity that involves comparing one's own practices, processes, products and services with the best in the field or with a company similar to one's own company. This is important when setting goals that will ensure that the company remains competitive with fresh ideas. HEIs are operating in a competitive industry that necessitates benchmarking to remain competitive. The concept of benchmarking began in the United States of America (USA) in response to the pressure experienced in competitive markets (Bacsich, 2010). The competitive pressure required the USA to perform a self-analysis to ascertain the best practices in the industry and make a comparison with the USA's practices.

Alexander and Golja (2007) stressed the importance of benchmarking HEIs' e-learning, as this involves comparing and measuring e-learning, which encourages innovation. Benchmarking is a common approach to quality assurance (Grifoll et al., 2010). The benefits of benchmarking are listed hereunder.

- Benchmarking allows organisations to explore better ways to meet customers' needs, assists organisation to identify their strengths and weaknesses, stimulates continuous operational improvement and is essential for initiating innovative ideas in a cost-effective way (Kozak and Rimmington, 1998).
- According to Jarrar and Zairi (2001), benchmarking assists in strategic decision-making, it improves processes and the allocation and deployment of resources become more effective.
- Grifoll et al. (2010) identified ten benefits of benchmarking. The organisation can be measured against other similar organisations, opportunities arise to set new standards in learning development, new targets can be set for improvement, new ideas can be used to promote innovation, better understanding of the organisation is facilitated, self-assessment is possible to ascertain the organisation's strengths, the knowledge gained allows for better and more informed decisions to be made, improved strategies can be formulated and implemented and the institution's identity is strengthened, which enhances the institution's reputation and places it in a better position to respond to national performance indicators.

Benchmarking is therefore an important tool that organisations can use to improve quality standards and ensure that the quality of their e-learning is competitive when compared to both national and international institutions.

2.16 CONCLUSION

The literature pertaining to e-learning was reviewed with the emphasis on what e-learning is, types of e-learning and blended learning with its advantages and disadvantages. A brief discussion of e-learning in HEIs in developed and developing countries ensued, as well as a closer look at some of the universities that have implemented e-learning in South Africa. The learner management systems, with the focus on MOODLE, was explained, as well as the prerequisites for effective e-learning systems. The cultural impact on education was discussed and an explanation of the importance of institutions conducting e-learning system readiness checks was advanced. The chapter concluded with a thorough analysis of the quality standards of e-learning, highlighting the importance of benchmarking. Chapter 3 discusses a number of models that have been used to evaluate e-learning systems. These are the models from which the researcher chose for implementation in the study. An in-depth discussion of stakeholders is presented, as stakeholders were part of the model that was adopted.

CHAPTER 3

APPLICATION OF THEORY

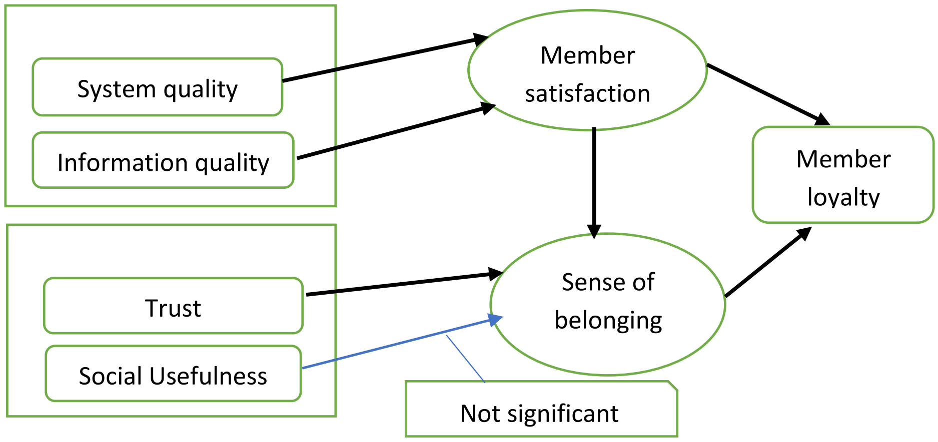
3.1 INTRODUCTION

This chapter begins by highlighting the importance and benefits of measuring e-learning success. This is followed by a discussion of the various models that can be used to measure the success of e-learning. Emphasis is placed on the various ways in which institutions can measure the success of e-learning and these include the use of the D & M Model, the modified D & M Model, the 2008 Lins Virtual Communities Model, the Technology Acceptance Model (TAM), the Hexagonal E-Learning Assessment Model (HELAM) and the Evaluation Methodology Model. The Evaluation Methodology Model was used in this study. There was also a proposal to include stakeholders as the 11^{th} component of the model, as the model presently comprises 10 components. The chapter concludes with a stakeholder analysis that identifies the stakeholders and their responsibilities and concerns.

3.2 MODELS FOR MEASURING E-LEARNING SUCCESS

Ellis and Kuznia (2014) stated that one of the measures of e-learning is by means of stakeholder value. This implies that all stakeholders should benefit from the e-learning initiative for e-learning to be deemed successful. According to Tarus, Gichoya and Muumbo (2015), for e-learning to be successful it is dependent on adequate technical skills that both students and educators should possess to be in a position to effectively use the e-learning tools. Andronie (2014) hypothesised that e-learning should be measured in terms of technological performance and that there are benefits linked to measuring the performance. One of the benefits is improving the effectiveness of the training.

Several models are used to measure e-learning systems' success. According to Dorobat (2014), the D&M Model was introduced in 1992 and comprises six components, namely system quality, use of system, information quality, organisational impact, user satisfaction and individual impact. Visser et al. (2013) explained that the name D&M Model stands for the DeLone and McLean Information System Success Model. In 2003 the D&M Model was modified to include six dimensions, which are service quality, system quality, intention to use, information quality, net benefits and user satisfaction (Dorobat, 2014). According to Dorobat (2014), the D&M Model was modified even further by Holsapple and Lee-Post, which led to the introduction of The Holsapple and Lee-Post 2006 Model. In 2008 the 'intention to use' was replaced by the 'sense of belonging' and 'benefits' were replaced by 'member loyalty' in the model, leading to the 2008 Lin's Virtual Community's Model, which is depicted in Figure 3.1.



Source: Adapted from Dorobat (2014)

Figure 3.1: The 2008 Lin's Virtual Community's Model

The Technology Acceptance Model (TAM) is used to measure e-learning systems. It is the information system theory model on the way in which users accept the use of new technology (Dorobat, 2014). According to Tarhini et al. (2017), this model was introduced in 1989 by Fred Davis and includes perceived usefulness, perceived ease of use, attitude towards using and actual system use. TAM is utilised to understand the use and adoption of e-learning (Park, 2009). Chuttur (2009) argued that there is a limitation with this model in that it does not consider all external factors that may affect the system's success. For this reason, this model was not deemed fit to be used in this study, as external factors that may hinder the success of e-learning are important for consideration when measuring the success of e-learning systems.

The Hexagonal E-Learning Assessment Model (HELAM) measures e-learning success to ascertain the learners' satisfaction with internet learning and blended learning (Ozkan et al., 2008). According to Bowyer & Chambers (2017), HELAM is a multidimensional model that is used for evaluating learner management systems and it takes the perceptions of learners into consideration. HELAM includes the following dimensions: instructor attitudes; content quality; technical issues; learners' perspectives; system quality and supporting issues. Bowyer and Chambers (2017) hold that the disadvantage with HELAM is that it only considers one stakeholder of e-learning, the students, and fails to consider other stakeholders, such as the lecturers and administrators.

According to Ozkan et al. (2008), critical success factors (CSFs) are measures of e-learning success that focus mainly on students' perceptions of the system. There are four CSFs, namely students' characteristics; university support; instructors' characteristics and technology infrastructure. Table 3.1 presents a comparison of the various models that can be used to measure e-learning success and the components that are visible in each.

Table 3.1: E-Learning comparison evaluation model

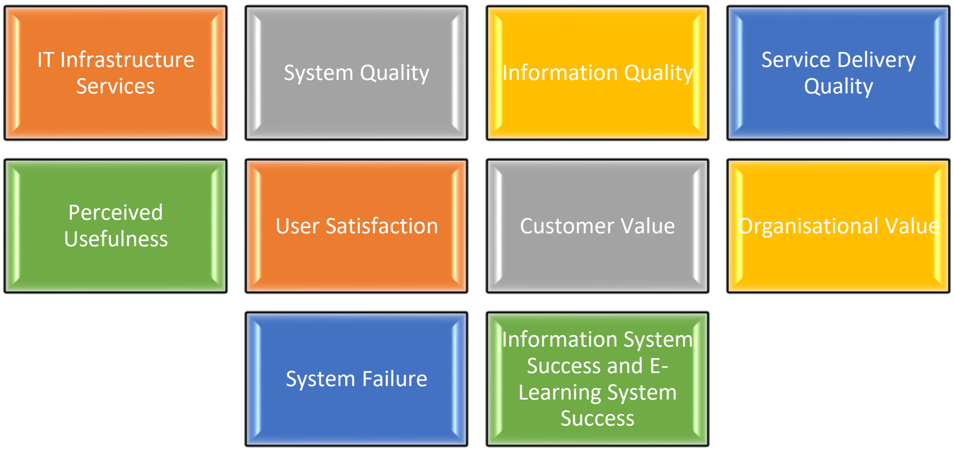
Component	D&M Model	2008 Lins Virtual Communities Model	HELAM Model	CSF E-Learning	TAM	Evaluation Methodology Model
IT Infrastructure Services			✓	✓		✓
System Quality	✓	✓	✓			✓
Information Quality	✓	✓	✓			✓
Service Delivery Quality	✓		✓			✓
Perceived Usefulness	✓	✓	✓	✓	✓	✓
User Satisfaction	✓	✓	✓	✓	✓	✓
Customer Value						✓
Organisational Value						✓
System Failure						✓
Information System Success and E-learning System Success						✓
Stakeholder Analysis	?	?	?	?	?	?

Source: Adapted from Pradana and Amir (2016)

The evaluation methodology model was used in this study for measuring the success of e-learning systems. The reason for using this model was that it takes both internal and external factors that affect the success of e-learning systems into consideration and it is the only model that considers ten components when measuring the success of e-learning, as the rest consider fewer components, as indicated in Table 3.1 above.

3.3 EVALUATION METHODOLOGY MODEL

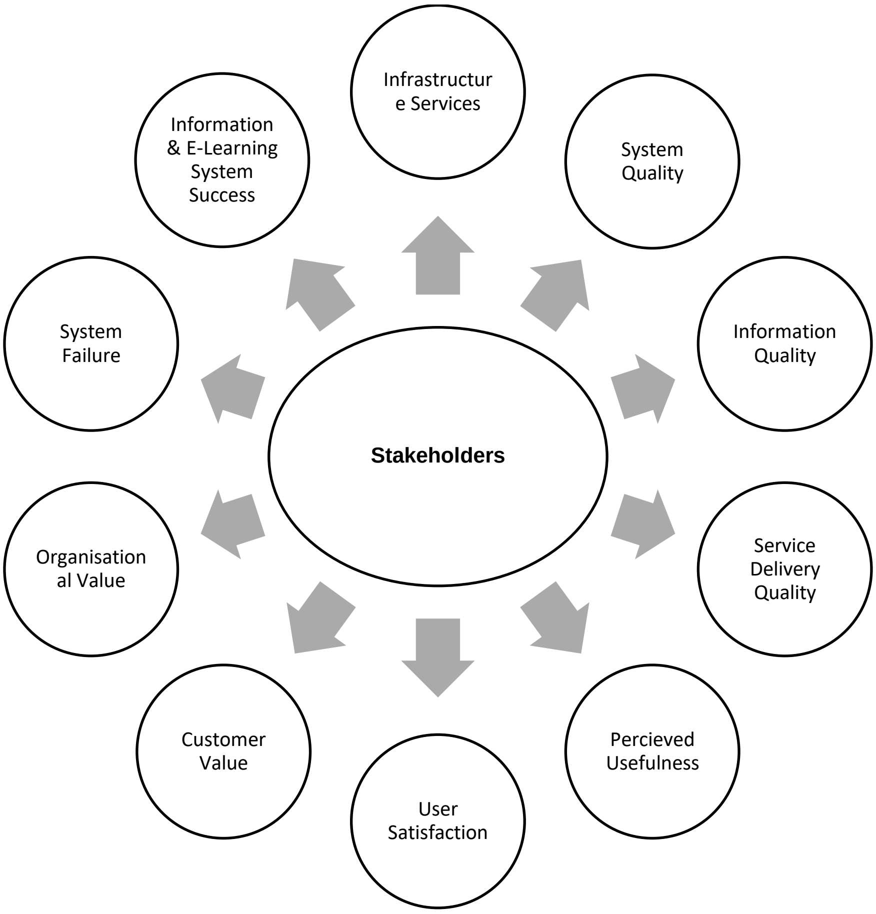
This study applied the evaluation methodology model for measuring the success of e-learning systems. Hassanzadeh, Kanaani and Elahi (2012) highlighted the importance of a model for measuring the success of e-learning systems. Al-Sabawy (2013) proposed the model presented below comprising ten variables.



Source: Adapted from Al-Sabawy (2013)

Figure 3.2: Evaluation methodology model

The evaluation methodology model for measuring e-learning success has been adopted by numerous scholars but a gap remains in the literature with regard to the model that still needs to be explored, as the studies that were conducted had several limitations and recommendations for future research. The researcher added stakeholders (internal and external) as the eleventh variable of the model, as stakeholders are affected by e-learning systems and they can have an impact on the success of those systems. The model that was tested in this study is presented in Figure 3.3.



Source: Adapted from Al-Sabawy (2013) and Maric (2013)

Figure 3.3: Proposed evaluation methodology model

The variables of the proposed evaluation methodology model are explained briefly in the section that follows.

3.3.1 IT Infrastructure Services

Chanopas, Krairit and Ba Khang (2006) hold that the term information technology (IT) became popular in the 1990s and has been defined as shared IT resources that are the foundation of organisational communication and implementation of business functions. Information technology (IT) infrastructure is the most important component of computer technology, basic data systems and communication within the technological framework (Jabbouri, Siron, Zahari and Khalid, 2016). According to Shibambu and Ditsa (2017), IT infrastructure has become a vital tool for daily operations in most organisations that seek to decrease costs while still improving the quality of the services that they offer. Akbar et al. (2015) stated that with IT infrastructure there is a creation of firm value, where the firm has an opportunity to share information both internally and externally. Shibambu and Ditsa (2017) indicated that IT infrastructure is made up of compatibility, IT personnel, connectivity, IT management and modularity. According to Chanopas, Krairit and Ba Khang (2006), there are two broadly defined IT infrastructures, namely human and technical. Human infrastructure is the kind of skills and knowledge that are needed to manage the IT resources within organisations and technical resources are the hardware, software, telecommunications and tangible IT resources, as well as the network. Weill and Vitale (2002) and Shibambu and Ditsa (2017) posit that information technology infrastructure comprises four elements. Weill and Vitale (2002) briefly described these four components as follows.

- Shares and Standard Application: these are the applications that are not likely to change, such as human resource management, accounting and budgeting.
- Shared IT Services: includes customer databases as well as PC/LAN access and intranet.
- Human IT Infrastructure: translation that is conducted by humans and requires knowledge, experience, skills and standards so that IT components can be bound into reliable services that are understood by service business people.
- IT Components: consists of technology components such as printers, database software packages, scanners, operating systems, credit card swipes and routers.

Moore (2018) has a different view of the four critical elements of technology infrastructure and sees them as systems, objectives, evaluation and personnel.

- Systems: two aspects must be considered with regard to systems. The first is the format or the delivery method used to create the institutional content and the second is the tool or platform that is used to deliver the content.
- Objectives: Aligning the learning objectives with the technology tool for ease of evaluation of the tool, if there is an understanding of what one was attempting to accomplish.
- Evaluation: Evaluation is accomplished in two parts; the first part is the initial evaluation of the tool that will be used for e-learning and the second is the continuous evaluation that occurs after the implementation of the e-learning

system. According to Ozkan and Koseler (2009), to achieve continuous improvement there is a need for assessment to be performed and the problem is that in most cases the IT division overlooks this essential requirement.

- Personnel: Hiring institutional designers to align technology with instruction. The instructional designer, as the subject matter expert in integrating technology, should work with the faculty to align the technology with the learning objectives to integrate the technology.

3.3.1.1 Security

When assessing infrastructure services several facets need to be considered and these are found within the four elements of the IT infrastructure. One of the issues that needs to be dealt with is technical security. The challenges related to security are problematic and result in constraints in the use of technology (Durairaj and Manimaran, 2015). Jindal and Singhal (2012) added that security is a major challenge for social networking and computing, as a third party is used to keep and manage the data and this requires faith in the service provider. According to Bokhari, Kuraishy and Ahmad (2015), during the drive to uplift the e-learning infrastructure, security of the e-learning system is an issue that still needs to be addressed. Bose and Sarddar (2017) hold that it is important to ensure smooth and secure integration of students' requirements with the course materials, which highlights the importance of ensuring that the learning material is protected. There are a number of combinations of signal transmission techniques, advanced web technologies and other hardware developments that can be used to ensure secure e-learning (Durairaj and Manimaran, 2015). A study conducted by Durairaj and Manimaran (2015) on security issues based on cloud e-learning revealed that 74.6% of the issues with cloud e-learning were related to security. There are two significant security issues that need to be addressed, namely authorisation and authentication and trust and security (Bokhari, Kuraishy and Ahmad, 2015).

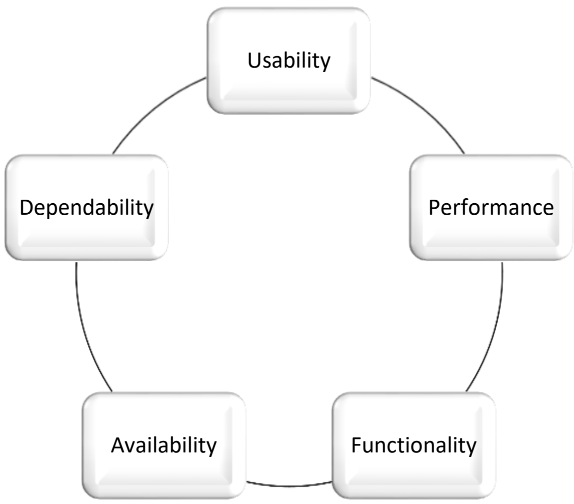
There is a way in which higher education institutions can minimise the challenges associated with the security of e-learning systems. This is by using cryptography. According to Patil, Vedpathak, Shinde, Vatandar and Janrao (2018), cryptography is a technique that is used to secure communication and analysis by constructing protocols that prevent third parties and the public from being able to read private messages. Bandara, Ioras and Maher (2014) also recommended the use of cryptography, which involves the creation of a shared secret key for the encryption and decryption of messages, for securing e-learning systems. Bokhari, Kuraishy and Ahmad (2015) also view cryptography as an option for securing e-learning systems.

3.3.1.2 Investment in IT Infrastructure

In many firms a significant amount of capital expenditure is invested in IT. One of the reasons that companies continue to invest in IT is so that they can reap the benefits, which include a reduction of costs, an increase in customer value and an improvement in quality (Arora and Rahman, 2016). Mohamad, Zainuddin, Alam and Kendall (2017) highlighted the importance of investing in IT infrastructure. A company's IT infrastructure investment is the key to the sustainability and ongoing success of the company. According to Mohamad et al. (2017), IT investment has been linked to performance. Mithas and Rust (2016) supported the statements made by the above-mentioned authors when they claimed that IT investment is linked to performance. They indicated that managers should draft IT strategies that allow for better allocation of IT resources, as this will give them a competitive advantage. Mohamad et al. (2017) hold that there are a number of authors who did not find a link between IT investment and performance. With all the uncertainty with regard to whether or not IT investment is linked to performance, companies still see the need to invest in IT, as they understand that they will be at a disadvantage if they do not do so (Mohamad et al., 2017). Research was conducted by Dolci, Maçada and Grant (2017) on "*Making Sense of Information Technology Investment on Type of Supply Chain Governance*", and the researchers found that investment in IT led to improved sales.

3.3.2 System Quality

The quality of the systems is about the way in which the users perceive the performance of the system. Quality can be used as an evaluation tool in e-learning where excellence is evaluated. It is therefore important that there should be a set of standards for e-learning quality (Hadullo, Oboko and Omwenga, 2018). With e-learning, the quality of the system is measured using both the hardware and software applications (Freeze, Alshare, Lane and Wen, 2010). According to Bharati and Chaudhury (2015), system quality is the way in which the individual perceives the overall performance of the system; considering the ease of use, the flexibility and reliability of the system as well as the convenience of accessing the system. Al-Samarraie, Teng, Alzahrani and Alalwan, (2017) posit that the information system success model uses operational characteristics such as user interface consistency, reliability, response rate in interactive systems and document quality to measure system quality. This is in line with the views of Sarrab et al. (2015), as they indicated that there are a limited number of system quality characteristics, namely usability, performance, functionality, availability and dependability. All are represented in Figure 3.4.



Source: Adapted from Sarrab et al. (2015)

Figure 3.4: System quality characteristics

A brief explanation of each characteristic follows.

- *Usability:* Sheikhtaheri et al. (2014) list simplicity, user-friendliness and intuitiveness as the characteristics of usability. The users of e-learning systems must be able to use the system regardless of their degree of ability, age or health status. This implies that the system application must support the various ways in which people communicate and the different languages, paying particular attention to students with special needs. The system must be easy to learn and easy to understand to attract the attention of learners (Sarrab et al., 2015). When a system is user friendly, it attracts more users, especially if the users are convinced that it is satisfying their needs.

- *Performance:* The quality of the transmitted audio packets, images and storage management mechanism should be enhanced and of a high standard with e-learning (Sarrab et al., 2015). Nothing is as frustrating as having to study online and have technological challenges such as poor visual and audio quality. This discourages learners. According to Sheikhtaheri et al. (2014), for a system to be performing well, its response time (speed and reasonability) is important and it must be reliable and flexible. Flexibility is the ability of the system to adapt to the constantly changing demands and requirements of users (Al-Debei, 2014).
- *Functionality:* The systems must be able to function in a way that meets the set educational objectives, as well as the needs of the students, academic staff and other stakeholders. The system should also be flexible and simple and able to offer learning to students in whichever geographical area they may be (Sarrab et al., 2015).
- *Availability:* Availability of the system is important. It should be available to all stakeholders whenever they wish to access it. The processing and response time should be executed on time for the users' convenience (Sarrab et al., 2015). Timeliness is the responsiveness of the system in reacting to requests for information or actions that need to be carried out (Al-Debei, 2014).
- *Dependability:* This refers to the system being easy to install and set up anywhere, as well as the user being able to reconfigure, modify and upgrade the system without problems (Sarrab et al., 2015). No user will want to use a system on which they cannot depend.

Lee, Ariff, Shoki, Zakuan and Sulaiman, (2016) hold that the way in which the website is designed, the reliability of the website, the security and privacy of the website and the way in which customers are served on the website are all determinants of online customer purchase. Hadullo, Oboko and Omwenga (2018) argued that system quality can be influenced by taking into account a number of factors such as student, instructor, course design, course support, course assessment and institutional factors. Hadulo et al. (2018) discussed a number of e-learning system quality factors that are described briefly hereunder.

Course design: According to Mtebe and Raisamo (2014), if courses are well designed, user satisfaction tends to increase. Other studies have confirmed this statement as they have found that if the courses are well designed learners' knowledge, skills and abilities improve (Chawinga, 2016; Tarus, Gichoya and Muumbo 2015). Varonis (2014) posits that the course design should include features for students who are disabled, including those who cannot hear and those who are partially impaired. The author mentioned that the course design should include accurate closed captioning for non-synchronised content, the transcripts should allow for access to information for learners who cannot see and this can be conveyed by audio means, text and audio should be described by means of images and videos for learners who cannot hear and the navigation facilities should accommodate learners with motor skill impairments (Varonis, 2014).

Content support: these are the activities intended to support and facilitate the learning process. These include the use of multimedia, discussion forums and using learner management systems (Hadullo, Oboko and Omwenga, 2018). Using multimedia enhances the learning process (Tchoubar, 2014). The discussion forums and chats assist in developing the student's independent learning, as they engage with information on their own without the assistance of instructors (Murro, Wagacha, Kihoro and Oboko, 2014; Soliman, 2014).

Social support: This kind of support can be classified into four different types of supportive behaviour, namely affirmation support, emotional support, instrumental support and informational support (Hadullo, Oboko and Omwenga, 2018). According to Munich (2014), affirmation support is when positive feedback is provided about the person's behaviour and decisions; emotional support is having concern and compassion; informational support is advice and information support for decision making and instrumental support is providing practical as assistance and resources. Munich (2014) defined social support as exchanging verbal and nonverbal messages that convey emotions, information and referral so that stress and uncertainty can be reduced. There are various means by which social support can be received, through peers, chat and e-learning group work and forums (Weng, Tsai and Weng 2015).

Course assessment: Wittstrom, Cone, Salazar, Bond and Dominguez (2010) highlight the importance of assessments for effective educational outcomes. One form of assessment that can be used is the examination. According to Turner and Webster

(2017), assessments should be linked to the expected learning outcomes of the course.

Institutional factors: These factors address infrastructure issues as well as funding, culture and policies (Hadullo, Oboko and Omwenga, 2018). Azawei, Parslow and Lundqvist (2016) argued that even though e-learning tools have provided benefits, the barriers to e-learning should also be considered. These barriers include but are not limited to lack of ICT infrastructure, lack of technical support, ambiguous plans and policies and inadequate interest and motivation.

Learner characteristics: Collaborative (learning) is when the e-learner characteristics and learner requirements are integrated with the learning processes (Jawahar and Nirmal, 2015). According to Jawahar and Nirmala (2015), there are a number of learner characteristics that include reflective, group or solo and active learning qualities, which are also referred to as learner portfolios and in an e-learning environment these can be analysed by a collaborative agent. Kuo, Walker, Schroder and Belland (2014) stated that when students learn from one another during their interaction it influences students' satisfaction in e-learning, as they are able to exchange information. Apart from just interaction, internet self-efficacy, or the ability to organise and execute plans, internet-related action is required to accomplish the assigned tasks, as this influences learners' satisfaction with e-learning positively (Kuo et al., 2014).

Instructor characteristics: Islam, Beer and Slack (2015) argue that e-learning does have benefits but for instructors it comes with a number of challenges. These challenges are linked to acquiring and implementing IT skills for the purpose of teaching. Al-Busaidi and Alshihi (2014) support this argument, as they indicated that instructor factors such as self-efficacy, experience and motivators, attitudes towards e-learning and incentives have been found to have a role in determining the quality of e-learning. Mtebe and Raisino (2014) stressed the importance of adequate ICT infrastructure and mentioned challenges with inadequate ICT resources and unreliable internet connectivity.

3.3.3 Information Quality

When people select information, they ensure that the information that they select is of good quality and that it is the best information available to satisfy their needs (Mai, 2013). Information quality means measuring the quality of the information that is produced by the system. Al-Debei (2014) stated that information quality at higher education institutions pertains to the quality of the outputs and includes but is not limited to information on courses, publications, seminars, research events and academic programmes. According to Freeze et al. (2010), information quality is about the e-learning content that is placed on the website. Mai (2013) alluded to one of the challenges being to gain an understanding of what exactly makes that information the best information in terms of availability with regard to exploring the nature of information quality.

There are numerous characteristics of information quality, namely completeness, timeliness, currency, comparability, significance, relevance, accurateness, consistency, conciseness, precision, ease of understanding and format (Freeze et al. 2010). Al-Samarraie et al. (2017) agree that accuracy, timeliness, completeness, relevance and consistency of the information provided by an information system are the information quality measures for semantic success. *Completeness*, is the ability of the system to provide the necessary information; *currency* is the system information being up-to-date; *accuracy* is how precise and correct the information that is provided on the system is and *format* is the presentation of the information and the navigation within the system (Al-Debei, 2014). Al-Debei (2014) posits that perceived usefulness is affected by information quality. Mai (2013) shared these sentiments, as the author mentioned that information of a high quality has the characteristics of being relevant, up-to-date, understandable to the user, on time and economical for the purpose at hand.

According to Helfert et al. (2013), the evaluation of information quality should consider various aspects, as information quality is a multi-dimensional concept. Bharati & Chaudhury (2015) hold that it is the user who should decide on the value of an information system after having evaluated the quality that the information provides. Mai (2013) argues that information quality is dependent on the context and for one to understand it, it must be within specific circumstances and situations. Although information quality is viewed as being subjective because the judgment of the quality of information is made by the users, there is a need to measure, quantify and control information quality. According to Mai (2013), it can be more difficult to judge the information quality on the web than traditional printed publications as there is no quality control mechanism on the web. This has led to a paradigm shift, where web-based information has been challenged to come up with innovative ways to create different conditions for assessing information quality.

3.3.4 Service Delivery Quality

Service quality, as defined by Nejadjavad and Gilaninia (2016), is a means of measuring the way in which customers' needs and expectations are met through service. The difference between clients' expectations of service and the actual service received can be used as a definition of service quality. Service quality has an important role in adopting e-learning (Wong and Huang, 2011). There is a positive relationship between acceptance and using e-learning technology together with e-learning systems service quality. System success is affected by service quality. According to Wong and Huang (2011), IT professionals have developed the SERVQUAL scale, which assesses information system service quality. SERVQUAL was established from information system success (ISS) and they are both devoted to ensuring the quality of information systems. According to Wong and Huang (2011), from the users' perspectives, there is a good chance that users will utilise e-learning if they perceive the service as being of a high quality. The service quality that the organisation provides could influence the end-users' likelihood of accepting and using e-learning technology. Wong and Huang (2011) highlighted the importance of taking e-learning system service quality into consideration when designing and delivering e-learning courses, so that organisational learning results can be enhanced.

According to Nejadjavad and Gilaninia (2016), in order to satisfy the client, it is important to understand the service quality dimensions and the expectations and perceptions of the clients with regard to each dimension. Good quality service makes it easier to achieve behavioural objectives that are related to the future and for the desired effects to be justified. Numerous conceptual models of service quality are used by researchers. Nejadjavad and Gilaninia (2016) recommend one of the most popular models that was proposed by Gronroos and is used in Europe. This model consists of three main dimensions, namely functional quality, technical quality and mental image. The model includes five service quality dimensions, namely *reliability, assurance, tangibles, empathy and responsiveness.* This model is referred to as the RATER model and is discussed in Table 3.2.

Table 3.2: RATER model

Dimensions	**Description**
Reliability	A system that is capable of executing the service that was promised accurately and dependably, is said to be reliable (Uppal et al., 2017). According to Akter et al. (2013), reliability is when the system is available at any time, anywhere.
Assurance	The staff should have confidence, inspire trust and be competent in such a way that they are able to apply their expertise (Carroll et al., 2016).
Tangibles	According to Uppal et al. (2017), tangibles are the physical appearance of facilities and personnel as well as the equipment and communication material.
Empathy	Empathy is individualising the attention that the service provider provides to its customers in such a way that the service provider seems to be caring (Uppal et al., 2017).
Responsiveness	Responsiveness is when service providers are willing and eager to provide speedy service (Uppal et al., 2017). According to Carroll et al. (2016), responsiveness is service providers' willingness to provide service of high quality so that customers' needs can be met.

Source: Adapted from Uppal et al. (2017); Akter et al. (2013) and Carroll et al. (2016)

3.3.5 Perceived Usefulness

Acceptance of technology is affected by two main beliefs, which are the perceived usefulness and perceived ease of use of the product (Al-Debei, 2014). Al-Debei (2014) and Tarhini et al. (2017) hold that the perceived ease of use predicts the perceived usefulness and system usage. The ease of use influences the perceived usefulness. Mohammadi (2015) implied that a person's willingness to use an information system relies mostly on that person's perception of the use of the system. According to Ezzi (2014), one of the key factors that contributes to the acceptance of information systems is the perceived usefulness of the system. If the information system is perceived as being useful, there is more likelihood that the level of use of the system will be high. Al-Samarraie et al. (2017) added that utility value acts as the predictor of users' satisfaction and plays a role in the users' continued intention to engage in e-learning. Utility value implies the degree of assistance provided by the e-learning when applied to tasks. According to Al-Samarraie et al. (2017), higher education institutions should improve and enhance utility value, information quality and task technology fit, as these aspects of e-learning systems are the drivers of usefulness and will be beneficial in improving users' perceptions of the usefulness of the system.

3.3.6 User Satisfaction

User satisfaction is measured as the level of successful interaction between users and information systems (Freeze et al., 2010). It is an understanding of the extent to which the information system meets the students' needs (Sugianto and Tojib, 2015). Al-Samarraie et al. (2017) hold that the overall level of student satisfaction with their university experience may be affected by their level of satisfaction with an e-learning system. According to Freeze et al. (2010) and Bano et al. (2017), users' satisfaction relies on the information system meeting their needs and if the information system fails to meet the users' needs they will become dissatisfied with the system. Al-Samarraie et al. (2017) agree that if the level of information quality is high, there will be an increase in user satisfaction. The students' satisfaction with the system and the way in which it contributes to their learning outcomes may lead to the system being perceived as being successful (Freeze et at., 2010). It is thus the duty of higher education institutions to ensure that the quality of information contained in their e-learning systems is high and that the learning experiences meet and exceed the users' needs and expectations (Al-Samarraie et al., 2017). Sugianto and Tojib (2015) posit that there are several dimensions to user satisfaction, namely ease of use, efficiency, layout, timeliness, confidentiality, security, information content, communication, confidentiality and convenience of access.

3.3.7 Customer Value

Leroi-Werelds et al. (2014) define customer value as when the customers base their assessment of the products or services rendered on their opinions of what was offered compared to what they received. The value of services or products is determined by the customer and not the supplier. There are a limited number of characteristics upon which customers base their perception of the value of products and services, namely financial resources, knowledge, needs and desires and previous experience (Leroi-Werelds, 2014). Chen (2015) indicated that customer value can be measured using eight types of value.

- Customised service: including flexibility in terms of operating hours, ease of handling after service and sincerity in dealing with service complaints.
- Consideration of service alternatives: where consideration is given to the opinions of other people.
- Service quality: considering customers' interests.
- Service equity: meeting and exceeding the customers' expectations with added value and relevant services.
- Servicescape: a physical environment in which a service process takes place.
- Social-psychological interaction: allowing the customers the freedom to speak their mind and maintaining relationships after offering the service.
- Service episodes: adequate delegation of employees for service and a sense of value for money.
- Service risk avoidance: maintaining the reputation of the company and assuring high service quality.
- Weinstein and McFarlane (2017) summarised customer value by asking two important questions, "What do customers really want and how do we meet their demands"? In other words, what do customers value? One of the possible answers is that the customers want more than just value, they want the service providers to go the extra mile and deliver way more than their basic needs and wants (Weinstein and McFarlane, 2017).

3.3.8 Organisational Value

E-Learning benefits an organisation's goals. These benefits are identified by Pandey (2013) as:

- reduction of training costs - the lower the costs associated with e-learning, the more e-learning adds to organisational value, as HEIs will be able to produce maximum results with minimum inputs;

- a decrease in material costs, as material does not have to be printed and students can access it and study online;
- an increase in productivity, as neither students nor lecturers are geographically bound and e-learning can take place anywhere in the country at any time; e-learning is a way to provide the skills and tools needed to enhance performance and
- e-learning assists with standardisation, as the process is consistent in delivering the content.

According to Ryan, Harrison and Schkade (2002), in an organisation the top management is faced with crucial concerns with regard to IT investment related decisions. Most of the studies conducted to measure IT benefits have focused on whether or not the IT investment benefits the organisation. In other words, is it adding to organisational value? In measuring whether or not e-learning is adding to organisational value, one needs to engage with more than one stakeholder (students, academic and ICT staff), as these are the main pillars for evaluating the success of the e-learning systems and they determine the ways in which it adds value to them as employees and users (Ozkan and Koseler, 2009).

3.3.9 System Failure

Ssekakubo et al. (2011) conducted a study “to identify the underlying causes of failure” in developing countries’ e-learning management systems and the findings revealed five main reasons for system failure.

- Internet accessibility and a knowledge gap between the LMS and the stakeholders: the internet is not easily accessible to all. It was also found that the lecturers and management had received some form of training with regard to e-learning systems but not the students. This resulted in an information gap between lecturers, management and students.
- Low comfort levels using ICT solutions and high ICT illiteracy rates: in developing countries confidence when using ICT systems is usually low resulting in a slow rate of acceptance of e-learning systems.
- LMS selection and usability issues: some institutions do not conduct usability assessments for various reasons. This means that any problems that would

have been identified and rectified are now likely to cause disappointment and frustration for students. Students may have poor perceptions of the LMS as a result.

- Insufficient user support strategies and ineffective maintenance: the disadvantage of not having a suitable maintenance and support strategy is that the LMS service is less effective.
- High expectations and poor marketing strategies: when LMS support system initiatives are initiated from top to bottom there could be resistance from the stakeholders who will have to implement e-learning. According to Msomi (2016), it has been noted that in some South African universities the academic staff members were not involved when the institutions decided to introduce e-learning. They were only involved during the implementation of e-learning and this led to them being reluctant and resistant to using e-learning. The perception was that e-learning would replace them, rather than seeing it as a tool to assist them in carrying out their duties effectively and efficiently.

3.3.10 Information system success and e-learning system success

In 1992 the information systems evaluation model was developed. This model suggests that there are numerous factors that affect the success of information systems, namely the quality of the information, whether or not users are satisfied with the system, the quality of the system, the impact of the organisation as well as the impact of the individuals (Pradana and Amir, 2016).

In the beginning of the research emphasis was placed on the importance of stakeholders and not just including students and academics as stakeholders but going beyond the students' and academics' perceptions. The following section provides a thorough analysis of all stakeholders, which is the eleventh variable of the proposed model.

3.4 STAKEHOLDERS

Stakeholders are the most important role players in all organisational activities (Al-Sabawy, 2013). The higher education institution can have the best e-learning systems and tools in the world, but that does not guarantee their actual use among stakeholders, as they can make or break the success of e-learning systems (Maric, 2013). Al-Sabawy (2013) holds that studies of e-learning appear to ignore the fact that there are numerous stakeholders with a role in e-learning and these studies usually focus on one stakeholder, the students. Sudfelt, Campbell-Meier and McGuire (2016) support this statement by postulating that limited research has been conducted on the types of benefits and challenges that come with a flipped classroom beyond the experiences of students. It is therefore essential that a thorough stakeholder analysis is conducted, as successful implementation of e-learning depends to a large extent on whether or not the concerns and needs of stakeholders are being met. Khanyile and Green (2016) raised a concern that research has revealed that due to the anticipation of difficulties in representing stakeholders' interests, most organisations do not conduct formal analyses of stakeholders.

According to Juha (2014), stakeholders are the people that have the power to affect or influence an organisation's objectives. Khanyile and Green (2016) defined stakeholders as individuals who are interested in the system and the system's performance. It is therefore important to note that HEIs' success is highly dependent on their ability to ensure that they care for their relationships with their stakeholders (Juha, 2014). There are two types of stakeholders, namely internal and external stakeholders. Internal stakeholders are those found within the organisation, for example the staff and management and external stakeholders are found outside the organisation, suppliers and society in general (Slabá, 2015; Abidin, 2015). Slabá (2015) holds that opinions differ as to whether or not customers are internal or external stakeholders. Irrespective of the type of stakeholder, they each have their own expectations (Varma, 2016). It is therefore of utmost importance to manage stakeholders, as the success of any project depends on the way in which stakeholders are managed and their levels of satisfaction (Abidin, 2015). According to Farhan, Aslam and Jabbar (2018), engagement with all stakeholders in the learning process is crucial, especially with e-learning.

3.4.1 Stakeholder Theory

The main reason for the application of stakeholder theory is to determine the role of stakeholders in higher education (Leisyte and Westerheijden, 2014). Khanyile and

Green (2016) hold that stakeholder theory attempts to answer crucial questions with regard to stakeholders.

- Who are the stakeholders?
- What stake or claim do these stakeholders have?
- What responsibility does the organisation or institution have towards these stakeholders?

According to Slabbert (2015), stakeholder theory is more about ensuring that the way in which the company enriches their stakeholders is in line with the organisation's strategy, so that both the organisation and the stakeholders can benefit. One of the ways to ensure that both organisations and stakeholders benefit and to ensure that there is mutual understanding of interests, is through stakeholder management (Bierbooms, Van Oers, Rijkers and Bongers, 2016). Stakeholder management implies that stakeholder analyses should be conducted. A stakeholder analysis, as proposed by Bierbooms et al. (2016), should include four steps.

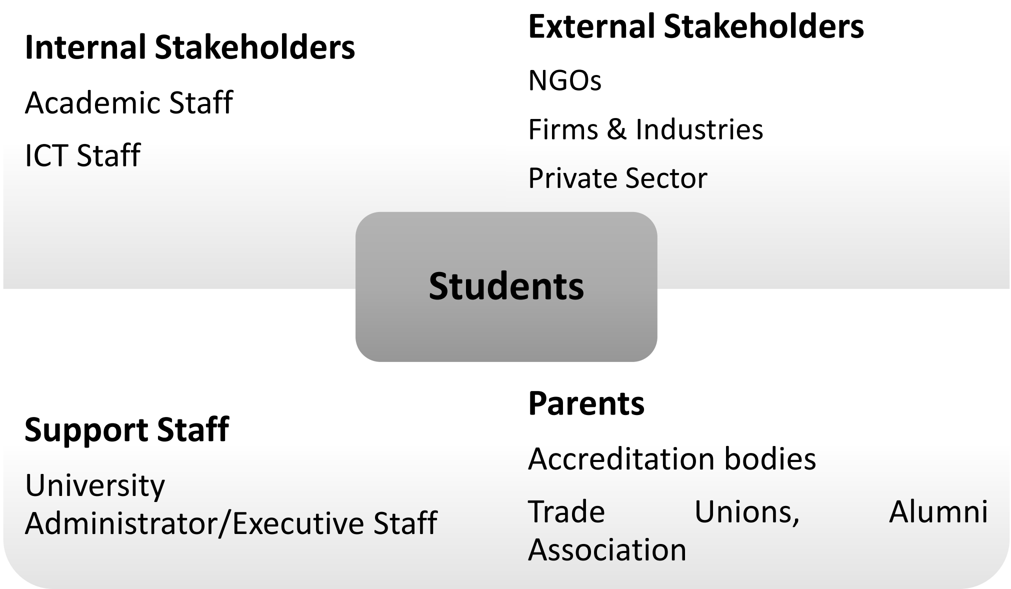
- Identifying the stakeholders.
- Understanding the nature of stakeholders' claims.
- Identifying the gaps in the ways that organisations'/institutions' objectives and strategies differ from the identified expectations of stakeholders.
- Prioritising stakeholders' demands.

This relates to the findings of Khanyile and Green (2016) about the ways in which stakeholder theory answers crucial questions. There are three perspectives that can be followed to analyse stakeholders and these are power, legitimacy and urgency (Sudfelt et al., 2016). Power is when the person wants to do as they wish because they feel they can. A stakeholder that is powerful has a say in a programme's development (Leisyte and Westerheijden, 2014). Legitimacy assumes that the person's actions are acceptable as they are in line with accepted norms, values and beliefs (Sudfelt et al., 2016). Urgency is when the stakeholder insists on action being immediate and constantly checks on progress (Leisyte and Westerheijden, 2014).

3.4.2 Stakeholder Analysis

Stakeholder analysis is important when one wishes to measure and understand the causes of system success and failure. The buy-in of stakeholders can be encouraged through this process (Marziliano, LaPan-Dennis, Zito and Gillespie, 2015). Stakeholders' perspectives must be seen as important to educational organisations if they wish to provide a successful learning process (Abidin, 2015). Stakeholder analysis is useful for generating knowledge with regard to understanding the important actors' behaviour, interests, agendas and intentions and what influence and resources they may have (Maric, 2013).

According to Marziliano et al. (2015), the stakeholders are students, faculty, administrators and staff. Agrawal and Sharma (2014) and Leisyte and Westerheijden (2014) argued that there are more stakeholders than only students, faculty, administrators and staff. They hold that stakeholders in higher education include staff, students, parents, faculty, alumni, administrators, career advisors, media, partners, recruiters, government and society. These authors took it a step further, as they identified both internal and external stakeholders. Figure 3.5 is a representation of stakeholders in higher education institutions.



Source: Adapted from Asiyai (2015) and Leisyte and Westerheijden (2014)

Figure 3.5: Higher education stakeholders

3.4.2.1 Students

Students were recognised as stakeholders in literature for the first time in 1975 (Leisyte and Westerheijden, 2014). Students are primary stakeholders, as they are direct recipients of services (Abidin, 2015). They are the consumers of e-learning (Wagner, Hassanein and Head, 2008). HEIs exist because of students. According to Sudfelt et al., (2016), students are dependent stakeholders because their need for e-learning and education is urgent. Leisyte and Westerheijden (2014) emphasise the need for higher education institutions to treat students as equal partners and for students to be involved in the process of internal quality assurance. Students' inputs are valuable for HEIs to be able to improve the quality of their offerings. The "policy theory" stresses the inclusion of students as stakeholder representatives to understand the concept of quality in education (Leisyte and Westerheijden, 2015). E-Learning is beneficial for students, as it assists them to gain access to information that would otherwise be difficult for them to access due to time constraints and geographical location (Wagner et al., 2008). E-Learning information is always available online at any time and any location.

Students should exercise their decision-making role in the education process more, especially with regard to the academic content (Asiyai, 2015). They should play their part of attending to their academic work and avoiding any issues that might lead to misconduct. In the case of e-learning, an example would be to do their work themselves rather than asking someone else to do the work on their behalf just because it is performed online.

According to Wagner et al., (2008), students have many concerns about e-learning and these are described hereunder.

- It is a different learning environment, which requires certain skills for the students to be successful. Students must be computer literate, as technical sophistication is a necessity.
- With e-learning there is a substantial amount of information that students will come across and access, as information is available from several sources. Students must be critical thinkers with evaluation skills in order to sift through this information.

- E-learning forces students to be more independent than they would be with traditional learning. This implies that students must be motivated and committed to learning, so that e-learning can be effective for them.

3.4.2.2 Academic Staff

The academic staff members are the main producers of education in higher education institutions and it is they who set the pace (Asiyai, 2015). They are the dominant stakeholders of e-learning, as they have power as content providers (Sudfelt et al., 2016). Shonola and Joy (2014) emphasised the importance of academic staff in implementing teaching and learning in the education system. They are responsible for guiding the educational experiences of students (Wagner et al., 2008). With e-learning, the academic staff's role shifts from being the main source of information to that of the manager of students' knowledge resources, as education is shifting to student-centred learning. Academic staff have an important role in ensuring that e-learning is a success. According to Asiyai (2015), the role of academic staff is to:

- ensure effective learning;
- promote innovation and creativity among students;
- communicate effectively with the relevant stakeholders;
- promote student-centred lectures;
- use active learning strategies so that teaching can be effective;
- continuously conduct research to assist in improving instructional practices and
- monitor and evaluate students' learning. Academic staff must evaluate and monitor the criteria and must be committed (Maric, 2013).

One of the challenges that academic staff face is that they do not have enough confidence to utilise the ICT devices. There are many academics who are of a mature age and do not have the requisite ICT skills, as they are comfortable with the old way of doing things. The academic staff should know their role and level of competence with regard to the use of technology to facilitate effective teaching and learning (Maric, 2013). They must adapt to the ever-changing online learning environment. According to Shonola and Joy (2014), a number of academic staff members are hesitant to use the new technologies as they need to see evidence that these new technologies will indeed be beneficial to the learning experience and enhance students' learning.

Academic staff must have an advanced knowledge of the use of technology, as they are the content providers (Wagner et al., 2008). Wagner et al., (2008) hold that the academic staff is also concerned that their students might not accept the e-learning tools. A study conducted by Hadullo, Oboko and Omwenga (2018) titled "*Factors affecting asynchronous e-learning quality in developing countries. A qualitative pre-study of JKUAT University*" revealed that instructors experience hesitation, as there is lack of motivation and incentives related to e-learning instruction. Instructors are concerned about the struggle of attempting to facilitate e-learning.

3.4.2.3 Employers

The employers are the organisations that will employ the graduates from the higher education institutions once their studies have been completed (Wagner et al., 2008). The inclusion of employers as stakeholders became a requirement in line with programme accreditation rules for when an institution of higher education wishes to revise a programme (Leisyte and Westerheijden, 2014). The reason for this inclusion is to ensure that there is an increase in the employability of the graduates (Leisyte and Westerheijden, 2014). The increase will be due to the HEI programmes being closely linked to the needs of the potential employers. Employers have a role in that they must provide feedback on how the graduates are performing their duties in the workplace, as this will assist with input towards the development and improvement of the curriculum (De Castro et al., 2016).

One of the concerns of employers regarding e-learning is that the element of interpersonal skills will be limited or lacking, as students will be studying online and not have contact with fellow students and academic staff (Wagner et al., 2008). When graduates enter the labour market they need interpersonal skills, as they are often required to work in teams. Employers are concerned about the gap between the skills that the graduates possess after studying at a higher education institution and the skills that they require in the workplace (Maxwell et al., 2010). This leads to a need for higher education institutions ensuring that they prepare the graduates by aligning the skills with which they equip students with the skills that are required in the workplace. Education should be competency-based with the focus on outcomes that are linked to the needs of the workplace (Vissers, van Daele, De Hertogh, de Meulenaere and Denekens, 2014).

3.4.2.4 Administrators and Executive Management

The administrators, more specifically executive management, are the most influential stakeholders at higher education institutions, as they are the tone setters for students, teaching staff and other stakeholders through the provision of effective leadership (Asiyai, 2015). They must ensure that the climate is conducive to promoting relationships between stakeholders, for example students/academic staff, student/student, academic staff/academic staff, staff/management etc. Administrative/Executive Management are definitive stakeholders, as they have the power to obtain resources and to decide whether or not e-learning is to be implemented (Sudfelt et al., 2016). The executives' responsibility is to ensure that they pursue excellence when delivering services. According to Sudfelt et al. (2016), executive management are of high importance in higher education institutions as they are responsible for the strategic and long-term planning. Asiyai (2015) listed the following roles of executives in ensuring that teaching and learning is successful in HEIs.

- Improving working conditions with the hope of attracting competent academics. Maric (2013) agrees with the improved working conditions for HEI staff.
- Improving the quality of research.
- Establishing an internal quality control system to improve the quality of teaching and learning.
- Ensuring that the stakeholders pursue the institution's mission statement and empower the stakeholders to be responsible and achieve the mission statement.
- Sponsoring of academic and support staff so they can attend training programmes including seminars, conferences and workshops. This is beneficial in that the training can be shaped in a way that makes it more relevant in the market, as the academic and support staff will have updated knowledge and skills.
- Ensuring that the academic staff provide professional development training programmes.

Support staff assist the academic staff with uploading study material and notices online for students. They are also stakeholders and it is important that they have the necessary skills to execute their tasks. The support staff are concerned with e-learning because as much as e-learning is promoted to deliver courses with the use of less labour, the time they spend in providing online versions of courses when compared to the time spent on traditional learning is twice as many hours (Wagner et al., 2008). Hudullo and Omwenga (2018) conducted a study titled "*Factors affecting asynchronous e-learning quality in developing countries. A qualitative pre-study of JKUAT University*". This study revealed that the e-learning students believe that the administrative support staff should be trained and physically oriented to the university and equipped with academic course registration information, academic advice information and any other information that will assist students in their studies. This will assist the administrative staff to be more efficient in assisting students to adapt to e-learning more rapidly.

3.4.2.5 Technical Providers

The technical providers are those who provide the technology that is needed to carry out e-learning (Wagner et al., 2008). They are responsible for computer services and equipment maintenance (Handullo and Omwenga, 2018). It is therefore important for technical support to be available, as this has a positive effect on the students' and academic staff's willingness to use the e-learning systems, as well as their level of participation (Alhomod and Shafi 2013). The providers of technology have the role of monitoring the service to ensure that it is user-friendly (Kim, Yang, Rowley and Kim, 2013). Technical providers are important because without them there is no e-learning, as e-learning is all about technology.

According to Wagner et al., (2008), technical providers' concerns with e-learning lie with the technology standards. They are concerned with the hardware and the expectations of consumers, as these expectations exert pressure on technical providers to improve their offerings. Karunaratne, Peiris and Hansson (2018) highlighted the importance of capacity building where the improvement of technical expertise of those involved in ICT and development projects is crucial.

3.4.2.6 Accreditation Bodies

The assessors of the quality of what education institutions are offering are the accreditation bodies (Wagner et al., 2008). According to Mabizela, Ballim and

Mabangizi (2014), the South African Minister of Higher Education and Training, Dr Nzimande, defined professional bodies in 2011 as follows: " *firstly, a group of people in a specific regulated occupation who, secondly, are entrusted with maintaining control or oversight of the legitimate practice of the occupation and, thirdly, have a significant influence on education linked to the professions, and ultimately have the final say as to who it will register as one of its own and who it will reject*". Accreditation bodies should ensure that the HEIs' courses meet the minimum requirements to be accredited. Even with e-learning, accreditation bodies should play a role in ensuring that the courses and information that is posted online do not fall below the minimum standards. The accreditation bodies are national systems that register and issue institutions with licenses and the education institutions are also required to undergo quality assurance assessments of their academic programmes (Knight, 2015). Benchmarking is associated with accreditation so that students can achieve their specific objectives in higher education institutions (Chandrasekaran, Stojcevski, Littlefair and Joordens 2013). South African higher education has several accreditation bodies (DHET, 2016).

- Umalusi: for the accreditation of National Certificates e.g. N1, N2 and N3.
- The Quality Council for Trades and Occupations (QCTO): for National Certificates N4, N5 and N6.
- The South African Qualifications Authority (SAQA).

3.4.2.7 Government

Higher education institutions in South Africa are state-owned and for this reason the government is a stakeholder and has a certain role to perform in ensuring that e-learning is a success. The government must ensure that its funding policies are in order, as e-learning systems can be costly (Msomi, 2016). Maric (2013) supports this by stating that the government is responsible for financial support. Asiyai (2015) stated that the government's responsibility is to ensure that the curriculum is reviewed consistently so that it can be in line with market demands, as the graduates that are produced by the institutions are produced for the market. The government has the responsibility of developing the policies that will be implemented by universities (Spaull, 2013). Government have a substantial interest in HEIs as vast sums of money are invested in HEIs. The money invested by the government should at least correspond with the throughput in HEIs.

3.4.2.8 NGOs, Local Communities and Private Sector

The private sector, local communities and non-government organisations (NGOs) contribute to the quality of education in higher education institutions (Asiyai, 2015). The private sector enterprises that contribute to the continuous search for improvement in university education are the alumni association, trade unions, other institutions, religious organisations, employers of labour and industries or firms (Asiyai, 2015). Private businesses and industries/firms are the organisations that employ the university graduates and they therefore need to invest through providing funding to higher education institutions to enhance the efficiency of the e-learning system. The alumni association introduced a fixed levy to be paid by members of their institutions so that funding can be improved. The private sector's main role is to contribute to education funding (Asiyai, 2015).

NGOs have an important role between governmental policy and public opinion when it comes to political, economic and cultural issues (Schmidt, 2014). This implies that they ensure that the government, institutions, students and the community all perform their role in ensuring that e-learning is a success. In developing countries, the NGOs assist the higher education institutions with compensation, as the funding for education in most cases is limited (Kieu and Singer, 2017). NGOs perform a role in collaborating with the higher education institutions in developing the curricula, as NGOs are potential employers of university graduates (Kieu and Singer, 2017).

3.4.2.9 Parents

Parents of students have an essential part in the success of e-learning in that they must take an interest in their children's studies. Parents need to take responsibility for ensuring that their children develop good study habits in order to learn effectively (Asiyai, 2015). They should always support their children. Parents become involved in their children's education so that their children can benefit from the educational outcomes that lead to future success (Anicama, Zhou and Ly, 2017). According to Nurmi and Silinskas (2014), there is an assumption that the children's academic functioning, personal goals and achievements are influenced by parents through the deployment of beliefs, support and involvement. Parents' involvement with homework plays an important evaluation role (Silinskas, Niemi, Lerkkanen and Nurmi, 2012). This assists with e-learning, as students are mostly independent and study on their own, so there is a need for someone to perform an evaluator role to ensure that the student has covered the work that they were supposed to cover.

It is clear from the literature that stakeholders have an important role in ensuring that learning is a success. Information communication technology is challenging and needs the support of all stakeholders for it to be successful and to minimise the challenges that are associated with e-learning. Silo mentality should be avoided at all costs. All stakeholders should be kept in the loop with regard to new developments, as they are all affected either directly or indirectly. The sooner higher education institutions understand the importance of analysing and attending to stakeholders' needs in e-learning, the fewer the challenges of e-learning.

3.5 SCHOLARS WHO HAVE ADOPTED SIMILAR MODELS

Several scholars have used the evaluation methodology model and support it. The list of scholars who have used the model and the results of their findings are presented in Table 3.3.

Table 3.3: Scholars who have adopted the evaluation methodology model

Author	Explanation	Results
Al-Sabawy (2013)	The author conducted a quantitative study at the University of Southern Queensland using the evaluation methodology model to measure the success of e-learning systems.	This study contributed to the body of knowledge and, according to Al-Sabawy (2013), the model was rated as being valid and reliable in measuring the success of e-learning systems. The results did however have numerous limitations, which led to the credibility of the study being questioned. These limitations include: • sample limited to one university; • only 22 ICT participants; • response of student sample was 12,4%, which could be considered relatively low; • student training and self-efficacy of academic staff was not included in the survey; • senior management and e-learning systems designers were not part of the study.
Mohammadi (2015)	The model was used to explore the effects of quality features, perceived simplicity of use and perceived efficacy of users of e-learning in Iran.	The results revealed that system and information quality were the dynamics that drove purpose and fulfilment with regard to the use of e-learning. This study focused on the quality factor of the model and did not explore any other factors.
Wang et al. (2014)	The authors wrote a paper to establish a comprehensive, multi-dimensional model for assessing e-learning system success.	The authors found interrelationships between six systems, namely systems quality, content quality, linkage quality, user satisfaction, system use and learning performance. This study did not include all the e-learning stakeholders.

Author	Explanation	Results
Mtebe and Raisamo (2014)	The paper represented a model for evaluating learner management systems deployed in HEIS in sub-Saharan countries through the adaptation of the updated DeLone and McLean information system success model.	The results revealed that the satisfaction of learners could not be explained by the quality of the system. Learners' satisfaction had a positive effect on learner management system use and a positive effect on the perception of learners regarding the benefits of the system to them and that it would improve their learning outcome.

Source: Cited from Al-Sabawy, (2013), Mohammadi, (2015), Wang et al., (2014) and Mtebe and Raisamo (2014)

3.6 CONCLUSION

The chapter discussed the models than can be used to measure the success of e-learning systems. These models were explained in detail by means of a literature review. The evaluation methodology model was discussed in more detail, as it is the model that was used in this study. The differences between the models were tabled, indicating the advantages and disadvantages of each. The evaluation methodology model was the most favourable model for this study based on the results presented in Table 3.1. Eleven variables were included in the evaluation methodology model and they were discussed in detail through a literature review. A stakeholder analysis was undertaken by means of the literature that was reviewed, where stakeholders of e-learning were identified and the stakeholders' roles in ensuring the success of e-learning and their concerns were mentioned. The chapter concluded by citing several scholars who have used various models for measuring e-learning systems, as well as the results of these studies in brief. Chapter 4 discusses the research methodology adopted for the study, the research paradigm that was chosen and the reason for choosing that research paradigm.

CHAPTER 4

RESEARCH METHODOLOGY

4.1 INTRODUCTION

Research methodology is essential, as it provides an indication of the way in which the study was conducted to meet the objectives and answer the research questions. It indicates which research tools were used in the study. The examiners use these selected tools to ascertain if the methods that were used by the researcher in answering the research objectives met the quality requirements and were appropriate for the study. According to Du Plooy-Cilliers, Davis and Bezuidenhout (2014), research is conducted for various reason, some of which are: applied research to find solutions to real life issues and implementing them and pure research, which is mainly for generating knowledge to add to the existing body of knowledge. The research methods utilised by researchers indicate the instruments and procedures that the researcher used to gather and analyse data (Cohen et al., 2011). This study followed applied research, as it assisted in finding a solution to the problem of e-learning in higher education institutions. According to Khan (2011), applied research is the application of research techniques, methods and procedures that form part of the research methodology. It is about the collection of information that will be used in the formulation of policies and the development of programmes, as well as programme modification and evaluation. Khan (2011) added that applied research enhances the understanding of a phenomenon, establishes causalities and outcomes and assists in identifying needs and developing strategies.

4.2 RESEARCH OBJECTIVES

Research objectives, as defined by Khan (2011), are goals that the researcher sets out to achieve by the end of the research journey. The purpose of this research was to use the evaluation methodology model, combined with an analysis of e-learning stakeholders in HEIs, to measure the success of e-learning systems. This research explored the following research objectives:

- to investigate the way in which the learner management system (LMS) is used for delivering and promoting teaching and learning;
- to ascertain which factors are essential for the successful and sustainable implementation of e-learning in HEIs;
- to conduct a stakeholder analysis with the aim of determining each stakeholder's role in the success of e-learning implementation in higher education institutions and
- to make use of the evaluation methodology model in assessing e-learning systems' success.

4.2.1 Secondary research

There are three different types of secondary data, namely raw data, which is the information that has already been collected, summaries of numbers and written books and research documents, which includes journals, treatises, theses and dissertations (Struwig and Stead, 2013). Clark (2013) defines secondary data as the collection of data that have already been collected and is available to be re-used as a source of information. In this study secondary data were utilised to highlighting important issues relating to the objectives of the study. These included an overview of e-learning and an in-depth exploration of LMSs. Factors essential for the successful and sustainable implementation of e-learning were explored. Secondary data were collected for conducting a stakeholder analysis and for finding potential e-learning measuring models.

4.2.2 Primary research

Primary research can be explained as gathering information for the first time to serve the purpose of the research (Wrenn, Stevens and Loudon, 2013). According to Struwig and Stead (2013), there are two methods of conducting primary research, observing people and asking questions.

4.3 RESEARCH PARADIGM

This research belongs to the pragmatists' paradigm. Debates, renegotiations and interpretations were used for solving problems. Khun (1970) first introduced the term paradigm in his book titled "The Structure of Scientific Revolutions". The researcher defined a paradigm as the entire constellation of beliefs, values and techniques that members of a community share. Unlike post-positivism, pragmatism stems from situations, actions and consequences. It focuses on solutions to problems (Creswell, 2009). Pragmatism is therefore an approach that assesses theories or beliefs when considering the practical application. This method supports the mixed methods approach, where both qualitative and quantitative data collection is undertaken. Pragmatism is the adaptation of different worldviews, methods and assumptions, as well as an incorporation of various methods of data collection and analysis (Creswell, 2009). Various paradigms are found in social science research and these are tabulated in Table 4.1.

Table 4.1: Research paradigms

Research Paradigm	Description
Positivist	There is an assumption that social reality encompasses attitudes, behaviours, beliefs and the measurement of satisfaction can be achieved objectively through the employment of traditional scientific methods by independent observers (those who are outside). The positivist paradigm is a truth-seeking paradigm.
Post-Positivism	This is in opposition to the positivist paradigm as it indicates that reality, or the truth, is dependent on the observer.
Critical Theory	An approach to culture that considers social, ideological, economic, ethnic and historical forces.
Constructivism	The way in which people learn. It is based on scientific study and observation. Constructs are complicated and not relatively true.
Participatory	Action research.

Source: Adapted from Aliyu et al., (2014)

There is a framework of assumptions that underlies social science research (Burrell & Morgan, 1979). Ontological, epistemological, methodological assumptions and assumptions about human nature are the four assumptions related to social science research. These are explained briefly in the paragraphs that follow.

Ontological assumptions: often refer to materialism, contra-idealism or positions in between. Also refer to the unproven assumptions about reality, such as the question of whether or not we have order or chaos in the world (Höijer, 2008). Ontological assumptions have concern for human beings and the nature of the world in a social context (Bryman, 2001).

Epistemological assumptions: these are associated with the ways in which to acquire and perceive knowledge (Bryman, 2001). Epistemological assumptions seek to determine and distinguish between knowledge and non-knowledge (Usher, 1996). Epistemology argues that a claim to know needs to be justified based on the way in which one arrived at that claim. There is an argument that knowledge claims have the same status, so the determination of their status lies with epistemology (Usher, 1996).

Methodological assumptions: analysis approach used for acquisition (Cohen et al., 2001). Mathematical calculations are used to test a theory and to generate results. A quantitative approach is used to control the social setting when undertaking actions and a qualitative approach is used to observe the changes that occur after the actions (Rahmawati, 2008).

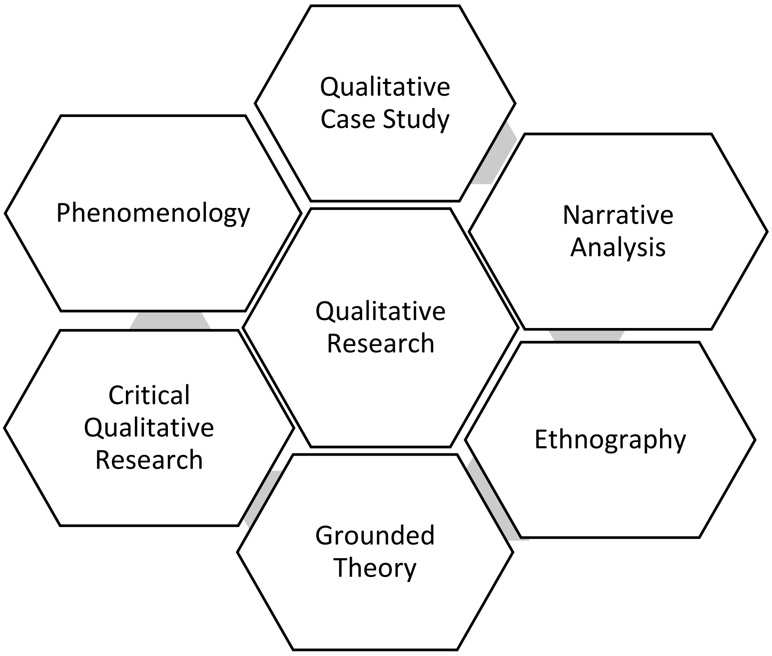
Assumptions about human nature: are voluntaristic or deterministic in nature, where individuals are the makers of the environment, as they are products of the environment (Putman, 1983). Denzin and Lincoln (2005) indicated that gaining direct knowledge of the subject under examination can assist in understanding the social world.

4.4 RESEARCH APPROACH

There are various types of research approaches, namely qualitative, quantitative and mixed methods approaches.

4.4.1 Qualitative Approach

A qualitative approach is when non-numerical data are used. This includes words, audio, images and diagrams, all gathered by means of interviews, researchers' notes and published and unpublished documents. All these are gathered by means of case studies, ethnography and action research. According to Oates (2010), qualitative data are mainly used by critical and interpretive researchers. There are 6 types of qualitative research, as depicted in Figure 4.1.



Source: Adopted from Merriam (2009)

Figure 4.1: Types of qualitative research

Du Plooy-Cilliers et al. (2014) mentioned three types of qualitative research, namely ethnography, grounded theory and case study. Williamson (2002) however, holds that there are eight research methods and these are historical research, the Delphi method, experimental design, case study, action research, ethnography, systems development in information systems research and survey research.

Historical research: reconstruction and interpretation of historical events by means of gathering information from historical documents (Leedy and Ormrod, 2010). This method was deemed impractical for this study, as technology is an emerging phenomenon and more advanced information technology is emerging in universities.

Delphi method: Gurrera, Caroff, Cohen, Carroll, DeRoos, Francis, Frucht, Gupta, Levenson, Mahmood and Mann (2011) indicated that with the Delphi method the focus is on the stability of the group’s opinion rather than on an individual’s opinion, as the group’s results are seen to be superior to that of the individual. The Delphi method is more relevant for predicting what will occur in the future. This study was about e-learning systems currently and assessing how well the e-learning system is performing, which is why the use of the Delphi method would not have been beneficial for this study.

Experimental design: mostly used in natural sciences rather than business and management studies (Bryman and Bell, 2011). The researcher chose not to use the experimental design because the manipulation of important variables cannot be achieved experimentally.

Case Study: when investigating a specific issue in depth, a case study is the most appropriate method to use (Zulu, 2007). A case study assumes that the case being examined is atypical. The case that the researcher selects is the basis for an in-depth, thorough and holistic examination of aspects that the researcher wishes to explore (Khan, 2011). This study adopted a case study where the University of Kwazulu-Natal's MOODLE learner management system's success was measured.

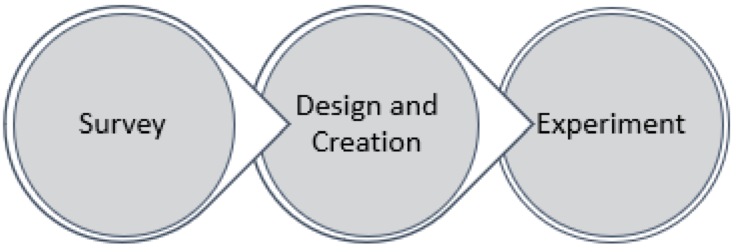
Action research: is conducted to develop a cause or to enrich conditions by increasing public consciousness (Neuman, 2006). According to Zulu (2007), this research method is useful when there is a need for processes to change and when there has not been an identification of the problems and their solutions. The use of this research method was not necessarily applicable to this research, as this study did not aim to investigate any process undergoing change.

Ethnography: Zikmund Babin, Carr and Griffin (2010) indicated that this method is more useful when there is a certain culture that is composed of people who find it difficult to put their thoughts and feelings into words. The ethnography method was unsuitable for this study because cultural aspects were not being measured in the e-learning system's success.

Systems development in information systems research: applies more to theories of information design and focuses on testing theories (Jones and Greoger, 2007). According to Irani, Themistocleous and Love (2003), this research method fails in solving problems associated with the development of strong and flexible information systems. This method was not adopted for this study as the study is not about the development of e-learning systems but rather about a model for measuring e-learning systems.

4.4.2 Quantitative Approach

The quantitative approach examines the relationships between variables. It is based on numbers from data that are usually collected by means of experiments and surveys (Creswell, 2009). Quantitative data are usually analysed using statistical tools. According to Oates (2010), quantitative data can be presented using tables, charts, graphs and other techniques that allow readers to visualise the data patterns. There are various types of quantitative approaches, as depicted in Figure 4.2.



Source: Adapted from Oates (2010)

Figure 4.2: Quantitative approaches

Saunders et al. (2003) identified six different types of quantitative research approaches, as presented in Table 4.2.

Table 4.2: Quantitative approaches

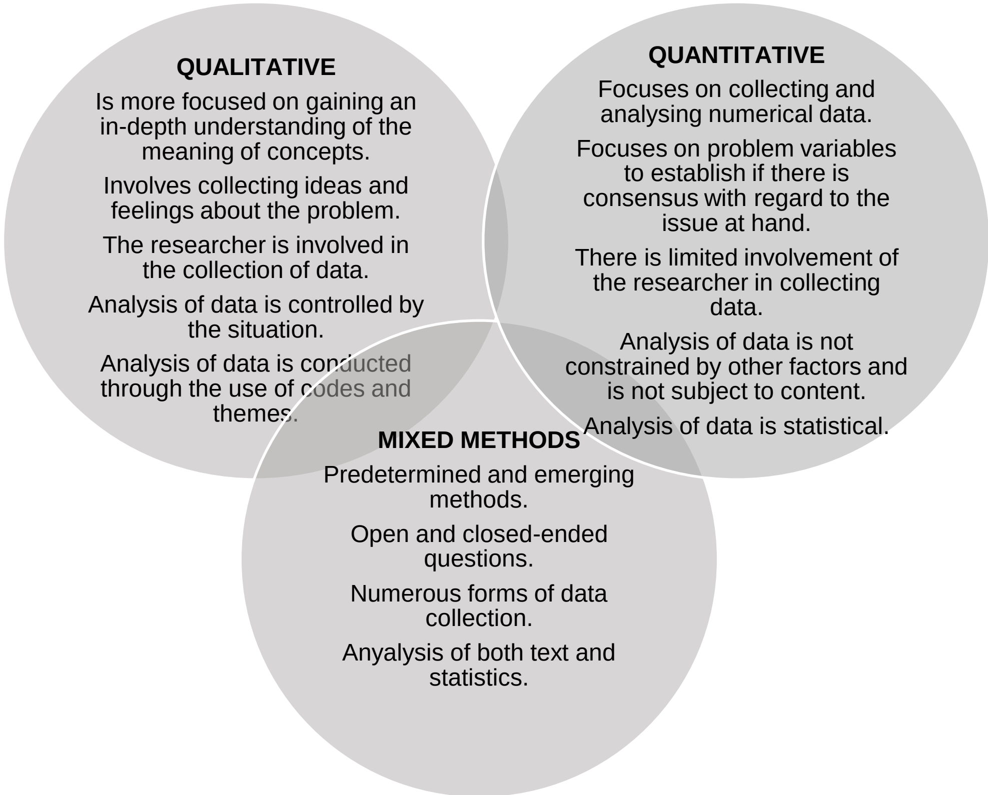
Approach	Description
Experimental	Research through experiment, making a quantifiable and observable change.
Quasi-experimental	Looks like the experimental approach but lacks the key ingredient. The assigning of subjects to different groups cannot be done randomly by the researcher.
Evaluation research	Systematic evaluation, where there is a chance of duplicating the results by using the same instruments and ascertaining if any findings could have occurred without the intervention by further testing of the evidence.
Surveys	There are different forms of survey methods for gathering information. These are structured or semi-structured interviews, self-completion questionnaires and standard tests of achievement and performance and attitude scales.
Existing data	Usage of data that already exists through an examination of documents and records.
Causal-comparative	Researching two groups to understand the cause of the differences between them.
Meta-analysis	This is done statistically, where the researcher obtains an average of the results of a selected study to obtain the overall index of the relationship or outcome.

Source: Chen (2011)

Survey research: Stangor (2011) holds that the survey method is the more effective method to use because of its ability to collect an extensive range of information within a limited amount of time. The researcher used the survey method in the form of a self-completion questionnaire for the quantitative study, as there was a large population and sample.

4.4.3 Mixed Methods

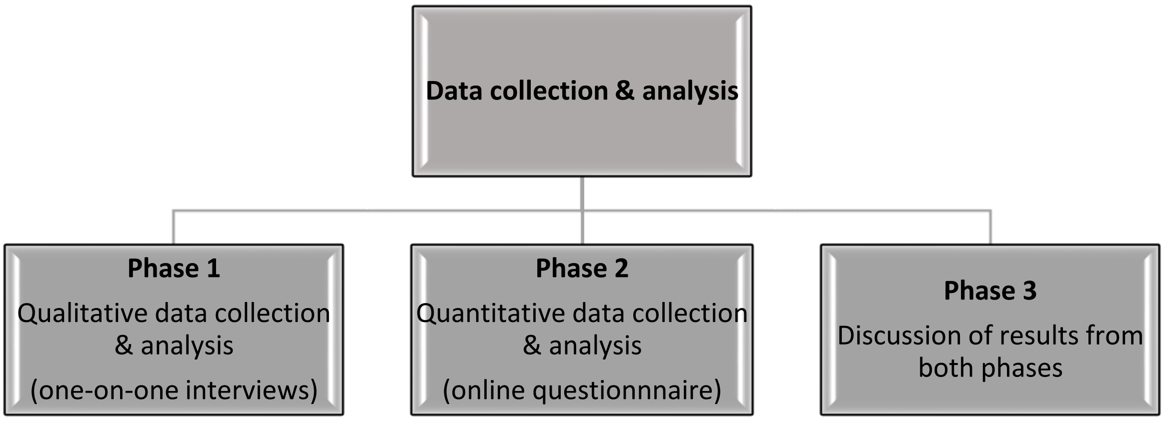
The main method used in the pragmatism paradigm is mixed methods, which combines qualitative and quantitative methods to generate new knowledge. Qualitative research is more of an enquiry process, where the researcher develops a holistic picture of the situation (Creswell, 1998). Qualitative research can be conducted in various ways. Quantitative research is more focused on numerical data. According to Khan (2011), quantitative research follows a rigid, predetermined and structured methodology with the emphasis on a larger sample size. Figure 4.3 distinguishes between qualitative and quantitative research methods.



Source: Neuman and Robson (2014) and Creswell (2009)

Figure 4.3: Qualitative, quantitative and mixed methods approaches

The research data were collected in two phases. Phase one was the qualitative data collection and analysis and phase two was the quantitative data collection and analysis.



Source: Researcher’s own construction

Figure 4.4: Data collection and analysis process

Phase one of data collection and analysis: The researcher collected qualitative data by means of one-on-one interviews. These qualitative data were analysed by means of coding, where responses from the participants were grouped according to similarities in answering the research questions.

Phase two of data collection and analysis: The researcher collected information from participants by means of questionnaires and this information was captured in QuestionPro and then transferred to excel and Statistica. Quantitative data analysis was performed by Statistica, a statistical analysis programme.

Phase three - discussion of the two phases: The researcher discussed the findings that emanated from the data that were collected and analysed by means of both qualitative and quantitative methods.

4.5 SELECTION AND JUSTIFICATION OF RESEARCH APPROACH

Bryman (2006) supports the use of a combination of quantitative and qualitative techniques, as it allows the researcher to collect significant data with more than one worldview. The reasoning behind the researcher using a mixed methods approach was that both qualitative and quantitative methods on their own would not have been sufficient to address the research objectives and to answer the research questions. Combining qualitative and quantitative methods assisted in developing a deep insight into the area of research, which can be difficult to understand using only one method

(Venkatesh, Brown and Bala, 2013). Using mixed methods provides a more in-depth understanding of the research problem than using one approach on its own. Mixed methods emerged during the 1980s as a third methodological movement for social and behavioural sciences (Tashakkori and Teddlie, 2003). Creswell and Plano Clark (2007) defined mixed methods as a philosophical method that combines qualitative and quantitative models to increase knowledge. According to Creswell et al. (2003), mixed methods assists in gaining various perspectives and limits the information gap by adding the information/data collected. Cohen et al. (2011) hold that with mixed methods, it is easy to uncover information whilst providing a number of perspectives in a way that minimises bias and assists researchers to reach more accurate conclusions.

This study’s qualitative research approach was based on a case study involving the University of KwaZulu-Natal. For the quantitative study, the researcher depended on numerical data from post-positivist claims for developing knowledge. Gray (2004) holds that the post-positivist approach stresses inferential statistics and places emphasis on assigning probabilities that the findings are correct. The open-ended qualitative questions that the participants were asked yielded detailed and thoughtful responses, as the participants could express their views and were not constrained by ‘agree or disagree’ answers. The closed quantitative questions allowed for ease of generalisation of the results, as there was a substantial number of participants and the reliability and validity of the data was assured due to the in-depth statistical analysis.

4.6 POPULATION

Population is the whole group of people that the researcher wishes to investigate (Sekaran and Bougie, 2016). The total number of participants for this study was drawn from the number of students who are registered at UKZN, approximately 30 000, the total number of academic staff, 1335, the number of ICT staff, 113, the number of support staff including representatives of the accreditation bodies and executives together with senior management, 1707.

4.7 SAMPLING

According to Thompson (2012), sampling is a method used when selecting some part of the population to observe to estimate something about the whole population. Khan (2011) indicated that a sample comprises the selected individuals from whom the researcher collects the required information. The researcher must therefore ensure that the sample that is drawn from the population is representative of the whole population. If researchers wish their research to be meaningful, it is important to utilise a sound sampling process (Sakaran and Bougie, 2016). There are two sampling techniques, namely probability and non-probability sampling. Table 4.3 indicates the differences between the two.

Table 4.3: Probability and non-probability techniques

Sampling Method	Sampling Technique
Probability: there is a probability for all elements of the population to be included in the sample.	• Random probability sampling - the setting up of the process should be done in a way that each unit in the population has an equal opportunity of being chosen at random. • Stratified random sampling - sampling that involves dividing the population into smaller groups based on their characteristics and attributes.
Non-probability sampling: there is no probability of any population element being included in the sample.	• Quota sampling - gathering data from a sample that has the same specific characteristics in the same proportions as the population. • Convenience sampling - a statistical method where a researcher selects people who are willing to volunteer and selection is based on availability and ease of access. • Judgement sampling - selection of the sample based on the opinions of experts. • Snowball sampling - where the participants recruit other participants who will be beneficial to the study.

Source: Neuman and Robson (2014)

The researcher made use of probability sampling when conducting the quantitative data collection, where the whole population was included in the sample. According to Khan (2011), for probability or random sampling, everyone in the population has an equal and independent chance of being selected to be part of the sample. The sample size was the whole population of students, academic staff and ICS staff, as the researcher used the online survey system and the questionnaire was sent to everyone using the UKZN notice system. 501 responses were received from students, 121 from academic staff and 22 from ICS staff.

For the qualitative study, non-probability quota sampling was used to select participants. Quota sampling was chosen with the view that it would allow representation from a variety of stakeholders. One-on-one interviews were conducted with 6 participants made up of two support staff members, two management and two members who belong to the accreditation bodies at UKZN. The criteria that the researcher used for selecting the participants was stakeholders who use MOODLE regularly.

4.8 DATA COLLECTION

The researcher made use of non-probability sampling to choose a sample from whom to collect qualitative data. According to Du Plooy-Cilliers et al. (2014), with purposive sampling the researcher chooses those whom they wish to include in the sample, people they wish to interview based on a set of characteristics or the objectives of the study. There are various types of qualitative data collection methods.

Table 4.4: Qualitative data collection methods

Method	Brief Description
Interview	Asking questions in a structured or semi-structured manner to gain an in-depth understanding of the objectives. The researchers listen and either write down or record the responses.
Focus group discussion	Conducting interviews with a group of diverse people, all of whom should be given a chance to state their views. There is a set of open ended questions that the group members are asked to discuss.
Observation	The researcher observes the behaviour and listens to the opinions of the participants either through participating in the activities or not, in order to achieve the research objectives.
Other	Rapid assessment procedure (RAP)

Source: Saunders et al. (2003)

For the qualitative data collection the researcher conducted one-on-one interviews with two support staff, two executive and senior members of management and two representatives of accreditation bodies. The researcher identified the relevant people who would be part of the sample and these participants referred other relevant participants by means of the snowball sampling method.

The questions that participants were asked were aimed at gaining an understanding of the research objectives and answering the research questions. There were ten open ended questions. The participants were given a copy of the questions before the interviews took place and they were informed that the interview would be tape recorded and transcribed verbatim. The participants were afforded an opportunity to review the transcriptions and make inputs if necessary once the information had been transcribed. The researcher made use of document reviews collected from UKZN.

Quantitative research is based on positivist or post-positivist philosophical assumptions. Numerical data are collected and analysed using statistics to determine the relationships between variables (Creswell, 2009). With qualitative research the researcher knows in advance what to look for and this leads to the qualitative view being ‘realistic’ or ‘positivist’ because of its ability to uncover an existing reality (Oates, 2010). When collecting the quantitative data, the researcher made use of probability sampling by obtaining a list of all students, ICS staff and academic staff registered on MOODLE at UKZN. The researcher used unrestricted probability sampling/simple random sampling. According to Sekaran and Bougie (2016), with unrestricted probability sampling there is a known and equal chance of all elements in the population being selected as a subject. When collecting the quantitative data, the researcher used structured surveys, where each questionnaire consisted of a formal list of questions asked of all participants. There were three different but similar questionnaires, one for the students, the second for the academic staff and the last for the ICS staff. These questionnaires were in the form of a web-based survey, (QuestionPro), and it was sent to participants via the UKZN notice system. The questions were asked with the aim of gaining an understanding of the research objectives and answering the research questions.

4.9 DATA ANALYSIS

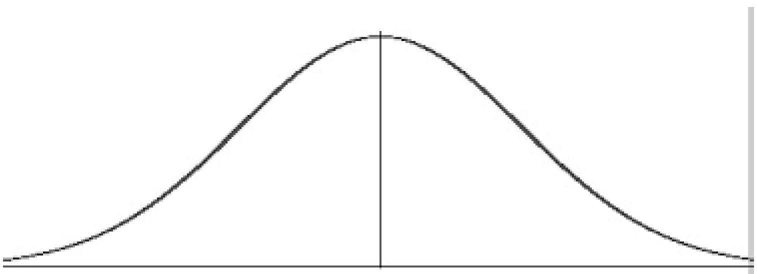
The researcher used themes and patterns to analyse the qualitative data. According to Oates (2010), patterns, visuals and themes are deemed to be relevant in a qualitative study. Cohen et al. (2011) indicated that creating themes and patterns can be referred to as coding. Coding can be achieved by grouping the text that pertains to a specific idea or thought. With this type of analysis, the researcher is able to identify similar themes. The steps to follow when conducting qualitative analyses are to:

- explore the data by going through all transcripts and making notes;
- segment and label the text so that the data can be coded;
- group codes that are similar so that themes can be developed;
- connect the themes;
- construct a narrative (Creswell, 2002).

When performing the quantitative data analysis, the researcher used an online survey system (QuestionPro) and data were exported to excel and Statistica for analysis. Welman & Kruger (2001) hold that there are four types of data/measurement scales and these were utilised by the researcher for conducting the quantitative research.

- **Nominal scale**: each person belongs to only one category. An example would be that the person is either a male or a female and cannot be both. Nominal distribution was used to determine the number of females as opposed to males who completed the questionnaires.

4.9.1 Nominal Distribution



Source: Welman and Kruger (2001)

Figure 4.5: Nominal distribution

- **Ordinal measurement**: this type of measurement ranks the order of things. For example, the ascending order of the way a person ranks the importance of religion. If it is not very important they would rate it as a 1 but if it is very important it would be rated as five on a 1 to 5 scale. The study made use of ordinal measurement as the evaluation methodology model questions required that participants answered question using a scale of 1 to 5, where 1 was strongly agree (SA), 2 was agree (A), 3 neither agree nor disagree (N), 4 was disagree (D) and 5 was strongly disagree (SD). A small section of the questionnaire is provided hereunder.

Table 4.5: Section of the questionnaire

Please tick the suitable box	**SA**	**A**	**N**	**D**	**SD**
IT Infrastructure Services					
The ICS division provides me with technology, advice and support services related to the MOODLE system.	1	2	3	4	5
The ICS division provides me with a wide range of facilities to perform MOODLE activities, such as access to the library.	1	2	3	4	5
The ICS division enables me to receive and exchange information and knowledge with lecturers and other students by using electronic linkages and software applications.	1	2	3	4	5
The ICS division provides me with data management advice and consultancy.	1	2	3	4	5
The ICS division provides me with a wide range of electronic channels, such as emails, websites and call centres to connect with others.	1	2	3	4	5
The ICS division provides me with MOODLE service with a high level of technical security.	1	2	3	4	5

- **Interval measure**: to measure equal differences.
- **Ratio measurement**: similar to interval measurement but data are measured by equal units through the use of percentage variance as one of the statistical possibilities that the researcher can use.

4.9.2 Multiple Regression Analysis

According to Gravetter and Forzano (2012), multiple regression analysis is a statistical process used for finding the most accurate prediction of equations. Collis and Hussey (2009) defined regression as a measure of whether or not a dependent variable can predict the outcome of an independent variable, if there is a relationship between the variables. Multiple regression was used in the study to investigate the effects of the independent variables on a single dependent variable (Zikmund et al., 2010). The researcher utilised multiple regression to understand the relationships between a specific dependent variable and a number of independent variables.

4.9.3 Effect of Demographic Variables

The researcher conducted an assessment to determine if the perceptions of the participants were influenced by the demographic variables. The researcher made use of t-tests, which are the statistical tests to understand the significant difference of the mean scores of two groups. According to Mitchell and Jolley (2012), the t-test is used to establish if there is any difference between two groups of subjects or samples. This study had more than one independent variable and there was therefore a need for the researcher to perform an ANOVA test, as the t-test is limited to two variables. Wiid and Diggines (2013) hold that ANOVA is a statistical test that can be performed when there are more than two means. After conducting the ANOVA test and discovering that there was a significant difference with some variables, the researcher conducted the post-hoc Tukey test to understand the groups of participants that were significantly different. According to Gravetter and Forzano (2012), the post-hoc Tukey is conducted to determine where the respondents differ significantly in their responses.

4.10 RELIABILITY AND VALIDITY OF STUDY

According to Venkatesh, Brown and Bala (2013), there are two primary issues that are addressed in quantitative research, namely reliability and validity measures. Reliability is about consistency and validity refers to the legitimacy of the findings. Khan (2011) holds that validity is about the appropriateness of each step taken to achieve the objectives. For a quantitative study, reliability and validity are important for minimising any errors that might arise. According to Thorndike (1997), reliability is the correctness or precision of the measurement procedure. Thorndike (1997) defined validity as the degree to which a study reflects or assesses a specific concept. To ensure validity, the researcher conducted pre-testing of the questionnaires. Lewis and Thornhill (2003) highlighted the need for pre-testing of questionnaires to determine if the participants will understand the questions and to determine if the responses to the questions will indeed answer the research questions. Khan (2011) holds that for a quantitative study, pre-testing is undertaken to determine any potential problems with the questionnaire. Pre-testing of the questionnaires was performed with 20 participants who were outside the population and sample but using a similar system. These participants were from the University of South Africa (UNISA). Pre-testing was conducted to check for common understanding of the questions and for the researcher to ascertain if there was a need to rephrase the questions. The results from the pre-test indicated that there was a common understanding of the questions. Only a few spelling errors were found and rectified by the researcher before the questionnaire was distributed.

The researcher conducted a pilot study at UKZN with 10 students, academic and ICT staff. This pilot study was undertaken to ascertain the length of time it would take to complete the questionnaire and to assess whether or not there was common understanding of the questions and if there were any inconsistencies with the questions meeting the objectives. The feedback revealed that the questions were understandable, the participants could answer and the responses received from the participants were in line with answering the research questions and the researcher was able to time the completion of the questionnaires.

The researcher made use of Cronbach’s alpha, which is a tool used for measuring internal consistency as to how close the set of items are to the group. This measure was conducted to determine reliability. According to Gravetter and Forzano (2012), Cronbach’s alpha produces values between 0 and 1. If the value is high, there is greater indication of a high degree of internal consistency and reliability. Therefore, a Cronbach’s alpha value of 0.70 and higher implies that there is good reliability and a value between 0.60 and 0.70 suggests that it is acceptable only if the other indicators of a framework’s construct validity are good (Wiid and Diggines, 2013; Mitchell and Jolley, 2010; Hair et al., 2006). If Cronbach’s alpha values are below 0.60 they are unacceptable (Wiid and Diggines, 2013).

To measure validity the researcher used exploratory factor analysis (EFA). According to DeCoster (1998), EFA is used when one wishes to understand the sets of items that can be grouped together in the questionnaire; to generate the factor scores that represent the underlying constructs for use in other analyses; determine which are the important factors when classifying a group of items; to demonstrate the dimensionality of the measurement scale and to identify what the nature of the constructs in underlying responses in a specific area are. The researcher used EFA to ensure that the understanding of the constructs was consistent with the nature and meaning of the constructs.

With qualitative research, validity is about the accuracy and credibility of what is reported. Trustworthiness and honesty are important for ensuring credibility. The researcher built relationships with the participants by being honest with them, as people mostly treat you the way you treat them. These relationships were built in the hope that the participants would provide honest feedback. Merriam (1988) holds that when a researcher wishes to validate the findings and to determine if the qualitative information that was gathered is credible, there are four primary ways to do this.

- Triangulation, where there is a convergence of various sources of information, such as documents and interviews.
- Checking the accuracy of the feedback received from participants.
- Giving a rich, strong description when delivering the findings.
- Conducting an external audit, where a person who is not part of the project is asked to review that study (Creswell, 2003).

4.11 BIAS

Bias occurs when the participants in the study rate themselves according to a common expectation, for example, participants rating themselves on performance regardless of the actual performance (Babbie, 2001). According to Easterby-Smith, Thorpe and Lowe (2002), for researchers to avoid bias, there is a tendency to leave the questions open. The authors posit that probes must never lead.

To avoid bias in the research, the researcher:

- used a large sample for the quantitative data collection with an equal chance for all people in the population to participate in the questionnaire as it was sent via QuestionPro through the UKZN notice board;
- used open questions for the qualitative study, where participants could explain their answers and feel free to offer their expert opinions and
- ensured confidentiality and anonymity for both the qualitative and quantitative data collection with no biographical information being required from the quantitative data collection participants; the questionnaire was answered anonymously.

4.12 ETHICAL CONSIDERATIONS

The researcher ensured that pre-agreements were made with UKZN in the form of a signed gatekeeper's letter. The researcher applied for, and was granted ethical clearance from the university (UKZN) to collect data. The participants were made aware that participation was voluntary and should they feel a need to withdraw from participating at any stage they were free to do so. A signed consent form was required from each participant who chose to take part in the study. This consent form assured the participants that confidentiality and anonymity of all records was of paramount importance and that any information that could identify the participants would be maintained by the Graduate School of Business and Leadership at the University of KwaZulu-Natal.

4.13 CONCLUSION

This chapter presented a discussion of the research methodology that was used in the study. A number of research paradigms were explored by the researcher by means of a review of existing literature and the research paradigm that was chosen was discussed together with the motivation for the choice. The chapter indicated the way in which the data were collected, which was by means of a combination of both qualitative and quantitative data collection methods, as neither on its own would have been sufficient to answer the research questions. Research instruments were discussed and the decision was made to employ one-on-one interviews to collect qualitative data and a questionnaire to collect quantitative data. The researcher explained how both qualitative and quantitative data were analysed, including the issues of validity and reliability. Bias avoidance was highlighted and the limitations that the researcher encountered were mentioned. Chapter 5 presents the qualitative data that were collected in the form of themes.

CHAPTER 5

PRESENTATION OF QUALITATIVE RESULTS

5.1 INTRODUCTION

The previous chapter presented a discussion of the research methods that were used in this study and the motivations behind the choices. This chapter presents the results of the qualitative part of the study, where data were collected from three stakeholders, namely management, support staff and quality assurance staff members. Qualitative data were collected to achieve the following research objectives:

- to investigate the way in which the learner management system (LMS) is used to deliver and promote teaching and learning;
- to ascertain which factors are essential for the successful and sustainable implementation of e-learning in HEIs;
- to conduct a stakeholder analysis with the aim of determining each stakeholder's role in the success of e-learning implementation in higher education institutions and
- to make use of the evaluation methodology model to assess e-learning systems' success.

5.2 PARTICIPANTS' PROFILES

Six participants were asked the same questions in an effort to address and answer the research question. The participants' profiles are presented in Table 5.1.

Table 5.1: Participants' profiles

Participant	Age	Classification	Education Level	Employment Type	Employment Period
Participant 1	41-50	Support Staff	Honours	Permanent	19 years
Participant 2	41-50	Support Staff	Honours	Permanent	8 years
Participant 3	51-60	Quality Promotion and Assurance	PHD	Permanent	2 years
Participant 4	51-60	Quality Assurance	Doctorate	Permanent	6 years
Participant 5	31-40	Management	PHD	Permanent	8 years
Participant 6	51-60	Management	PHD	Permanent	16 years

5.3 THEMATIC ANALYSIS OF QUALITATIVE DATA

The qualitative data that were collected were coded into themes and sub-themes as discussed in the following sections.

5.3.1 Theme 1: The use of LMS (MOODLE) in teaching and learning at UKZN

E-learning was introduced and is used for a number of reasons and in various ways by HEIs. The reasons for the introduction of e-learning are similar to the reason for using blended learning. Participants were engaged to discover why e-learning was introduced at UKZN and in what way the e-learning management system is utilised by the university. The reasons advanced resulted in the following sub-themes emerging.

5.3.1.1 Sub-theme 1.1: The reason for the introduction of MOODLE at UKZN

There are numerous reasons for institutions introducing e-learning as part of their teaching and learning. The e-learning LMS that was introduced at UKZN is MOODLE. The feedback from participants with regard to the introduction of MOODLE at UKZN offers a broader understanding of why the university chose to introduce MOODLE. These reasons include the need for: a learner management system; blended learning; student feedback system; interface between students and lecturers beyond the classroom and an enhancement tool. The feedback from the participants is expressed in their own words hereunder.

Participant 1

“The reason behind the introduction of MOODLE at UKZN is that the university needed a LMS. There was a department at the university that started using MOODLE on their own. It was the College of Humanities. They were using it for students to distribute notes and started teaching a little bit. Eventually the University Teaching and Learning had asked for a LMS system and since MOODLE was being used by College of Humanities they decided to use MOODLE system at UKZN.”

Participant 2

“MOODLE was installed in the mid-2000s which was available for anyone to use it. UKZN decided to officially adopt MOODLE in 2009 and it launched in 2010 beginning of the year. A study of different learner management system was conducted and from that study MOODLE was chosen because it is free and user friendly. It was a sensible choice. There was a need for blended leaning which is why a learner management system was investigated and introduced. UKZN needed an alternative way of communicating with students apart from traditional face to face learning so MOODLE was introduced as a form of blended learning. There is a team of developers all over the world who are adding new features to MOODLE.”

Participant 5

“MOODLE was introduced for electronic learning. It was to allow for interface between the students beyond the classroom. MOODLE was introduced for academics to post lecture notes which is for students to access online at their own convenience. Participant 3 and 6 agreed with this statement and mentioned that MOODLE was introduced to assist lectures in teaching and learning. MOODLE was introduced as an enhancement tool to facilitate learning and to bring the instructor closer to the students and to help in managing numbers. As technology advanced the university has found easier ways of handling the work using MOODLE. MOODLE assists in doing work more effectively and efficiently.”

Participant 4 expressed the same sentiments with regard to the introduction of MOODLE but added a different perspective.

Participant 4

Participant four mentioned that MOODLE was introduced as an online learner management system. *"It was started for various reasons such as being introduced as an interim student feedback system which is a platform for student's feedback. MOODLE was started as there was a demand for students to have this kind of technology. It was introduced for students to engage with other students and lecturers online."*

5.3.1.2 Sub Theme 1.2: The utilisation of MOODLE at UKZN

MOODLE has various functions that can be employed by universities in their teaching and learning. The qualitative study that was conducted with participants revealed a number of ways in which MOODLE is currently being used at UKZN. All participants had the same view of the way in which MOODLE is currently being used at UKZN and their responses follow.

Participant 1

"A large portion of MOODLE it is used for storing lecture notes. The university is currently trying to make it more of a teaching tool as there is training of staff on how to do quizzes on MOODLE, how to carry out discussions as the aim is to make it more of an interactive system. The way that MOODLE is, it can be used as a teaching tool. There are discussion forums where students engage with students and lecturers. The lecturer will put up a discussion question and students will respond."

Participant 2

"There is a whole lot of functionalities on MOODLE which are not being used like peer assessments. These are not used because there is a lack of support for lecturers and they do not know about these features. New things are scary to people. Lecturers need exposure to MOODLE. It is not easy to teach the advanced features to lecturers because those would need one on one sessions as each academic has specific needs. There is a need to sit down with lecturers to find out what their needs are including what their technology needs and problems are so that they can be provided with that kind of support. The problem is there is no human capacity to do that. So basically,

the current support that is available for lecturers is very basic level which just focuses on the basic use of MOODLE.”

Participant 6

“MOODLE is used for a lot of things in teaching and learning domain. It is a communication tool, used for uploading note, discussion groups. MOODLE is used for random grouping of students. From engagements with other academics on use of MOODLE they use it in different ways and it is not fully utilised but there are academics to try to use most of the functions of MOODLE. The assessment tool on MOODLE is not utilised and the participant would like to see more of that as MOODLE would be quick and fast in marking of student’s assessments.”

Participant 3

”MOODLE is currently used by lecturers to upload notes and slides or any other information that they want to communicate to the students. Additionally, MOODLE is used for uploading of module outlines and module templates. From the quality assurance side MOODLE is used for evaluation and to capture the student’s evaluation/feedback responses. Some lecturers but very few are using it as a teaching tool but mostly it is used for uploading notes. Currently the university wants to use MOODLE more as a learning platform but there is no indication how far that process is. There are quizzes that are conducted on MOODLE as part of learning.”

Participant 4

“MOODLE is currently used to upload notes as well as projects and assignments. It is used for assessment purposes through quizzes for certain modules not all. It is used into some degree as a replacement where students don’t engage as much in lecture classes because they know that the notes will be available on MOODLE. Information is translated into IsiZulu and is available on the MOODLE system. There are plans to have two other language translations (Afrikaans and Sesotho) but at this stage there is nothing concrete. This initiative is driven from the language office. MOODLE is not used to its maximum capacity. There are course outlines that have become mandatory for the lecture notes to be uploaded on to MOODLE but not all of them. MOODLE can

be used as a learning tool. The academics can use MOODLE to develop their own evaluation or feedback online form apart from Quality Promotion and Assurance (QPAs) evaluation and it will assist them in understanding how the students feel about the modules and how best they can improve modules continuously."

Participant 5

"Furthermore, MOODLE is to be used as a testing tool where quizzes are to be uploaded for students. It allows students to have more integration with the content and with the lecturers. Currently MOODLE is mainly used as a notice system than learning but that was not the intention behind it as it is currently used for posting material rather than a teaching tool. Some academics do use it for teaching but very few use it for discussions. There was a module which the participant last year (2016) did online where there was a lot of interaction between the students and the lecture and that was only last year 2016 and it did not happen again after that year. The main reason it is currently used for is uploading lecture notes and as a notice system. MOODLE is not used to its maximum capacity as more could be done for example there is no clarity if MOODLE can handle podcast where the academics can post videos of lectures online for students. This was more specifically needed during the #feesmustfall movement in 2016 where due to protests lectures were suspended for a while and if podcast was working students could have been able to access the lecture anywhere anytime even though students were not physically present at the university they were going to benefit. In the participants opinion she believes that the system cannot accommodate podcast. Another reason is some academics do not understand the advantages of using MOODLE. There were however interactions with academics before MOODLE was introduced interactions in terms of seminars and workshops but the problem is most academics do not attend such making it difficult to get their input."

5.3.2 Theme 2: Factors essential for successful and sustainable implementation of e-learning in HEIs.

A number of factors are essential for the successful implementation of e-learning. Participants were asked questions pertaining to these factors and the following themes emerged.

5.3.2.1 Sub-theme 2.1: Resources including human and financial

The term ‘human resources’ refers to the people who carry out the specific functions. These people are important, as they implement the systems being put in place. A number of participants highlighted the need for human resources to be suitably trained, as this is a means for institutions to build capacity.

Participant 1

“There is a combination of things which are required for e-learning systems to be a success. One of the requirements is well-trained staff members. Staff members must be willing to be trained. ICS staff members must be competent and they have to understand teaching pedagogies as well as the software so they can be able to offer support to users. There are however challenges that are hindering on the successful implementation of MOODLE and these are; external factors around MOODLE such as staff resources and staff training including budgets for training and having staff that can handle the software.”

Participant 2 mentioned that the essentials for e-learning to be a success are support and training for lecturers and technical capacity to ensure that there is no downtime. Currently at UKZN there is a challenge with regard to a lack of capacity.

Participant 4

“The challenges with MOODLE is that the uptake with MOODLE in 2015 to 2016 was very slow and one of the contributing factors is training to staff on MOODLE. That is being addressed to some extent through training of staff. Financially money is needed to upgrade the system and staffing (institution must build capacity).” Participant 5 shared the same sentiment as this participant and emphasised that *“Funding is needed for UKZN to successfully implement e-learning.”*

5.3.2.2 Sub-theme 2.2: Engagement with stakeholders

Engagement with stakeholders is important. All stakeholders have to understand what is happening in the institution, as they are either directly or indirectly affected. A number of participants highlighted the need for engagement with stakeholders to ensure that e-learning is successful. There were however, participants who indicated that there has to be some form of engagement with academics. These participants' views are expressed below.

Participant 1

"One of the biggest challenge is lack of engagement with staff as the training is forced on them which leads to resistance by staff members. Engagement with staff members is very important as it increases the success of e-learning."

Participant 5

"The other problem that lack of engagements has led to is the academics do not understand the benefits that comes with MOODLE system and until they realise these benefits and get proof that these indeed will make their lives easier than what is known to them which is the traditional way, it is hard for them to buy into the system and use it. Another challenge is that everyone at the university is working in silos."

Participant 6

"For e-leaning to be successful, regular discussions are needed through teaching and learning days, identifying champions that have used MOODLE so they can encourage all the others as they will be role models for new users. Seminars and workshops on MOODLE to eliminate the fear of using MOODLE. Getting buy in from stakeholders so that MOODLE can become a way of doing things is one of the greatest challenges and hinders with the success of implementing MOODLE."

Participant 4 stated that engagement with academics did occur by means of structured meetings, notices and presentations.

5.3.2.3 Sub-theme 2.3: IT Infrastructure for successful implementation of e-learning

Participant 1

"IT infrastructure is needed where the server can handle anything that is put on it and currently the MOODLE IT infrastructure at UKZN is capable and efficient. There are no challenges with the MOODLE system itself. According to Participant 2*; there is a*

need for networking, Wi-Fi, hardware and backups in ensuring the e-learning systems are a success."

Participant 3

"For e-learning systems to be a success there needs to be proper ICT infrastructure including computers for students so they can access MOODLE off campus. IT support for students including data. MOODLE system should be well maintained and reviewed."

Participant 4

"Resources such as infrastructure, equipment, ensuring that communication is sent through to all users is essential for successful implementation of MOODLE. Participant 5 highlighted that infrastructure, system must be upgraded, systems must have the capacity to meet the user's needs so the e-learning systems can be successful."

5.3.2.4 Sub-theme 2.4: Information technology skills

Participant 1

"Level of students that comes into the university at a first-year level, about 30% of them have not touched a computer and it is a critical factor as the university is trying to use technology as a teaching tool. What ICS has done is that they have put in programmes *which will assist students at a first-year level with equipping them with basic computer skills. The college of Humanities has made it compulsory for all first years' students to attend computer course with ICS and this is a free course so they just book the time and ICS teaches them the basic skills they will need to operate a computer. They cover how to switch a computer on, how to access internet, PowerPoint, word, and excel. At the end of the course students get an attendance certificate. Students are however very quick to grasp how the computer is used the challenge is understanding MOODLE as it is a bit more challenging. It has however been introduced to other colleges but they have not made it compulsory."* Participant 2 said that *"students must be trained and currently there is minimum support for students on how to use MOODLE. This is due to lack of capacity but the MOODLE system is user-friendly."*

Participant 3

"There must be computer training for students who do not have the computer skills. The College of Humanities has put up a module on digital literacy for ensuring that students get the basic computer skills. Participant 6 indicated that the ICS at UKZN they are always supporting academics on how to use MOODLE and even have training for academics at the beginning of the year. All users have support from ICS on using MOODLE."

Participant 4

"Currently there are staff members who are unwilling or unable to put up study material on MOODLE. One of the reasons could be because they have not been for training but there is more and more academics who are using the MOODLE system now (2017) as opposed to year 2015. Participant 5 mentioned the possible reason why some staff members are unwilling or unable to put study material on MOODLE. "The challenge most of the academics are old and are not familiar with this kind of technology so those issues need to be taken into consideration as some academics feel that these technologies are taking them out of their comfort zone. The other challenge is they do not understand the benefits that comes with MOODLE system and until they realise these benefits and get proof that these indeed will make their lives easier than what is known to them which is the traditional way, it is hard for them to buy into the system and use it."

5.3.2.5 Sub-theme 2.5: Quality assurance

Participant 3

"Quality assurance unit is needed for compiling evaluation reports on modules and they find it quicker and more efficient than manual process. Students do evaluation of modules questionnaire which is uploaded by ICS on the MOODLE system and they submit online and the results are accessed by QPA who then compile a report which are sent to lecturers and they review it so they can use it to improve their teaching and learning process. As far as teaching is concerned QPA is involved in creating templates for teaching. The quality assurance of the content is done by the lecturers. QPA is not involved in it."

Participant 4

"QPA is using MOODLE for evaluation reports successfully and language offices also uses it and in this regard, there is evidence that it is successful. MOODLE has been reported at the quality announcement project to the Council on higher education and the panel that visited the QPA did recognise the successful components of MOODLE which is around the points that MOODLE is currently being used for at UKZN."

5.3.2.6 Sub-theme 2.6: Impact of MOODLE

Participant 1

"MOODLE is a success because of the number of students that use the MOODLE system and based on the number of interaction on the MOODLE system students love MOODLE. Lecture attendance is dropping significantly because students download lectures on MOODLE as opposed to attending lectures. There was one point in time where there were 30000 students on MOODLE at the same time. There is a system administrator who administers MOODLE and she manages the software and the hardware."

Participant 5

"There is no indication if the MOODLE system has been evaluated and if users have given any feedback on MOODLE and their opinion on how best the MOODLE system can be improved to make it more user friendly. Some students are no longer attending lectures because the lecture notes and slides are posted on MOODLE. MOODLE is successful to a certain extent in that it is efficient. It has made communication and submission of assignments easier for example the Turnitin students submit their assignments online it goes through Turnitin automatically before it's submitted to the lecturer eliminating the process of the student having to put the assignment on Turnitin before submitting and having to print and submit the Turnitin report. With MOODLE students and lecturers are killing two birds with one stone. MOODLE makes assignments easier to manage."

5.3.2.7 Sub-theme 2.7: Challenges associated with MOODLE

Participant 3

"There are challenges associated with the implementation of e-learning and these are; some students were given computers but due to the poor financial background that students come from they end up selling the computers to make money. It then becomes difficult for students from previously disadvantaged households to fully benefit from the MOODLE system when it comes to flexibility of access as the LANS are always crowded and they must wait in long queues to get access to MOODLE. Even if they have a computer the added challenge of internet access, broadband becomes a problem. Resources are a challenge. Some students are computer illiterate. MOODLE is however a success because it is cost effective, easy access, paperless with less bulks to carry around, flexible in terms of accessibility as it can be accessed from anywhere if one has broadband. It is more efficient and effective."

Participant 4

"The challenge with MOODLE is if lectures note are uploaded on MOODLE the students will have to have access to a computer and not just a computer but to broadband (the internet) as well. To have these students will require financial aid and it becomes more challenging especially for financially disadvantaged students. This leads to many students not having access to internet and the computer because the technological resources are limited at the university."

5.3.3 Theme 3: Stakeholders and stakeholders' role in ensuring the success of e-learning.

There are a number of stakeholders with a role in ensuring the success of e-learning. Participants were asked their opinions with regard to the stakeholders that are needed to ensure that e-learning is a success. Several participants named the same stakeholders but it was interesting to note that the most popular stakeholders were students, academics and ICS staff members. There were however, participants who were able to identify other stakeholders that should be part of e-learning. The results are presented in the sub-themes that follow.

5.3.3.1 Sub-theme 3.1: Academic staff, students and support staff as stakeholders

Participant 6

"Lecturers: they must make sure that they understand the benefits and tools that MOODLE presents. Some academics should explore the various tools that are available on MOODLE as they only use the basics but there is a whole lot that they can tap into. Academics have concerns and they are reluctant to change. They want to know why they must change a working method. It's not easy to get the buy in from academics from the start they need evidence that it is better than what they used to. Students: students must do what the lecturers expect them to do. It is their responsibility to actively participate in the system and to be ethical in the way they use MOODLE and the system should not be abused by students. Students concerns on using MOODLE is that they do not have data and not all of them have good smart phones or laptops. Some would say they are discouraged because the system has notes they could feel they can find anywhere so there must be something exciting for them on MOODLE to get them to use the system; something that they can find only on MOODLE. Administrators: are to post messages on MOODLE, to do groupings and to upload marks. Management: they should be more involved in understanding of MOODLE in the developmental form. Some management have not used the tool and it is important that they use it so they can understand how it works."

Participant 1

"The stakeholders that should be involved are academics for engagements, support staff as they must be utilised for managing MOODLE. Both the academics and support staff must be trained on MOODLE for it to be a success."

Participant 2

"Lecturers use the MOODLE tool in their teaching and are stakeholders. *Students as stakeholders because they are driving the need for MOODLE. Their role is to pressurise the lecturers to use MOODLE. The main concerns of students are technical problems as well as concerns about work being lost in the system. There is free data on campus so should be able to access MOODLE."*

Participant 5

"Academics should make sure that they use the MOODLE system because it will not be success if it is not used. Students must access the system so they can benefit from the MOODLE system."

Participant 3

"Academic staff have the responsivity to upload the notes on MOODLE and they just can't dump notes on the system they should make sure that it is user friendly to students, they must not overload it as it overwhelms students. Students have a responsibility to ensure that MOODLE becomes a success by taking advantage of the MOODLE benefits and that they must make sure that they use it because MOODLE gives the students an opportunity to get more material and more information."

Apart from all the participants identifying administrators, academics and students as stakeholders, Participant 4 mentioned additional stakeholders as being important for teaching and learning that should be part of this sub-theme. The participant's response with regard to stakeholders is presented hereunder.

Participant 4

"Students and staff are the users and they provide reports/feedback to ICS, ACC and QPA either directly or indirectly. QPA must use the system for student evaluation. QPA is to have continuous engagements with academics and ICS as the QPA needs to provide support to academic staff and students."

5.3.3.2 Sub-theme 3.2: University teaching and learning office (UTLO) as a stakeholder

Participant 1

"Consultation with the education department for advice on how they should proceed with MOODLE because they have the education and pedagogy skills. The University Teaching and Learning Office (UTLO) for consultation where meetings are held with the deans of teaching and learning."

Participant 2

"The university teaching and learning office should be the drivers of MOODLE."

5.3.3.3 Sub-theme 3.3: Information communication services (ICS) and academic computing centre as stakeholders

Participant 2

"ICS as stakeholders as they provide the technical service. What stresses ICS the most is making sure that ICS can handle the number of users as there can be a huge number of users using it at the same time. The system has to be monitored all the time. Something will happen that the ICS staff member has not experienced before and how she will deal with that is a cause for concern. The worry of making sure that the system is always functional. Due to the large numbers at UKZN it makes it challenging to explore MOODLE because there is concerns of how the network will handle it."

Participant 3 emphasised that ICS must ensure that the system is operational, effective, easy to access and user friendly.

Participant 4

"ICS are the developers are responsible for the planning and the development of the learner management system, monitoring of implementation and evaluation of system. They must provide reports to different structures and university community at large and to ensure that the system is upgraded so that the best possible opportunities can be made available to staff and students. ACC is to plan for staff training and ensure that training does happen. They must carry out evaluations with the aim of trying to improve the system."

Participant 5

"ICS role is ensuring that the system is operational, easy to access and easy to use, user friendly and accommodative, ensuring that there is recording of the lectures and posting the recordings on MOODLE."

5.3.4 Theme 4: Evaluation methodology model for assessing e-learning systems

The study made use of the evolution methodology model to assess e-learning systems. The participants were asked a number of questions in relation to some of the components of the evaluation methodology model. This resulted in the following findings, which were grouped into sub-themes.

5.3.4.1 Sub-theme 4.1: Assessment of IT infrastructure

Participant 1

"IT infrastructure is on point and there are no challenges with it. There was once a quiz set by the college of humanities where they wanted to do an online test with the students. We had 1500 students taking the quiz online during the day and there were no problems with taking the quiz and accessing it. The school of IS and T (Information Systems and Technology) now do their first year MCQ tests on MOODLE which they have after hours from 5pm to 6pm and it is about 800 to 1000 students. When they started the test all 800-1000 students started at the same time and there were no problems."

Participant 2

"IT infrastructure is good. There is a powerful server, the only problem is the human infrastructure."

Participant 3 agreed with Participant 2 and said that the IT infrastructure is stable, the only issue being that access to the LAN is overcrowded. With regard to service delivery, students are happy with MOODLE but they doubt the confidentiality of the system and some believe that people are able to hack into MOODLE and access their information. Although ICS has assured them that it is secure, the students are not convinced.

Participant 5

"IT infrastructure is ok its jut human resources that are scarce because it is difficult to get assistance from ICS. This is because there is a few of them servicing the whole

university. It looks as if they are not doing their job but it is the numbers that are too huge and they are not capacitated to be able to reach all the numbers."

Participant 4 however, indicated a concern with regard to the ICT infrastructure.

Participant 4

"When it comes to IT infrastructure there is limited access to devices, limited connectivity and these are reported by students and staff during quality reviews."

5.3.4.2 Sub-theme 4.2: Assessment of system quality

Participant 1

In terms of the quality of the MOODLE system, Participant 1 indicated that *"MOODLE is of high quality, it is easy to use and navigate. There is support for students from the ICS side. There are hardly problems with logging in on MOODLE and if there is a problem the administrator knows about it first and they will put up a message saying there is currently a system challenge. There has never been a survey on how students find MOODLE or what the other user's opinion on MOODLE is."*

Participant 5

"Quality of MOODLE is good the challenge is that MOODLE is not being used to its full capacity."

5.3.4.3 Sub-theme 4.3: Assessment of satisfaction with MOODLE

Participant 1

Participant 1 stated that he is satisfied with MOODLE and what it does and that the only facet that requires attention is the introduction of MOODLE as a teaching tool rather than just a tool for uploading notes.

Participant 3

"Information gathered from feedback/evaluation reports from students indicates that students are happy with MOODLE as the information that they need is all there on the

MOODLE system, for example the lecture slides which are covered during lecturers. The students are enjoying the flexibility as they can sit anywhere including at home and be able to access notes and lecture slides. Some students like the fact that they don't have to attend lectures if the slides are posted on MOODLE they do not see the need to attend lecturers."

Participant 6 claimed that people are satisfied with MOODLE and that MOODLE has assisted QPA with student evaluations.

Participant 4

"An advantage that MOODLE has is it has created is the opportunity for research. Created opportunities for students to use the research found on MOODLE and to engage in that research. When we look at the awards across the four colleges' research days; the distinguished teacher's awards have been awarded because of their engagement with MOODLE as a platform. Teaching and learning conference in the past three years has done a lot of research on MOODLE in terms of planning and implementation but nothing on evaluation. The satisfaction with MOODLE is high and MOODLE has highly assisted QPA with student evaluations."

5.3.4.4 Sub-theme 4.4: Assessment of MOODLE's contribution to customer and organisational value

Participant 1

"In my opinion MOODLE has contributed massively to customer value because of the number of students that use it. If you look at the times that students are on MOODLE you will find that in the early hours of the morning at about 2am and 3am you will find about 7000 students on MOODLE which shows that it is convenient to users as they can access it at any time anywhere." According to Participant 1 *"before MOODLE the university used they used another Online Learning System (OLS) but MOODLE has huge benefits in that MOODLE is free and it has made the support staff life easier as they have moved to paperless which takes away unnecessary process of paperwork which was time consuming. Now assignments can be submitted and marked online which makes the process quicker. It lessens the burden of the support staff. There is however a need for support staff to be trained on MOODLE for them to benefit from*

the efficiency of it. For executive management MOODLE has financial benefits in that it is free so it reduces costs. The only major costs associated with MOODLE is that staff will have to be sent for training on how to use MOODLE. MOODLE sits on the UKZN software and therefore it is very safe from the infrastructure side. There is an international community that takes care of MOODLE and in terms of the software they take care of the security every few months a new version is introduced. UKZN is currently on version 3.2 and the new version that they will move to in January 2018 is 3.4. Nobody has access to the UKZN database."

Participant 2

"MOODLE is contributing to customer value because it makes it possible for lecturers to communicate with their students and to post lecture notes which is a great resource for students. Furthermore, MOODLE is adding to organisational value in that it has provided efficient ways to teaching and learning not just for academics but for support staff as well."

Participant 3 agreed that MOODLE contributes to customer and organisational value. *"MOODLE system is contributing greatly to customer value as MOODLE is a very useful platform. Moreover, MOODLE is adding great organisational value as it adding to the technological development."*

According to Participant 5, the main stakeholders of MOODLE are students, so MOODLE is contributing to the core of UKZN's existence, as it is adding to organisational and customer value.

Participant 4

"MOODLE has impacted on organisational value in terms of production and efficiency. It is a secure integrated system. It will be integrated with the language department. Support staff can do more now with MOODLE. It improved the teaching and learning environment. MOODLE has been recognised as an institutional strength in the quality announcement project report by the council on higher education and they did that through QPA self-reflective report as well as site visit that they had where they spent the entire day interviewing staff and students and they were able to pick up from there

the value that MOODLE has added to the institution. Most of the modules are evaluated via MOOLE than on paper as they are moving to paperless environment. With online evaluation the report is generated immediately. Currently there is a team which is looking at developing an e-learning policy and the engagements will start in the end of January 2018."

Participant 6 mentioned that there has never been a study to check on the ways in which MOODLE is contributing to the organisation and customers. The participant stressed that their response with regard to customer and organisational value is not factual, only based on their opinions and observations. The participant's response is presented in the following paragraph.

Participant 6

"MOODLE is contributing to customer value but there has not been a study at UKZN to check how the students are performing since the introduction of MOODLE to determine if MOODLE is effective but if it were to be done the participant believes that it will show positive results. MOODLE is contributing to customer value in that messages reaches students faster for example if there are unforeseen circumstances and lecturer decides to cancel a lecture the students can know about it via MOODLE before they go to class. MOODLE has a positive impact on organisational value in terms of finances as lecturers don't use hard copy most of the time. MOODLE saves human resources and time."

5.4 CONCLUSION

This chapter presented the qualitative data that were collected from the stakeholders. There were six participants who participated in one-on-one interviews and their views with regard to the questions that they were asked in addressing the research questions were presented. The participants contributed by answering questions relating to all four research questions. The results were grouped into themes and sub-themes and presented accordingly. There were four themes and seventeen sub-themes that became part of the main themes. Overall, the results were positive and MOODLE is seen as a favourable system. Not disregarding the fact that MOODLE has a number of challenges, the impact that MOODLE has made is significant. The chapter that follows presents the quantitative data that were collected from three stakeholder groups, namely students, academic staff and ICS staff members by means of questionnaires.

CHAPTER 6

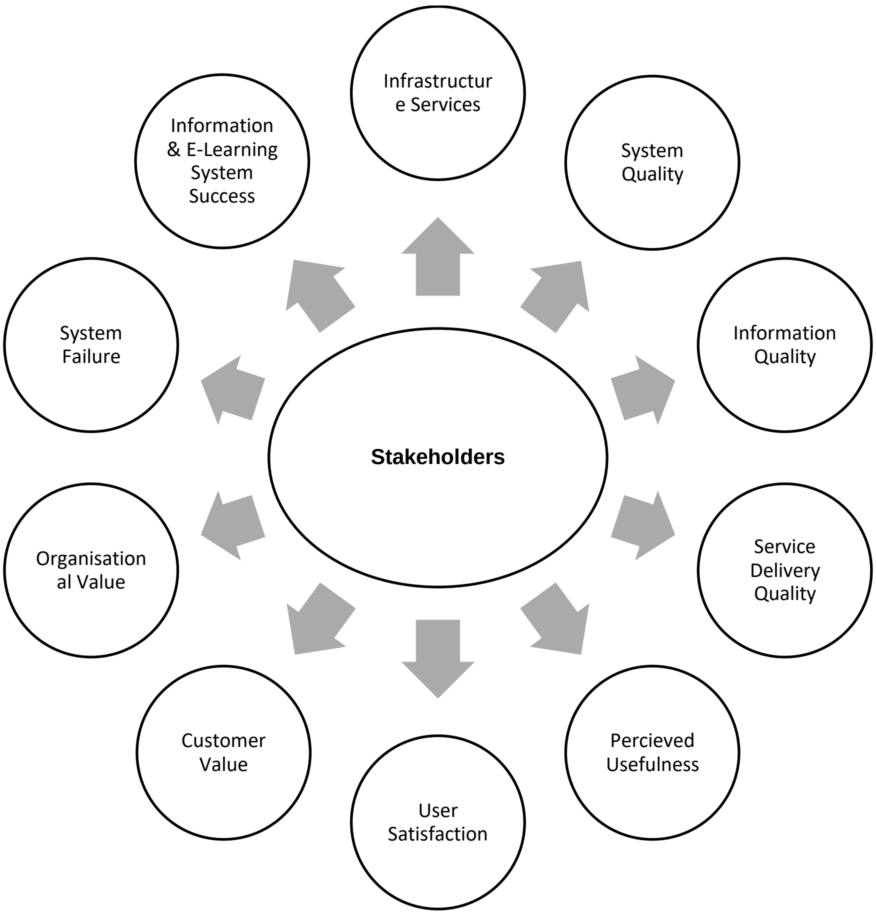
QUANTITATIVE RESULTS

6.1 INTRODUCTION

Quantitative data were collected from students, ICS staff and academics at UKZN by means of self-administered questionnaires. The quantitative study was undertaken to obtain information pertaining to objective four:

- to make use of the evaluation methodology model to assess e-learning systems' success.

The following model was used to assess e-learning systems' success.



Source: Researcher's own construction

Figure 6.1: Proposed evaluation methodology model

6.2 THE QUANTITATIVE DATA PRESENTATION OF STUDENTS' RESULTS

This section presents the quantitative data collected from the students' questionnaires.

6.2.1 Description of Student Participants' Demographic Profiles

Figures 6.1 to 6.7 illustrate the student participants' demographic profile.

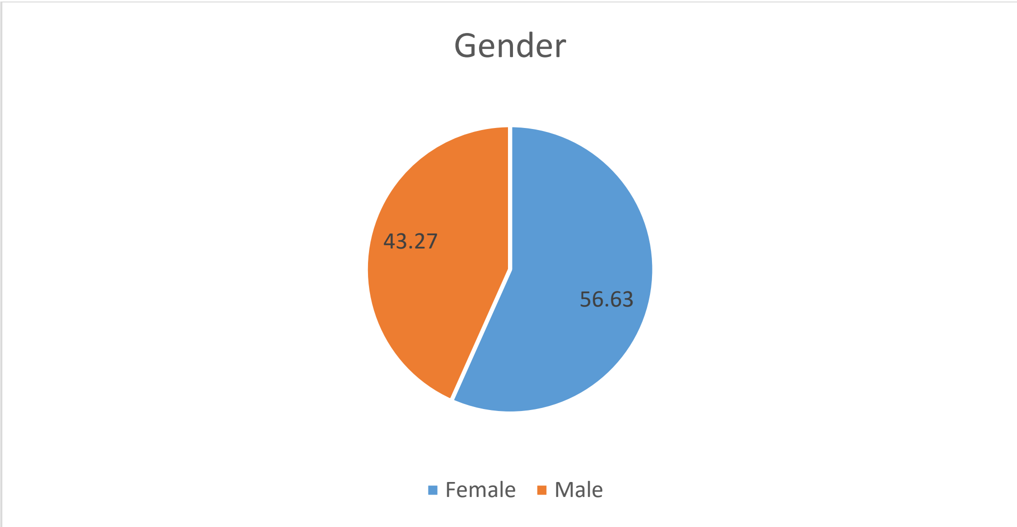


Figure 6.2: Students' gender

The largest number of students that responded were female, represented by 56.63% as opposed to male student participants at 43.97%.

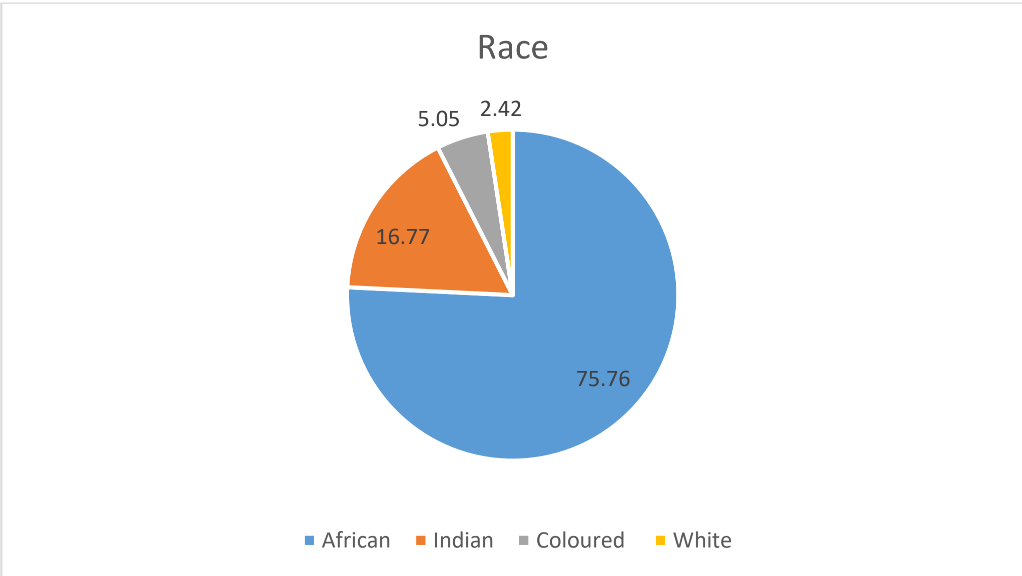


Figure 6.3: Students' race

Most participants were black (75.76%) followed by 16.77% Indian students.

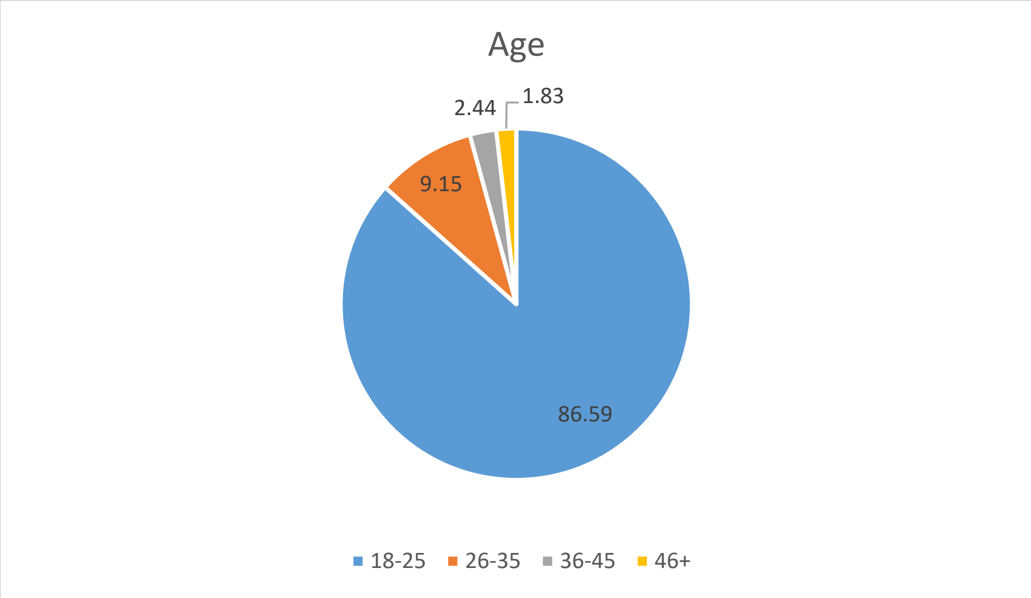


Figure 6.4: Students' age

The majority, 86.59% of the student participants were between the ages of 18 and 25, with 9.15% between the ages of 26 and 35. This indicates that the majority of the student participants were young adults.

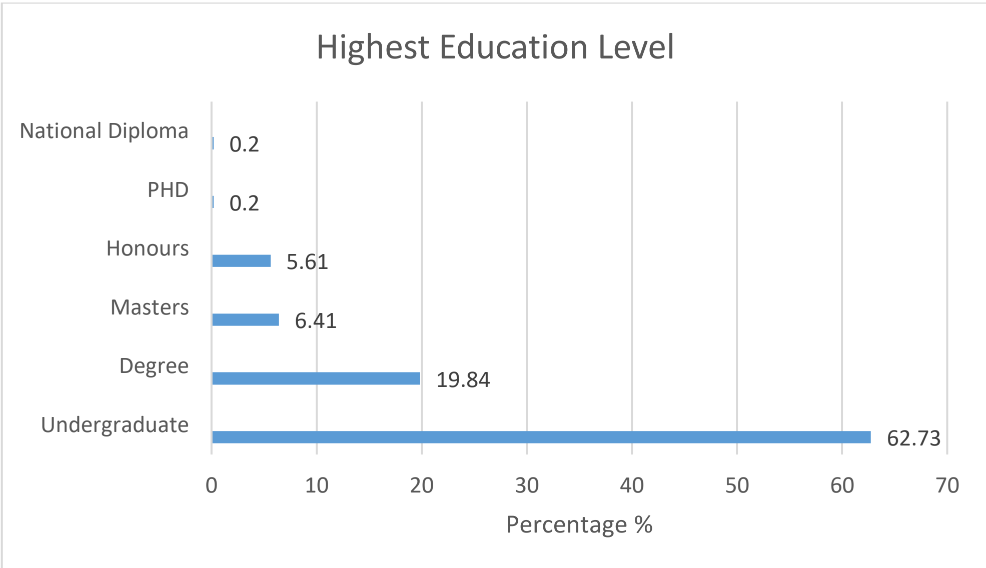


Figure 6.5: Students' highest level of education

A large percentage, 62.73%, were undergraduate students with only a matric qualification. 19.84% of the participants were post graduate students with a degree.

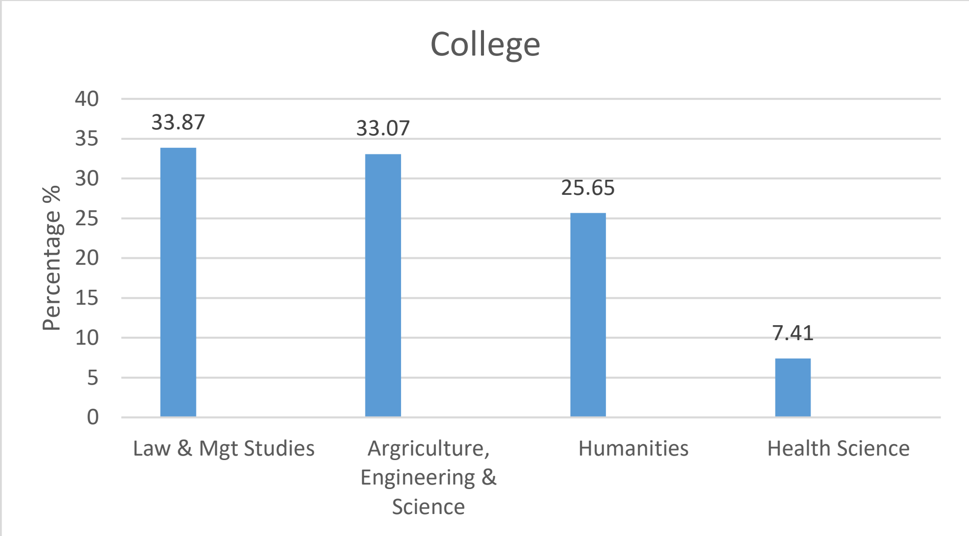


Figure 6.6: Students' college

With regard to the academic colleges in which the students are registered, the majority are part of the College of Law and Management Studies, 33.87%, which is not far off the 33.07% who were from the College of Agriculture, Engineering and Science.

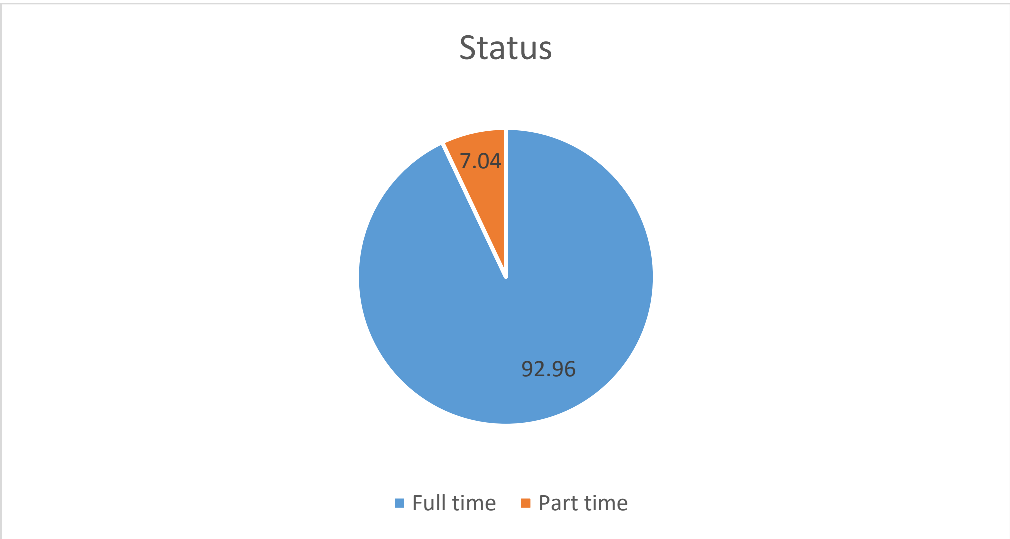


Figure 6.7: Students' enrolment status

Most of those who participated are full time students at 92.96% and this is mainly because the university offers more full time than part time courses. Only 7.04% were part time students.

6.2.2 Presentation of Results as Expressed by the Students

Table 6.1: IT infrastructure services data presentation (IS) – Students (%)

IS	Category/statements	SA	A	N	D	SD
IS1	The ICS division provides me with technology, advice and support services related to the MOODLE system.	29.30	43.85	18.24	5.53	3.07
IS2	**The ICS division provides me with a wide range of facilities to perform MOODLE activities, such as access to the library.**	**30.75**	**48.68**	12.83	5.09	2.65
IS3	The ICS division enables me to receive and exchange information and knowledge with lecturers and other students by using electronic linkages and software applications.	19.31	38.62	29.88	8.74	3.45
IS4	The ICS division provides me with data management advice and consultancy.	31.97	43.79	15.47	5.70	3.05
IS5	The ICS division provides me with a wide range of electronic channels, such as emails, websites and call centres to connect.	25.96	49.89	15.01	5.6	3.45
IS6	The ICS division provides me with MOODLE service with a high level of technical security.	30.83	46.04	16.63	3.24	3.24

Data collected from students revealed information pertaining to students' perceptions of the IT infrastructure at UZKN. Overall the results were positive, as most students (45.14%) agreed that the IT infrastructure is in place. The question that attracted the strongest agreement with regard to the IT infrastructure was "*The ICS division provides me with a wide range of facilities to perform MOODLE activities, such as access to the library",* where 79% of the students agreed and strongly agreed with the statement. However, 147 students were neutral in answer to the statement "The *ICS division enables me to receive and exchange information and knowledge with lecturers and other students by using electronic linkages and software applications",* with only 60 students disagreeing with the statement.

Table 6.2: System Quality (SQ) – Students (%)

SQ	Category	SA	A	N	D	SD
SQ1	I find the MOODLE system easy to use.	52.52	33.13	7.88	3.03	3.43
SQ2	**I find the MOODLE system easy to learn.**	**49.09**	**34.34**	9.89	3.83	2.83
SQ3	The data in the MOODLE system is integrated and consistent.	32.12	41.01	17.98	5.85	3.03
SQ4	The MOODLE system always does what it should.	29.06	38.41	21.14	8.94	2.43
SQ5	The MOODLE system requires only the minimum number of fields and screens to achieve a task.	22.15	41.46	26.42	7.72	2.23
SQ6	The MOODLE system meets my requirements.	30.95	43.99	15.07	6.51	3.46
SQ7	The MOODLE system includes all the necessary features and functions for my study.	31.92	39.79	16.36	8.08	3.83
SQ	**Mean/Average %**	**35.40**	**38.88**	**16.40**	**6.28**	**3.03**

The test of system quality revealed positive results and most students agreed that the system is of a good quality. One of the main reasons identified from the results that led to this conclusion of system quality, is that most students responded positively to "*I find the MOODLE system easy to use and I find the MOODLE system easy to learn*". Over 80% of the students responded positively to these statements. However, over 30% of the students answered between neutral and strong disagreement with the following two statements. "*The MOODLE system always does what it should"* and *"The MOODLE system requires only the minimum number of fields and screens to achieve a task*". This should not be taken lightly as it indicates that there is a group of students who are not satisfied with the system quality.

Table 6.3: Information Quality (IQ) – Students (%)

IQ	Category	SA	A	N	D	SD
IQ1	The MOODLE system provides me with the outputs I need.	24.94	49.49	16.83	5.47	3.24
IQ2	**The information from the MOODLE system is easy to understand.**	**40.77**	**41.78**	11.97	4.05	1.42
IQ3	The information I need from the MOODLE system is always available to me.	30.08	39.22	15.85	13.01	1.82
IQ4	Information from the MOODLE system is in a form that is readily usable.	33.67	46.53	12.65	4.89	2.24
IQ5	The information in the MOODLE system is concise.	26.48	45.79	19.92	6.16	1.64
IQ	**Mean/Average %**	**31.19**	**44.56**	**15.44**	**6.72**	**9.05**

The quality of information offered by the MOODLE system was rated as high by students, as an average of 75% of the students agreed. The statements that were rated highly by the students were, "*The information from the MOODLE system is easy to understand" and "The information I need from the MOODLE system is always available to me*". A number of students did not concur with the statement that "*The information I need from the MOODLE system is always available to me*", as 151 students answered neither agree/nor disagree and strongly disagree.

Table 6.4: Service Delivery Quality (SDQ) – Students (%)

SDQ	Category	SA	A	N	D	SD
SDQ1	**I find MOODLE easy to navigate.**	**34.41**	**43.92**	13.76	5.46	2.43
SDQ2	**I am able to complete tasks quickly with MOODLE.**	**30.91**	**42.42**	17.37	7.07	2.22
SDQ3	MOODLE is well organised.	33.73	40.61	13.73	8.89	3.03
SDQ4	MOODLE loads its pages fast.	23.17	37.80	22.96	12.39	3.66
SDQ5	MOODLE is always available when I have to complete and perform learning activities.	23.69	44.57	16.26	12.05	3.41
SDQ6	MOODLE does not crash frequently.	25.20	41.26	22.36	7.72	3.45
SDQ7	MOODLE makes lectures, materials and feedback available within a suitable time frame.	21.50	48.88	16.83	10.14	2.63
SDQ8	With MOODLE I get feedback about my queries quickly.	16.05	33.53	33.94	12.39	4.07
SDQ9	I feel my information as a student is protected on MOODLE.	20.81	39.79	25.65	10.50	3.23
SDQ10	MOODLE is convenient for me to change a curriculum.	16.26	35.64	31.36	10.59	6.11
SDQ11	MOODLE allows me to engage in online discussions with other students.	16.63	35.94	35.94	11.76	4.66
SDQ12	MOODLE allows me to discuss issues with my lecturers.	16.63	35.94	35.94	11.76	4.66
SDQ13	MOODLE assists me with administrative challenges such as unmarked assignments and the way forward.	13.72	31.97	32.99	13.11	8.19
SDQ	**Mean/Average %**	**22.54**	**39.13**	**24.28**	**10.36**	**4.05**

The majority of the students rated service delivery quality highly, as they agreed and strongly agreed with most statements. What was most attractive to students with regard to system delivery quality was reflected in the following statements. “*I find MOODLE easy to navigate”, “I am able to complete tasks quickly with MOODLE”* and

"MOODLE is well organised". There were high percentages (over 70%) of students who strongly agreed and agreed. There were a number of concerning statements where more than 40% of the students were neutral and in disagreement and strong disagreement and these statements were: "*MOODLE makes lectures, materials and feedback available within a suitable time frame", "I feel my information as a student is protected on MOODLE", "MOODLE is convenient for me to change a curriculum", "MOODLE allows me to engage in online discussions with other students", "MOODLE allows me to discuss issues with my lecturers", "MOODLE assists me with administrative challenges, such as unmarked assignments and the way forward*".

Table 6.5: Perceived Usefulness (PU) – Students (%)

PU	Category	SA	A	N	D	SD
PU1	**Using the MOODLE system makes it easier for me to do my studies.**	**35.03**	**44.60**	11.81	6.11	2.44
PU2	MOODLE improves my study performance.	24.95	41.85	22.88	7.01	3.29
PU3	**The MOODLE system is useful to me in my studies.**	**31.27**	**47.94**	12.34	5.14	3.29
PU4	MOODLE helps me to accomplish my tasks more quickly.	27.22	42.68	20.62	6.59	2.88
PU	**Mean/Average %**	**29.61**	**44.26**	**16.91**	**6.21**	**2.98**

The perceived usefulness of MOODLE by students was more favourable with the statements "*Using the MOODLE system makes it easier for me to do my studies"* and "*The MOODLE system is useful to me in my studies*", where over 70% of the students strongly agreed and agreed with the statements. The only two worrying statements to which attention needs to be paid are "*MOODLE improves my study performance"* and *"MOODLE helps me to accomplish my tasks more quickly",* as approximately 30% of the students were not in agreement with these statements, including students who were neutral with regard to the statements.

Table 6.6: User Satisfaction (US) – Students (%)

US	Category	SA	A	N	D	SD
US1	**If I had to choose between doing my studies online and face-to-face, I would choose online.**	**25.71**	**27.53**	18.42	15.79	12.55
US2	**I am satisfied with my decision to study at a university that is using MOODLE.**	**34.41**	**43.93**	13.96	5.06	2.63
US3	**I am satisfied with the performance of the MOODLE system.**	**27.73**	**48.78**	12.75	7.49	3.23
US	**Mean/Average %**	**29.28**	**40.08**	**15.04**	**9.45**	**6.13**

Students seem to be happy with the MOODLE system, as over 70% of the students responded positively to all the statements that follow: "*If I had to choose between doing my studies online and face-to-face, I would choose online", "I am satisfied with my decision to study at a university that is using MOODLE"* and *"I am satisfied with the performance of the MOODLE system*". What is critical to note is that more than 40% of the students were neutral, strongly disagreed and disagreed with the statement "*If I had to choose between doing my studies online and face-to-face, I would choose online*".

Table 6.7: Customer Value (CV) – Students (%)

CV	Category	SA	A	N	D	SD
CV1	I believe that with MOODLE I have received value for money.	16.46	39.63	27.64	10.59	5.69
CV2	MOODLE has assisted me to gain an understanding of concepts and principles in my study area that I do not believe I would have gained without MOODLE.	21.41	39.19	25.45	8.08	5.85
CV3	**Overall, MOODLE is simplifying my life.**	**29.41**	**44.01**	18.05	4.25	4.25
CV	**Mean/Average %**	**22.42**	**40.94**	**23.71**	**7.64**	**5.26**

Students had to respond to questions pertaining to the value MOODLE adds for them as stakeholders in the university. The response was reasonably positive, as over 60% of the students responded positively. On the one hand the statement "*Overall, MOODLE is simplifying my life*" stood out, as approximately 70% of the students agreed with the statement. There was however a negative response to customer value, as over 30% of the students were neutral, disagreed and strongly disagreed. The main statements about which most students were neutral, included "*I believe that with MOODLE I have received value for money"* and *"MOODLE has assisted me to gain an understanding of concepts and principles in my study area that I do not believe I would have gained without MOODLE*".

6.2.3 Measure of Validity and Reliability - Students

Validity was tested using exploratory factor analysis (EFA), which is a statistical tool that was used to uncover the underlying structure of a relatively large set of variables. This measure resulted in the rotated factor matrix presented in Table 6.8.

Table 6.8: Rotated factor matrix - students

Variable	Factor Loadings (Varimax raw) (Copy of Data) Extraction: Principal components (Marked loadings are >.400000)						
	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**	**Factor 6**	**Factor 7**
SDQa SDQ5	**0.715281**	0.200046	0.109995	0.165292	0.228610	0.214489	0.197605
SDQ6	**0.679202**	0.196648	0.103524	0.266791	0.222634	0.069818	0.080224
SDQ4	**0.644673**	0.130236	0.068430	0.088600	0.268168	0.291694	0.117276
SDQ3	**0.597226**	0.069510	0.030503	0.245133	0.378058	0.358021	0.078249
SDQ7	**0.594587**	0.360391	0.154636	0.213148	0.236777	0.036940	0.087241
SDQ2	**0.563678**	0.034489	0.074393	0.260281	0.366015	0.330138	0.055788
SDQb SDQ12	-0.008521	**0.778501**	0.127193	0.234161	0.147422	0.197274	0.075856
SDQ13	0.017213	**0.777098**	0.125490	0.169362	0.082774	0.198113	0.111365
SDQ11	0.076246	**0.776079**	0.082716	0.153975	0.129975	0.155985	0.068013
SDQ10	0.330141	**0.714519**	0.143510	0.121705	0.017199	-0.028080	0.083329
IS2	0.043693	0.042527	**0.785401**	0.100684	0.151167	0.177518	0.181086

Variable	Factor Loadings (Varimax raw) (Copy of Data) Extraction: Principal components (Marked loadings are >.400000)						
	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**	**Factor 6**	**Factor 7**
IS3	0.074392	0.144971	**0.752666**	0.131667	0.131389	0.237861	-0.022928
IS1	0.015186	0.075249	**0.740649**	0.096792	0.135043	0.189263	0.171450
IS4	0.028369	0.253397	**0.733111**	-0.047360	0.076001	0.067178	0.162501
IS5	0.144025	0.089525	**0.698608**	0.217925	0.255198	0.033471	-0.100283
IS6	0.232206	0.141096	**0.636241**	0.178125	0.338402	-0.019434	-0.003621
PU1	0.127888	0.268110	0.115400	**0.768569**	0.224552	0.135411	0.101282
PU3	0.231282	0.144166	0.104170	**0.766640**	0.248531	0.188801	0.130971
PU2	0.165571	0.308141	0.130790	**0.728069**	0.172204	0.154927	0.184631
PU4	0.162866	0.234886	0.066031	**0.715776**	0.231934	0.165594	0.246689
SQ2	0.206414	-0.017619	0.165456	0.358326	**0.751629**	0.135456	0.030031
SQ1	0.191998	-0.051774	0.203378	0.337036	**0.742367**	0.125561	0.052676
SQ3	0.158429	0.220112	0.184366	0.082889	**0.739170**	0.146305	0.120675
SQ6	0.249480	0.171814	0.116948	0.241463	**0.725958**	0.155328	0.174820
SQ4	0.213087	0.203750	0.159618	0.098340	**0.721504**	0.243930	0.110475
SQ5	0.062012	0.242335	0.181792	0.064624	**0.679755**	0.130651	0.150250
SQ7	0.267518	0.218350	0.142503	0.216620	**0.601467**	0.144245	0.103680
IQ1	0.255673	0.217077	0.213823	0.267318	**0.520048**	0.275847	0.138572
1Q4	0.236715	0.130773	0.210812	0.288881	0.264246	**0.723976**	0.084735
IQ3	0.172473	0.325311	0.219225	0.093199	0.193561	**0.667594**	0.210183
IQ2	0.166491	0.096389	0.270829	0.345529	0.309821	**0.619650**	0.092297
IQ5	0.289844	0.292912	0.212640	0.202392	0.291709	**0.606527**	0.078778
CV1	0.188585	0.222545	0.092510	0.175907	0.198324	0.132235	**0.685994**
CV2	0.079950	0.172683	0.101050	0.383089	0.186953	0.081699	**0.658502**
US1	-0.002341	0.201982	0.117384	0.160398	-0.076760	0.071042	**0.630055**
Expl.Var	4.174837	4.252406	3.972466	4.506640	5.677507	2.922793	2.529035
Prp.Totl	0.101825	0.103717	0.096889	0.109918	0.138476	0.071288	0.061684

Table 6.9: Student variable description

Variable	Description
IS	Infrastructure Services
SQ	System Quality
IQ	Information Quality
SDQa (SR)	System Reliability
SDQb (SDQ)	Service Delivery Quality
PU	Perceived Usefulness
CV & US1 (CV)	Customer Value

Service delivery quality was divided into two, SDQa and SDQb. SDQa includes the items: *"I am able to complete tasks quickly with MOODLE", "MOODLE is well organised", "MOODLE loads its pages fast", "MOODLE is always available when I have to complete and perform learning activities", "MOODLE does not crash frequently"* and *"MOODLE makes lectures, materials and feedback available within a suitable time frame"*. These items are based more on the reliability of the system, which is why the researcher renamed this group as variable system reliability (SR). SDQb includes the items: *"MOODLE is convenient for me to change a curriculum", "MOODLE allows me to engage in online discussions with other students", "MOODLE allows me to discuss issues with my lecturers"* and *"MOODLE assists me with administrative challenges, such as unmarked assignments and the way forward".* These items pertain to service delivery quality (SDQ) and remained as SDQ.

The test for validity was positive. The use of exploratory factor analysis to test validity did however, lead to the rotated factor analysis by establishing the relationships between the measured variables. The service delivery quality (SDQ) variable was divided into two parts, SDQa (SR) (SDQ2, 3, 4, 5, 6 and 7) and SDQb (SDQ) (SDQ10, 11, 12 and 13), as represented in Table 6.9 above. Information quality responses IQ1 (*The MOODLE systems provides me with the outputs I need*), was grouped with all other system quality (SQ) variables and customer value CV1 and CV2 responses were grouped with user satisfaction response US1 (*If I had to choose between doing my studies online and face-to-face, I would choose online*). The results led to the separation of service delivery variable (SDQ) into two variables, SR and SDQ. A number of the items (SDQ 1, 9 and 8) were deleted because their factor loading was below the cut-off value of 0.5. Items US2 and 3 and CV3 were also eliminated because their factor loading was below the cut-off value of 0.5 and the responses suggest that customer value and user satisfaction are viewed in the same way. The respondents made no distinction between the two.

Cronbach's alpha was used to test the internal consistency and reliability of each of the factors reported in Table 6.8. Cronbach's alpha is a tool that is used to measure internal consistency to indicate how closely related the items in a group are. Pallant (2011) indicated that having a Cronbach's alpha value of 0.7 or higher implies that there is an acceptable level of internal consistency and reliability. Pallant also holds that it is common to find Cronbach's alpha values below 0.7, where the variables consist of items that are less than 10. This has led to accepting Cronbach's alpha coefficients from 0.6. This measure was performed to ascertain reliability. The results are revealed in Table 6.10.

Table 6.10: Cronbach's alpha measure of reliability results - students

Variable	Cronbach's Alpha
IS	0.87495
SQ	0.92216
IQ	0.87098
SR	0.87777
SDQ	0.86297
PU	0.90119
CV	0.66267

According to Gliem and Gliem (2003), if the Cronbach's alpha coefficient is closer to 1.0, it means there is greater internal consistency of the items in the scale. The students' results revealed a Cronbach's alpha that is closer to 1.0, meaning that there is greater consistency of the items in the scale.

6.2.4 COMPARISON OF RESULTS BASED ON SELECTED DEMOGRAPHIC DATA (Students)

The researcher conducted MANOVA, ANOVA and Tukey post hoc tests to determine if there were differences in the responses based on gender, race, age, highest level of education and college. The results of these tests are revealed in the tables that follow.

Table 6.11: ANOVA test results based on students' gender

Analysis of Variance Marked effects are significant at p < .05000		
Variable	**F**	**p**
System Reliability	0.103151	0.748220
Service Delivery Quality	0.184645	0.667604
Infrastructure Services	1.125415	0.289287
Perceived Usefulness	0.224287	0.636007
System Quality	0.711574	0.399340
Information Quality	0.362482	0.547414
Customer Value	0.289978	0.590483

The ANOVA test that was conducted revealed that there was no statistically significant difference ($p < .05$) based on gender for all variables.

Table 6.12: ANOVA test results based on students' race

Analysis of Variance Marked effects are significant at p < .05000		
Variable	**F**	**p**
System Reliability	0.984779	0.399664
Service Delivery Quality	**2.651135**	**0.048209**
Infrastructure Services	1.137888	0.333285
Perceived Usefulness	0.916844	0.432550
System Quality	1.852062	0.136864
Information Quality	0.878845	0.451902
Customer Value	0.253579	0.858788

The MANOVA test results revealed that there was no statistically significant difference based on race for most of the variables. The participants only differed with regard to service delivery quality, where there was a statistically significant difference of $p = 0.048$.

Post hoc tests (Tukey HSD) were conducted to determine the practical significance of the results obtained through the ANOVA. The Tukey HSD test results for significant difference due to race with regard to service delivery is represented in Table 6.13.

Table 6.13: Mean score and standard deviation (SD) in service delivery quality (Students' Race)

Race	No	Mean	SD
Black	365	2.529680	0.890975
Indian	81	2.814815	0.821689
Coloured	11	2.871212	1.464565
White	24	2.510417	0.959730
Total	481	2.584546	0.903735

Table 6.14: Tukey HSD – students' race with regard to service delivery quality results

Tukey HSD – Students' Service Delivery Quality Results **Marked differences are significant at p < .05000**				
R	**{1}** **M=2.5297**	**{2}** **M=2.8148**	**{3}** **M=2.8712**	**{4}** **M=2.5104**
1 {1} Black		**0.048306**	0.600502	0.999624
2 {2} Indian	**0.048306**		0.997367	0.463906
3 {3} Coloured	0.600502	0.997367		0.688247
4 {4} White	0.999624	0.463906	0.688247	

There is only a statistically significant difference where p = 0.048 between the responses of black (mean = 2.52) and Indian students (mean = 2.81). Looking at the mean scores, it is evident that Indian student participants agreed more on issues of service delivery quality than did black student participants.

Table 6.15: ANOVA test results based on students' age group

Analysis of Variance **Marked effects are significant at p < .05000**		
Variable	**F**	**p**
System Reliability	0.360312	0.781701
Service Delivery Quality	0.587941	0.623150
Infrastructure Services	**3.820083**	**0.010041**
Perceived Usefulness	2.417587	0.065628
Service Quality	1.627757	0.182074
Information Quality	0.686667	0.560516
Customer Value	1.543203	0.202512

The MANOVA test results revealed that there was no statistically significant difference based on age for most of the variables. The participants only differed with regard to infrastructure services, where there was a statistically significant difference of p = 0.01.

Post hoc tests (Tukey HSD) were conducted to determine the practical significance of the results obtained by means of the ANOVA. The Turkey HSD test was not powerful enough to determine the paired difference in data.

Table 6.16: Mean score and standard deviation (SD) - infrastructure services (Students' age)

Age	No	Mean	SD
18-25	414	2.077617	0.747902
26-35	44	2.056818	0.773080
36-45	12	2.638889	1.072694
46+	9	2.666667	0.924211
Total	479	2.100835	0.769269

Table 6.17: ANOVA test results based on students' highest level of education

Analysis of Variance **Marked effects are significant at p < .05000**		
Variable	**F**	**p**
System Reliability	1.379360	0.202982
Service Delivery Quality	1.434977	0.179285
Infrastructure Services	**2.526470**	**0.010649**
Perceived Usefulness	1.748700	0.085096
System Quality	1.465680	0.167221
Information Quality	1.858457	0.064570
Customer Value	1.588625	0.125571

The MANOVA test results revealed that there was no statistically significant difference based on the highest level of education for most of the variables. The participants only differed with regard to infrastructure services, where there was a statistically significant difference of $p = 0.01$.

Post hoc tests (Tukey HSD) were conducted to determine the practical significance of the results obtained through the ANOVA. The Turkey HSD test results for a significant difference of highest level of education with regard to service delivery is represented in Table 6.18.

Table 6.18: Mean score and standard deviation (SD) - infrastructure services (Students' highest level of education)

Highest Level of Education	No	Mean	SD
No Matric	3	2.611111	1.387777
Matric	307	2.042780	0.687323
Diploma	1	1.833333	
Degree	14	1.476190	0.633324
Post Graduate Degree	1	2.666667	
Honours Degree	99	2.229630	0.839175
Master's Degree	26	2.338462	0.928688
Doctorate/PhD	32	2.248958	0.963044
Total	485	2.099588	0.766741

Table 6.19: Tukey HSD – Students' highest level of education infrastructure service results

Tukey HSD – Students' Infrastructure Services Results Marked Differences are significant at p < .05000								
R	**{1} M=2.5297**	**{2} M=2.8148**	**{3}**	**{4} M=2.8712**	**{5}**	**{6}**	**{7}**	**{8} M=2.5104**
{1} No Matric		0.539118	0.810646	0.993804	0.631837	0.535700	0.864550	0.791095
{2} Matric	0.539118		0.527464	0.198847	0.844116	0.954167	0.216999	**0.005635**
{3} Diploma	0.810646	0.527464		0.785586	0.557344	0.524552	0.708748	0.908496
{4} Degree	0.993804	0.198847	0.785586		0.596307	0.210193	0.765048	0.606899
{5} Post Graduate Degree	0.631837	0.844116	0.557344	0.596307		0.849814	0.659305	0.482549
{6} Honours Degree	0.535700	0.954167	0.524552	0.210193	0.849814		0.240208	**0.010380**
{7} Master's Degree	0.864550	0.216999	0.708748	0.765048	0.659305	0.240208		0.317685
{8} Doctorate/PHD	0.791095	**0.005635**	0.908496	0.606899	0.482549	**0.010380**	0.317685	

There is a statistically significant difference where p = 0.010 between the responses of participants with an Honours Degree (mean = 2.22) and participants with a Doctorate/PhD (mean = 2.24), as well as a statistically significant difference of p = 0.005 between the responses of participants with matric (mean = 2.04) and participants with a Doctorate/PhD (mean = 2.24). Looking at the mean scores, it is evident that Doctorate/PhD student participants agreed more on issues pertaining to infrastructure services.

Table 6.20: ANOVA test results based on students' college

Analysis of Variance Marked effects are significant at p < .05000		
Variable	**F**	**p**
System Reliability	0.548265	0.649523
Service Delivery Quality	**3.578418**	**0.013916**
Infrastructure Services	1.126826	0.337726
Perceived Usefulness	0.280994	0.839128
System Quality	0.018223	0.996651
Information Quality	2.009789	0.111702
Customer Value	2.434149	0.064197

The MANOVA test results revealed that there was no statistically significant difference based on college for most of the variables. The participants only differed with regard to service delivery quality, where there was a statistically significant difference of $p = 0.013$.

Post hoc tests (Tukey HSD) were conducted to determine the practical significance of the results obtained by means of the ANOVA. The Turkey HSD test was not powerful enough to determine the paired difference in data.

Table 6.21: Mean score and standard deviation (SD) - service delivery quality (Students' college)

College	No	Mean	SD
College of Agriculture, Engineering and Science	160	2.558854	0.941678
College of Health Sciences	33	2.901515	1.107396
College of Humanities	126	2.406085	0.856931
College of Law and Management Studies	166	2.668675	0.828519
Total	485	2.580069	0.902122

6.2.5 Correlation Matrix - Students

There were a number of correlations of the variables from the students' results. These are presented in Table 6.22.

Table 6.22: Student correlation matrix

Variable	Correlations (Copy of Data) Marked correlations are significant at p < .05000 N=486 (Case wise deletion of missing data)						
	SR	**SDQ**	**IS**	**PU**	**SQ**	**IQ**	**CV**
SR	1.000000						
SDQ	**0.452939**	1.000000					
IS	**0.399187**	**0.386412**	1.000000				
PU	**0.594594**	**0.493397**	**0.378078**	1.000000			
SQ	**0.701679**	**0.401549**	**0.538838**	**0.623590**	1.000000		
IQ	**0.663803**	**0.476765**	**0.516720**	**0.561009**	**0.647321**	1.000000	
CV	**0.397576**	**0.442739**	**0.360727**	**0.556919**	**0.415482**	**0.420780**	1.000000

There is linear relationship between IQ and SR, where r = 0.66; SQ and SR, where r = 0.70; SQ and PU, where r = 0.62 and IQ and SQ, where r = 0.64. The results are at a confidence interval of 0.95. The variables that have the strongest correlation, where r = 0.70, is the relationship between SR and SQ. The results of the correlation between SR and SQ are depicted in the graph in Figure 6.9.

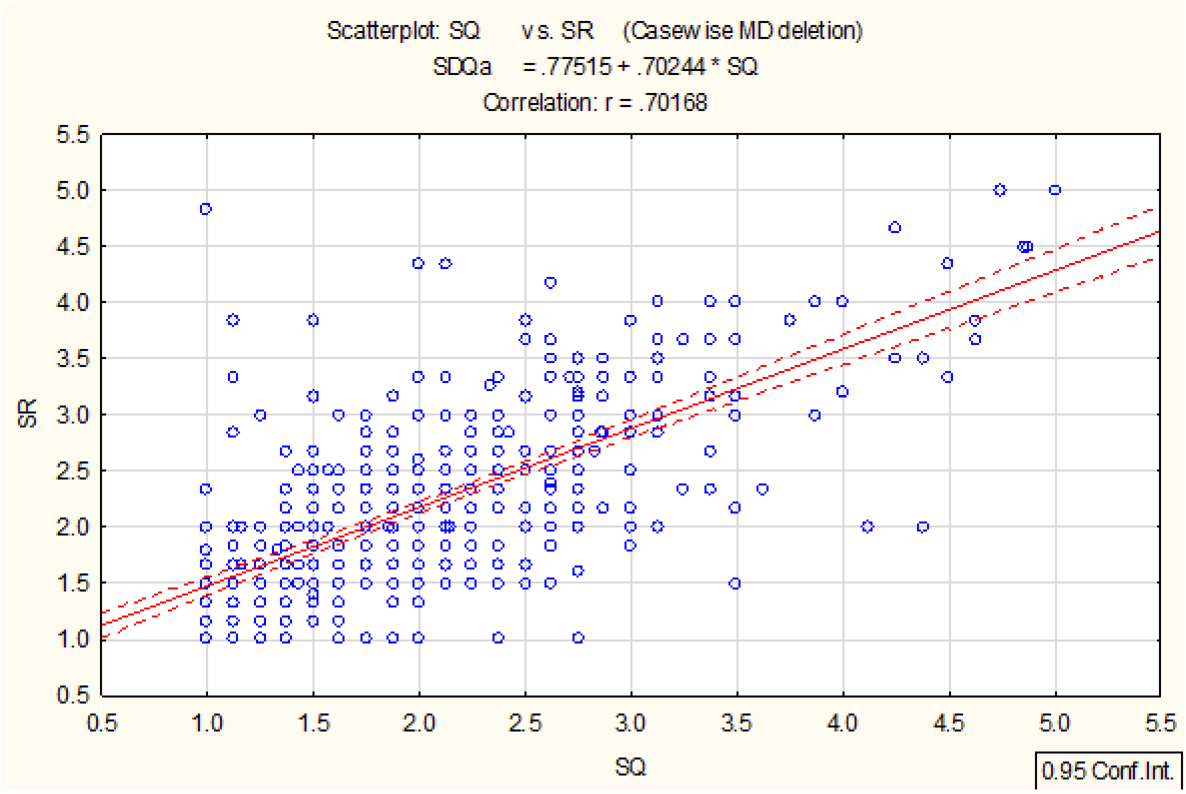


Figure 6.8: Student correlation matrix graph (SQ and SR)

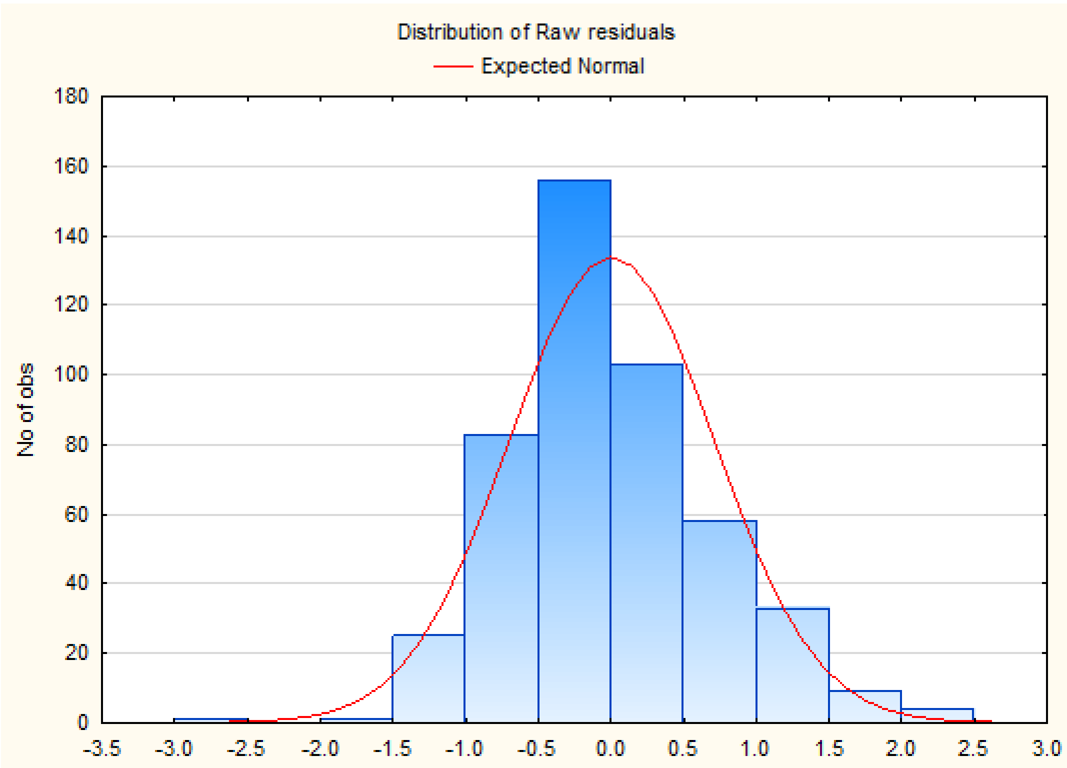


Figure 6.9: Test for normality (students)

Figure 6.9 above represents the normality test for the students' sample. It is evident from the graph that the sample was drawn from a normally distributed population.

6.2.6 Multiple Regression Analysis (Students)

Multiple regression analysis was conducted to determine which of the independent variables predicts customer value, which is a dependent variable. Multiple regression analysis was suitable for this study as it allowed for a simultaneous investigation to determine how well a set of variables can predict a certain outcome. Table 6.10 represents the regression summary for the dependent variable, customer value, and these results are based on the modified results as represented in the rotated factor matrix (Table 6.8).

Table 6.23: Regression analysis for dependent variable CV – students (N=473)

	Regression Summary for Dependent Variable: CV (Copy of Data.xlsx GRAPH) R = .60976925 R^2 = .37181853 Adjusted R^2 = .35543119 F(12,460) = 22.689 p < 0.0000 Std. Error of estimate: .72515					
	b*	**Std. Err.**	**b**	**Std. Err.**	**t(479)**	**p-value**
Intercept			**0.693637**	**0.219801**	**3.15575**	**0.001706**
Gender	-0.003885	0.037630	-0.007074	0.068515	-0.10325	0.917810
Race	-0.055477	0.037819	-0.066318	0.045209	-1.46692	0.143080
Age	-0.063287	0.051658	-0.100295	0.081866	-1.22511	0.221161
Education Level	0.066686	0.043151	0.027356	0.017702	1.54541	0.122936
College	-0.010309	0.039069	-0.007390	0.028008	-0.26387	0.791996
Enrolment Status	0.066933	0.047211	0.233808	0.164918	1.41772	0.156948
SR	-0.005274	0.058425	-0.005867	0.064998	-0.09027	0.928112
SDQ	**0.173808**	**0.045350**	**0.173472**	**0.045262**	**3.83262**	**0.000144**
IS	**0.106152**	**0.046813**	**0.124339**	**0.054833**	**2.26759**	**0.023817**
PU	**0.389875**	**0.052231**	**0.404575**	**0.054200**	**7.46443**	**0.000000**
SQ	0.012080	0.061197	0.013447	0.068124	0.19739	0.843609
IQ	0.059085	0.056312	0.064950	0.061902	1.04924	0.294618

The R = .60976925 value represents the correlation coefficient of how much the independent variables correlate with the dependent variables. The adjusted R^2 = .35543119 indicates how much variance in the dependent variable is accounted for and this shows that 35.5% of the variance in the dependent value is accounted for by the independent variables. This is an amount that is much lower than 0.05, meaning that the adjusted R^2 is significantly different from zero, so the model does predict customer value. This is represented in the F test that was performed, where $F(12,460) = 22.689$ $p < 0.0000$ Std. Error of estimate: .72515. b on the graph represents the unstandardised regression coefficient. The results imply that if all the variables are held constant, then for every one-unit increase in service delivery quality there will be a 0.17 increase in customer value; a one-unit increase in infrastructure services will result in a 0.12 increase in customer value and a one unit increase in perceived usefulness will result in a 0.40 increase in customer value.

Customer value is the dependent variable. Three variables revealed positive influences on the dependent variable. This is represented in Figure 6.10 below.

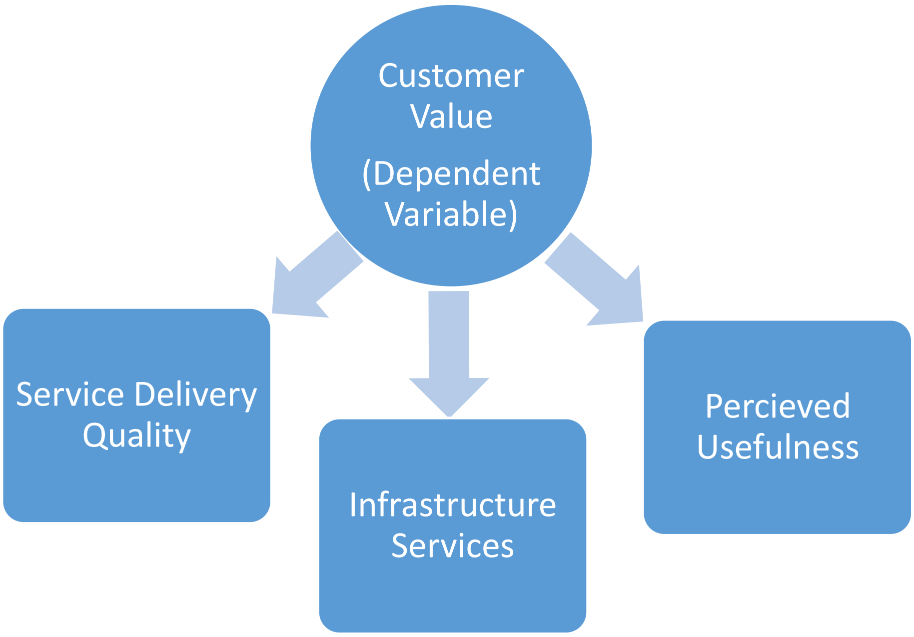


Figure 6.10: Regression Summary for Dependent Variable CV - Students

Figure 6.10 indicates that customer value is dependent on three variables, namely service delivery quality, infrastructure services and perceived usefulness.

6.3 THE QUANTITATIVE DATA PRESENTATION OF ACADEMICS' RESULTS

This section presents the quantitative data collected from the questionnaire distributed among academics.

6.3.1 Description of Academic Staff Participants' Demographic Profiles

The academic staff's demographic profile reveals the following information about the members who participated in the study.

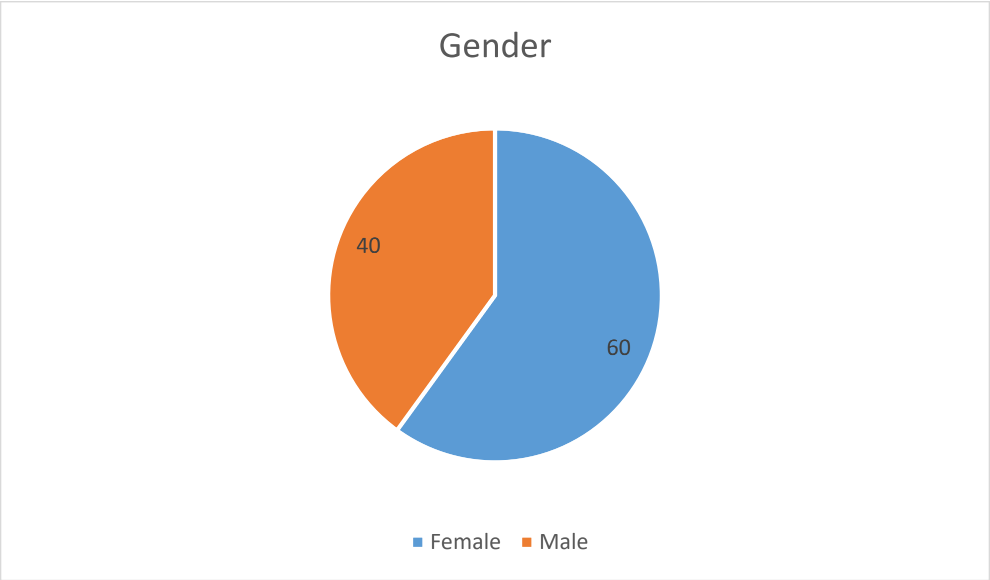


Figure 6.11: Academics' gender

There were more female academic staff participants at 60% of the total as opposed to 40% males.

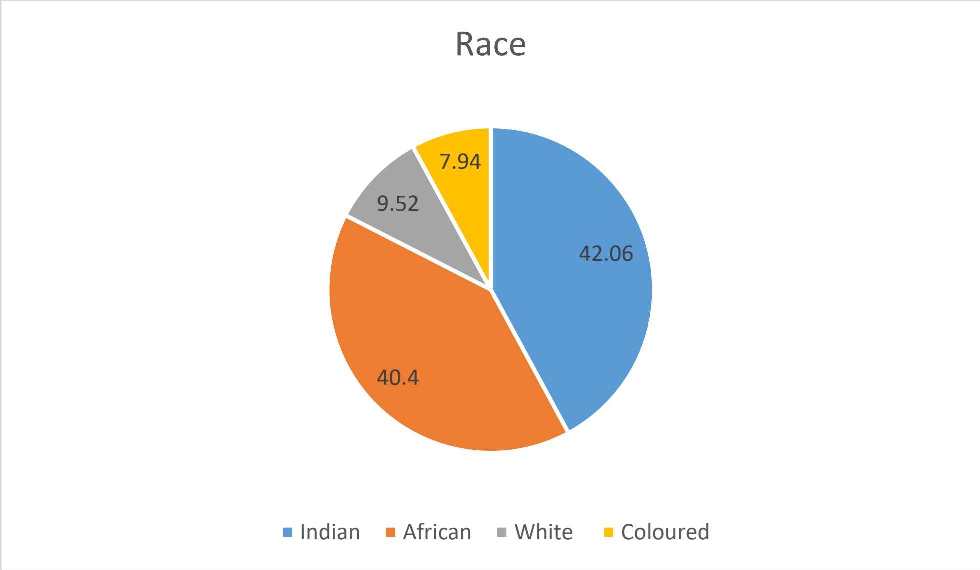


Figure 6.12: Academics' race

Indian academic staff participants accounted for 42.06%, followed by 40.48% black academic staff, then 9.52% white academic staff and lastly 7.94% coloured academic staff.

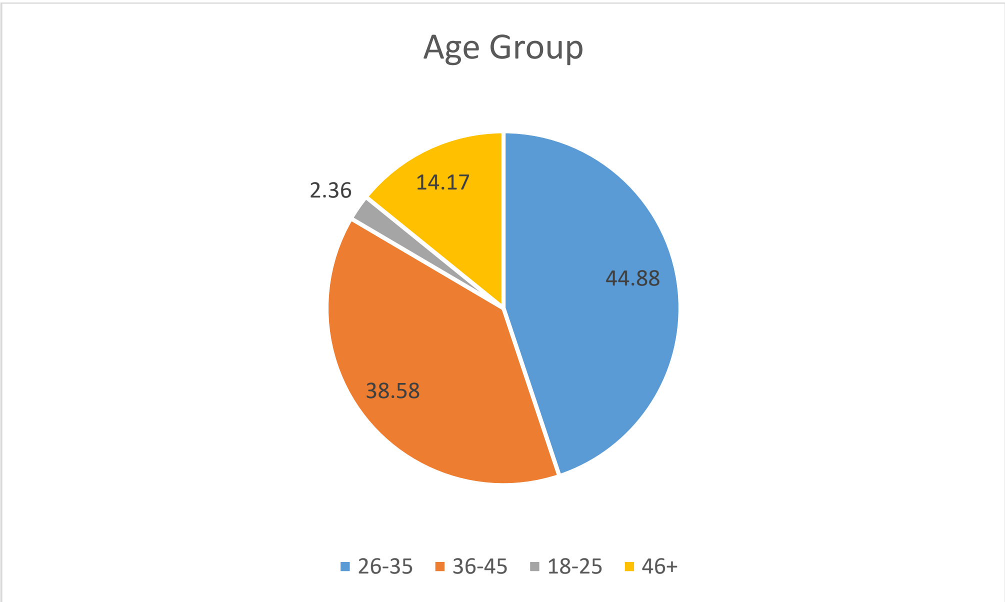


Figure 6.13: Academics' age groups

Many academic staff members were between the ages of 26 and 35 (44.88%). The second largest group was academics within the age range of 36 to 45 (38.58%), 14.17% of the academics were over the age of 46 and 2.36% of the academics were between the ages of 18 and 25.

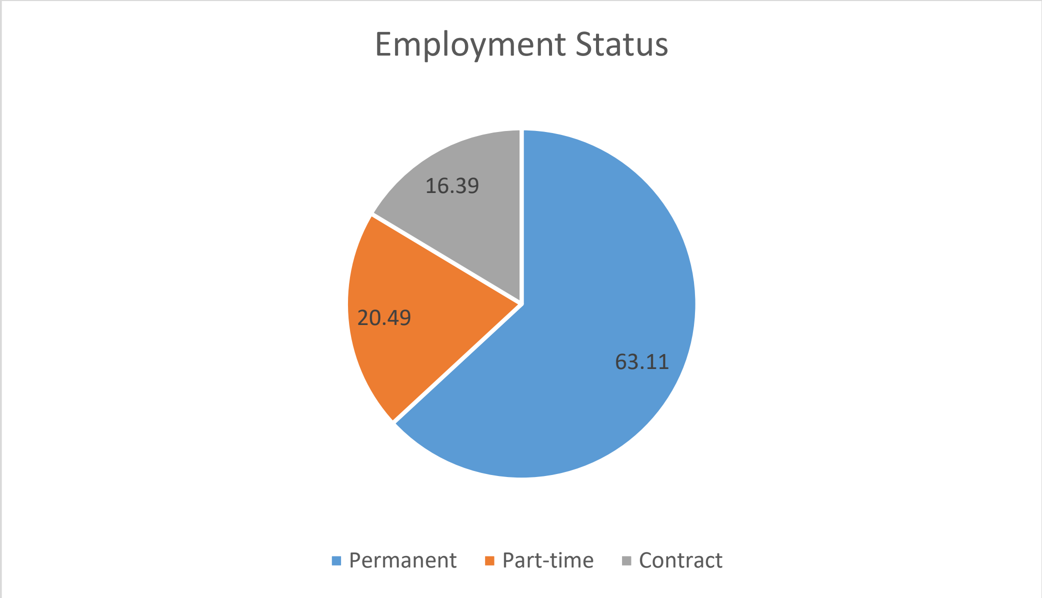


Figure 6.14: Academics' employment status

63.11% of the academics were permanently employed, 20.49% were part time employees and 16.39% were on contract.

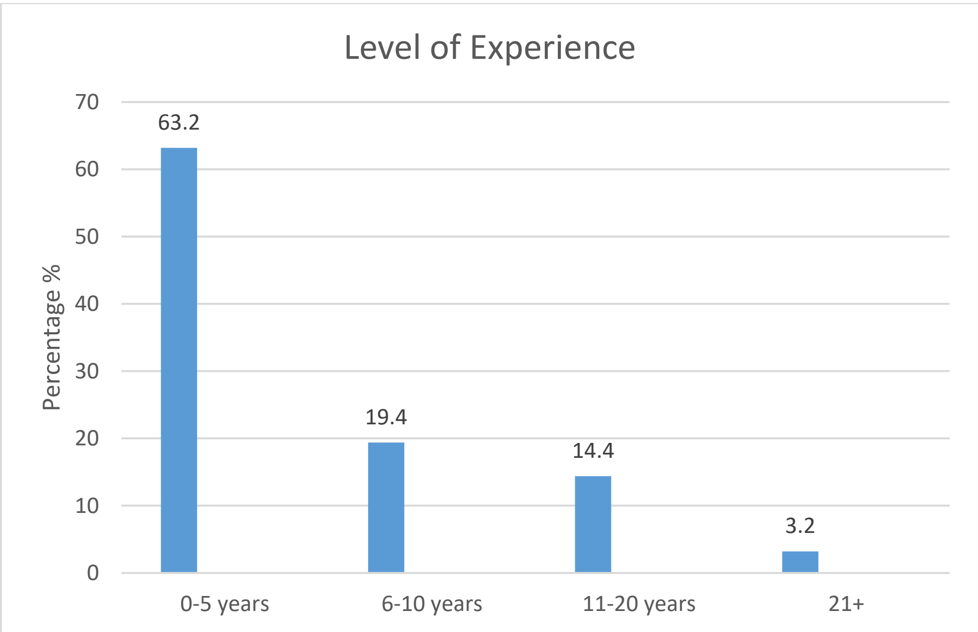


Figure 6.15: Academics' level of experience

With regard to the level of experience within the UKZN environment, a large percentage of employees had only been working there for 0 months to 5 years (63.20%). 19.40% of the academic staff members had been employed for a period of 6-10 years, 14.40% of the academics had been with UKZN for 11 to 20 years and

3.2% of the academic staff who participated in the study had been with the university for more than 20 years.

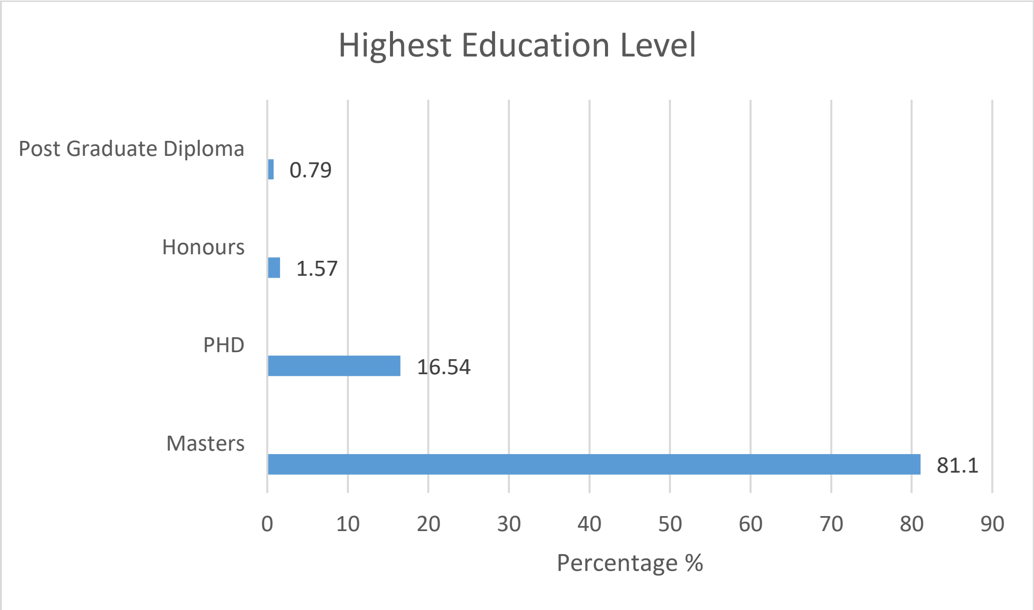


Figure 6.16: Academics' highest level of education

None of the academics had education qualifications at a level lower than matric, matric only, diploma or degree, as all the academics that participated had achieved post graduate qualifications. A substantial number (81.10%) of the academics had a master's degree; 16.54% held a Doctorate/PhD; 1.57% had an honours degree and 0.79% had a post graduate diploma.

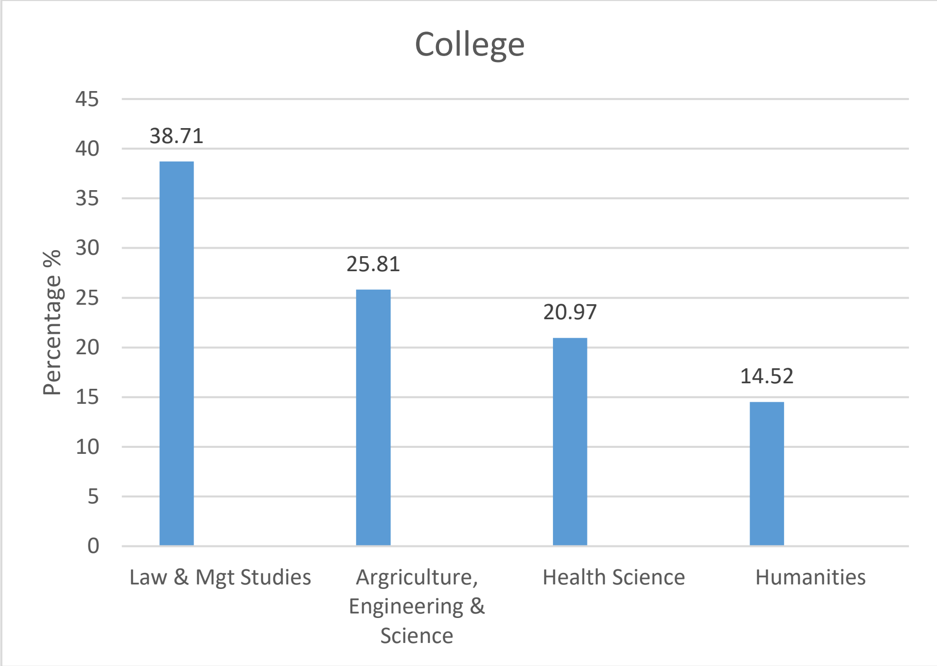


Figure 6.17: Academics' college

The best response of academics with regard to participation in this study was from the College of Law and Management Studies at 38.71%, followed by the College of Agriculture, Engineering and Science with 25.81%, the College of Health Sciences with 20.97% and lastly the College of Humanities with 14.52%.

6.3.2 Presentation of Academic Staff's Results

Table 6.24: IT Infrastructure services data presentation (IS) – academics (%)

IS	Category	SA	A	N	D	SD
IS1	**The ICS division provides me with technology, advice and support services related to the MOODLE system.**	**21.77**	**71.77**	4.03	2.42	0
IS2	**The ICS division provides me with a wide range of facilities to perform MOODLE activities.**	**16.13**	**72.58**	6.45	4.03	0.81
IS3	**The ICS division enables me to receive and exchange information and knowledge with other lecturers and students by using electronic linkages and software applications.**	**26.58**	**64.23**	5.69	4.06	2.43
IS4	The ICS division provides me with data management advice and consultancy.	19.67	64.75	7.37	6.55	1.64
IS5	The ICS division provides me with a wide range of electronic channels such as emails, websites and call centres to connect.	14.63	67.48	14.63	1.62	1.62
IS6	The ICS division provides me with MOODLE service with a high level of technical security.	16.13	65.32	16.93	0.81	0.81
IS	**Mean/Average %**	**19.15**	**67.69**	**9.18**	**3.25**	**1.22**

IT infrastructure was rated positively by academic staff, as over 80% agreed with the statements. The statements that had a high level of agreement were, "The *ICS division provides me with technology, advice and support services related to the MOODLE system", "The ICS division provides me with a wide range of facilities to perform MOODLE activities"* and *"The ICS division enables me to receive and exchange* *information and knowledge with other lecturers and students by using electronic linkages and software applications*”. There was a significantly low level of disagreement with IT infrastructure statements.

Table 6.25: System quality (SQ) – academics (%)

SQ	Category	SA	A	N	D	SD
SQ1	**I find the MOODLE system easy to use.**	**16.13**	**79.03**	3.22	0.81	0.81
SQ2	**I find the MOODLE system easy to learn.**	**21.95**	**70.73**	5.69	0.81	0.81
SQ3	**The data in the MOODLE system is integrated and consistent.**	**18.69**	**70.73**	8.13	1.62	0.81
SQ4	The MOODLE system always does what it should.	25.00	62.09	10.48	1.61	0.81
SQ5	The MOODLE system requires only the minimum number of fields and screens to achieve a task.	17.07	67.48	12.19	2.44	0.81
SQ6	The MOODLE system meets my requirements.	20.32	64.22	11.38	3.25	0.81
SQ7	The MOODLE system includes all the necessary features and functions for teaching.	10.74	71.90	12.39	4.13	0.81
SQ	**Mean/Average %**	**18.55**	**69.45**	**9.06**	**2.09**	**0.81**

The academics’ results revealed agreement with the statements that tested the system quality. Approximately 80% of the academics believe that the MOODLE system is of a high quality. The statements that stood out were, “*I find the MOODLE system easy to use”, “I find the MOODLE system easy to learn”* and *“The data in the MOODLE system is integrated and consistent*”. Academics seem to find MOODLE user friendly and to include all the features that they need as academics.

Table 6.26: Information quality (IQ) – academics (%)

IQ	Category	SA	A	N	D	SD
IQ1	**The MOODLE system provides me with information that is sufficient for my teaching needs.**	**18.54**	**70.96**	6.45	1.61	2.41
IQ2	The information from the MOODLE system is easy to understand.	22.13	68.03	6.55	2.45	0.82
IQ3	The essential information I need to set up my teaching in the MOODLE environment is available to me.	20.16	67.74	10.48	0.81	0.81
IQ4	Information from the MOODLE system is in a form that is readily usable.	21.31	65.57	10.65	1.63	0.82
IQ5	**The information in the MOODLE system is concise and sufficient for organising my course and teaching materials.**	**17.74**	**70.16**	8.87	2.41	0.81
IQ6	Information in the MOODLE system is well formatted.	17.74	66.93	9.67	4.83	0.81
IQ	**Mean/Average %**	**19.60**	**68.23**	**8.77**	**2.29**	**1.08**

The academics are satisfied with the information that is available in the MOODLE system. This can be concluded from the high percentage of academics who agreed with the statements regarding information quality. What was most favourable and had the highest percentage of those who agreed are the statements "*The MOODLE system provides me with information that is sufficient for my teaching needs"* and *"The information in the MOODLE system is concise and sufficient for organising my course and teaching materials*". Overall, the quality of MOODLE information was rated as good.

Table 6.27: Service delivery quality (SDQ) – academics (%)

SDQ	Category	SA	A	N	D	SD
SDQ1	**I find MOODLE easy to navigate.**	**15.45**	**78.05**	3.25	2.44	0.81
SDQ2	**MOODLE enables me to provide course information and knowledge for students.**	**21.31**	**69.67**	9.01	0	0
SDQ3	I can complete tasks quickly with MOODLE.	23.77	68.85	4.91	1.64	0.81
SDQ4	MOODLE is well organised.	26.01	61.78	8.13	3.25	0.81
SDQ5	MOODLE loads its pages fast.	25.41	63.11	8.19	2.46	0.81
SDQ6	MOODLE is always available for me to perform teaching activities.	24.19	66.13	6.45	1.61	1.61
SDQ7	MOODLE does not crash frequently.	17.65	68.06	10.92	2.52	0.84
SDQ8	**MOODLE enables me to deliver lectures, materials and feedback to students when promised.**	**20.96**	**70.16**	7.25	0.81	0.81
SDQ9	MOODLE enables me to deliver answers to students' queries quickly.	12.90	71.77	10.48	3.22	1.61
SDQ10	This site does not allow me to get full details of students' records.	15.00	67.50	15.83	0.83	0.83
SDQ11	MOODLE does not share the feedback of assignments of each student with other students.	13.82	69.10	14.63	1.62	0.81

SDQ	Category	SA	A	N	D	SD
SDQ12	MOODLE protects information related to personal details of students, including results.	16.26	68.29	11.38	2.44	1.62
SDQ13	MOODLE allows me to engage in online discussions with students.	16.93	66.93	14.52	0	1.61
SDQ14	MOODLE notifies me if students have received feedback.	10.00	74.16	15.00	0	0.83
SDQ15	MOODLE takes care of problems and students' enquiries promptly.	13.01	65.85	19.51	0.81	0.81
SDQ16	MOODLE allows me to discuss issues with my students.	9.01	78.68	9.01	0.81	2.45
SDQ	**Mean/Average %**	**17.60**	**69.28**	**9.06**	**1.44**	**1.00**

Academics are generally happy with the quality of MOODLE's service delivery. Most academics agreed with all the statements, thus rating the service delivery quality as high. The statements that most academics agreed with were "*I find MOODLE easy to navigate", "MOODLE enables me to provide course information and knowledge to students", "I am able to complete tasks quickly with MOODLE", "MOODLE, is always available for me to perform teaching activities"* and *"MOODLE enables me to deliver lectures, materials and feedback to students when promised*". Over 90% of the academics agreed with these statements.

Table 6.28: Perceived usefulness (PU) – academics (%)

PU	Category	SA	A	N	D	SD
PU1	**Using the MOODLE system makes it easier for me to do my job.**	**17.07**	**76.42**	5.69	0	0.81
PU2	MOODLE improves my job performance.	19.67	68.85	10.65	0	0.82
PU3	The MOODLE system is useful to me in my studies.	17.21	72.95	9.02	0	0.82
PU4	MOODLE allows me to accomplish my tasks more quickly.	12.50	77.50	8.33	8.33	0.83
PU	**Mean/Average %**	**16.61**	**73.93**	**8.42**	**2.08**	**0.82**

The results were positive with regard to the perceived usefulness of MOODLE. More than 80% of the academics agreed with the statements and the most favourable was "*Using the MOODLE system makes it easier for me to do my job*". The level of disagreement was low.

Table 6.29: User satisfaction (US) – academics (%)

US	Category	SA	A	N	D	SD
US1	I prefer e-learning as opposed to teaching face-to-face.	18.5	68.54	6.45	4.03	2.42
US2	**Based on my experience with the MOODLE system, I am satisfied with using the system.**	**21.77**	**66.93**	8.06	0.81	2.42
US3	**I am satisfied with the performance of the MOODLE system.**	**16.13**	**70.16**	10.48	1.61	1.61
US4	I feel that MOODLE serves my needs well.	13.55	72.88	9.32	2.54	1.69
US	**Mean/Average %**	**17.49**	**69.62**	**8.57**	**2.25**	**2.03**

Numerous academics were positive about the user satisfaction statements, as the results revealed a high level of agreement with the statements. "*Based on my experience with the MOODLE system, I am satisfied with using the system*", had the highest percentage of agreement, over 85%. Most academics seem to be satisfied with the MOODLE system. However, a handful of academics felt differently, as they were either neutral or disagreed and strongly disagreed.

Table 6.30: Organisational value (OV) – academics (%)

OV	Category	SA	A	N	D	SD
OV1	**The MOODLE system enables UKZN to respond quickly to change and to develop teaching and learning techniques.**	**17.74**	**72.58**	8.06	0	1.61
OV2	The MOODLE system establishes and maintains a good image and reputation for UKZN.	20.96	65.32	8.87	1.61	3.22
OV3	The MOODLE system is aligned with the UKZN organisational goals.	18.69	64.23	13.82	1.62	1.62
OV4	With MOODLE it is easier for UKZN to respond rapidly to change.	12.09	69.35	16.12	0.81	1.61
OV5	The MOODLE system is cost effective.	11.38	71.54	16.25	0	0.81
OV6	The MOODLE system makes it easier to establish good relationships with the user communities.	6.45	73.38	18.54	0	1.61
OV	**Mean/Average %**	**14.55**	**69.40**	**13.61**	**0.67**	**1.47**

The academics believe that MOODLE contributes to organisational value, as 80% of the academics agreed with the statements linked to organisational value. Many of the academics felt strongly and more than 90% agreed with the statement "*The MOODLE* *system enables UKZN to respond quickly to change and to develop teaching and learning techniques*".

6.3.3 Measure of Validity and Reliability – Academics

Validity was tested using exploratory factor analysis (EFA), which is a statistical tool that was used to uncover the underlying structure of a relatively large set of variables. This measure resulted in the rotated factor matrix represented in Table 6.31.

Table 6.31: Rotated factor matrix – academics

Variable	Factor Loadings (Varimax raw) (Copy of Data Academic) Extraction: Principal components (Marked loadings are >.400000)							
	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**	**Factor 6**	**Factor 7**	**Factor 8**
OV/US US4	**0.703198**	0.212121	0.077440	-0.037025	0.121954	0.070794	0.275663	0.044575
OV1	**0.677548**	-0.142447	0.218021	0.206685	0.121586	0.073121	-0.038104	0.039213
OV6	**0.665902**	0.068075	0.047460	0.142217	0.266612	0.237106	0.001154	-0.019105
US2	**0.623447**	0.268544	0.028408	-0.133042	-0.170469	0.173765	0.281238	-0.021192
OV4	**0.614395**	0.011055	0.294781	0.192694	0.186760	0.041990	-0.030692	0.171032
OV3	**0.594644**	-0.237327	0.254596	0.223239	0.157906	0.021247	0.045356	0.328382
OV2	**0.575377**	-0.249312	0.069881	0.170024	0.018450	0.359352	0.042685	0.109667
US1	**0.563600**	0.169250	0.184716	0.186714	-0.014978	0.326660	-0.006070	0.240946
US3	**0.560181**	0.173075	0.045337	-0.021910	0.126193	0.225724	0.352422	0.288958
SQa SQ2	-0.052319	**0.762921**	0.036903	0.105405	0.013891	0.184387	0.032374	0.214490
SQ1	0.029151	**0.717088**	0.044131	0.171363	0.046732	0.003252	0.118800	0.178298
IS2	0.084077	0.190343	**0.764945**	0.153563	0.101872	0.025859	0.093161	-0.065652
IS3	0.112211	0.045208	**0.751353**	0.212846	0.167860	0.149968	-0.084777	0.229413
IS6	0.095899	-0.115147	**0.732608**	0.025901	-0.127079	0.154566	0.069949	0.129933
IS5	-0.059465	0.032402	**0.602489**	-0.052776	0.078365	-0.229300	0.360930	0.134433
IS4	0.102104	0.103338	**0.589485**	0.236960	0.341079	0.012165	0.359090	0.116958
IS1	0.134049	0.313709	**0.585525**	-0.054271	0.194356	0.006715	0.140085	-0.087071

Variable	Factor Loadings (Varimax raw) (Copy of Data Academic) Extraction: Principal components (Marked loadings are >.400000)							
	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**	**Factor 6**	**Factor 7**	**Factor 8**
SDQa SDQ4	0.290517	-0.003507	0.151108	**0.776284**	0.008204	0.103482	0.115876	0.019425
SDQ6	0.060567	0.216193	0.072529	**0.734185**	0.172554	0.050839	0.045104	0.055021
SDQ5	-0.061962	-0.105648	0.120373	**0.723955**	-0.027784	0.020259	0.254246	0.145871
SDQ7	0.012379	0.191308	0.004206	**0.605474**	0.343626	0.134917	0.134712	0.045691
SDQ3	0.109259	0.185470	0.303886	**0.549716**	0.033614	0.203234	0.079090	-0.014358
SDQ8	0.392073	0.127309	0.092264	**0.472921**	0.331424	-0.201060	-0.139716	0.034437
PU2	0.134320	0.000714	0.006909	0.078781	**0.804085**	0.074470	0.014019	0.169429
PU3	0.003848	-0.019183	0.154306	0.010397	**0.733955**	0.080491	0.162133	0.306404
PU4	0.184230	0.049342	0.102735	0.100313	**0.702601**	0.093311	0.094343	-0.147794
PU1	0.074961	0.339210	0.004032	0.229358	**0.590136**	-0.037560	0.136308	-0.177523
SDQb SDQ16	0.045165	0.103635	-0.023425	0.075952	0.024661	**0.736751**	-0.005850	0.056292
SDQ13	0.189614	0.208432	0.127896	-0.111347	0.052429	**0.677276**	0.179610	-0.063968
SDQ9	0.245558	-0.019501	-0.091992	0.291932	0.221793	**0.553056**	0.172779	0.138217
SDQ10	0.336649	-0.042550	0.109419	0.198496	0.162142	**0.537080**	-0.120398	-0.065925
SDQ12	0.158996	-0.001446	0.188962	0.087453	-0.014253	**0.522756**	0.209253	0.273771
SDQ14	0.304743	0.023144	0.371161	0.191932	0.169842	**0.430823**	0.043618	0.069958
SDQ15	0.217270	-0.064964	0.309279	0.175469	0.105657	**0.420216**	0.222574	0.046748
IQ4	-0.083105	0.079133	0.137243	0.157231	0.134796	0.248260	**0.711879**	0.074945
IQ2	0.398732	-0.122847	0.203290	0.134756	0.218049	0.018686	**0.642295**	-0.161993
IQ5	0.022706	0.301228	0.270271	0.220560	0.075060	0.067263	**0.567217**	0.211808
SQb SQ5	0.092083	0.183639	0.237660	0.151163	0.003372	0.081951	0.173747	**0.708252**
SQ4	0.223808	0.319049	0.049243	0.128534	0.294231	0.020943	0.050323	**0.612125**
Expl.Var	5.275859	2.816053	4.751696	3.677045	3.529826	3.279981	3.257121	2.442501
Prp.Totl	0.107671	0.057470	0.096973	0.075042	0.072037	0.066938	0.066472	0.049847

Table 6.32: Academics' variable description

Variable	Description
IS	Infrastructure Services
SQa (SS)	System Simplicity
SQb SQ)	System Quality
IQ	Information Quality
SDQa (SR)	System Reliability
SDQb (SDQ)	Service Delivery Quality
PU	Perceived Usefulness
OV & US1 (OV)	Organisational Value

The service delivery quality was divided into two, SDQa and SDQb. SDQa includes the items: *"I can complete tasks quickly with MOODLE"; "MOODLE is well organised"; "MOODLE loads its pages fast"; "MOODLE is always available for me to perform teaching activities"* and *"MOODLE does not crash frequently".* These items are based more on the reliability of the system, which is why the researcher renamed this group to form a variable referred to as system reliability (SR). SDQb contains the items: *"MOODLE enables me to deliver answers to students about their queries quickly"; "This site does not allow me to get full details of students' records"; "MOODLE protects information related to personal details of students and their results"; "MOODLE allows me to engage in online discussions with students"; "MOODLE notifies me if students have received feedback"* and *"MOODLE allows me to discuss issues with my students".* These items pertain to service delivery quality (SDQ) and remained as SDQ.

System quality was also divided into two, SQa and SQb. SQa includes the items: *"I find the MOODLE system easy to use"* and *"I find the MOODLE system easy to learn".* These items are based on the simplicity of the system, which led to the researcher renaming the item as one variable, namely system simplicity (SS). SQb contains the items: *"The MOODLE system always does what it should"* and *"The MOODLE system requires only the minimum number of fields and screens to achieve a task".* These items focus on system quality and remained as the system quality variable.

The test for validity was positive. The use of exploratory factor analysis to test validity did, however, lead to the rotated factor analysis by establishing the relationship between the measured variables. The service delivery quality (SDQ) variable was divided into two, SDQa (SR) (SDQ3, 4, 5, 6, 7, 8) and SDQb (SDQ) (SDQ9, 10, 12, 13, 14, 15 and16), as represented in Table 6.31 above. System quality was also divided into two, SQa (SS) (SQ1 and 2) and SQb (SQ) (SQ4 and 5). User satisfaction responses US1, 2, 3 and 4 (*"I prefer e-learning as opposed to teaching face-to-face"; "Based on my experience with the MOODLE system, I am satisfied with using the system"; "I am satisfied with the performance of the MOODLE system"* and *"I feel that MOODLE serves my needs well"*) were grouped with organisational value OV. Organisational value and user satisfaction were viewed in the same way and merged into a single variable, as represented in Table 5.32 above. The respondents made no distinction between the two. A number of the items were deleted, as their factor loading was below the cut-off value of 0.5. The deleted items were IQ1 and 6, SQ3 and 6, SDQ11 and OV5.

Cronbach's alpha is a tool that was used to measure the internal consistency to indicate how closely the set of items in a group were. This test was performed to measure reliability. The results are revealed in Table 6.33.

Table 6.33: Cronbach's alpha measure of reliability results - academics

Variable	Cronbach's Alpha
IS	0.83298
SS	0.79279
SQ	0.71122
IQ	0.73817
SR	0.85359
SDQ	0.82056
PU	0.85710
OV	0.89298

According to Gliem and Gliem (2003), if the Cronbach's alpha coefficient is closer to 1.0, this means there is greater internal consistency of the items in the scale. The academic staff's results revealed a Cronbach's Alpha that was close to 1.0, meaning that there was significant consistency of the items in the scale.

6.3.4 COMPARISON OF RESULTS BASED ON SELECTED DEMOGRAPHIC DATA (Academics)

The researcher conducted MANOVA, ANOVA and Tukey post hoc tests to determine if there were differences in the responses based on gender, race, age, highest level of education, employment status, level of experience and college. The results of the MANOVA, ANOVA and Tukey post hoc tests are revealed in the tables that follow.

Differences in responses based on academics' gender

Table 6.34: Results of ANOVA test based on academics' gender

Analysis of Variance Marked effects are significant at p < .05000		
Variable	**F**	**p**
Value	0.403688	0.526400
System Simplicity	0.064394	0.800115
Infrastructure Services	0.377111	0.540316
System Reliability	0.076076	0.783161
Perceived Usefulness	0.662375	0.417348
Service Delivery Quality	0.571830	0.451014
Information Quality	0.035509	0.850850
System Quality	0.864511	0.354346

The ANOVA test revealed that there was no statistically significant difference ($p < .05$) based on gender for all variables.

Table 6.35: Results of ANOVA test based on academics' race

Analysis of Variance **Marked effects are significant at p < .05000**		
Variable	**F**	**p**
Value	**4.055068**	**0.008761**
System Simplicity	1.186463	0.317940
Infrastructure Services	0.325550	0.806881
System Reliability	0.147894	0.930859
Perceived Usefulness	0.901089	0.442948
Service Delivery Quality	0.602804	0.614431
Information Quality	1.922009	0.129703
System Quality	0.913900	0.436515

The MANOVA test results revealed that there was no statistically significant difference based on race for most of the variables. The participants only differed with regard to value, where there was a statistically significant difference of $p = 0.008$.

Post hoc tests (Tukey HSD) were conducted to determine the practical significance of the results obtained by means of the ANOVA. The Tukey HSD test results for significant difference of race with regard to value is represented in Table 6.36.

Table 6.36: Mean score and standard deviation (SD) value (academics - race)

Race	No	Mean	SD
Black	49	2.063492	0.547658
Indian	53	1.940252	0.334140
White	11	1.949495	0.201008
Coloured	10	2.525000	0.983266
Total	123	2.037715	0.514573

Table 6.37: Tukey HSD – academics' race value results

Tukey HSD – Academics' Results Marked differences are significant at p < .05000				
R	**{1} M=2.0635**	**{2} M=1.9403**	**{3} M=1.9495**	**{4} M=2.5250**
1 {1} Black		0.594584	0.901390	**0.041393**
2 {2} Indian	0.594584		0.999945	**0.004830**
3 {3} White	0.901390	0.999945		**0.044261**
4 {4} Coloured	**0.041393**	**0.004830**	**0.044261**	

There is a statistically significant difference where p = 0.041 between the responses from participants who are black (mean = 2.06) and those that are coloured academics (mean = 2.52); a statistically significant difference where p = 0.004 between responses from Indian (mean = 1.94) and coloured academics (mean = 2.52) and a statistically significant difference where p = 0.044 between white (mean = 1.94) and coloured academics (mean = 2.52). Looking at the mean scores, it is evident that coloured academic participants agreed more with regard to issues of value than other participants.

Table 6.38: Results of ANOVA test based on academics' age group

Analysis of Variance **Marked effects are significant at p < .05000**		
Variable	**F**	**p**
Value	0.989442	0.400284
System Simplicity	0.432265	0.730276
Infrastructure Services	2.034257	0.112721
System Reliability	0.994655	0.397883
Perceived Usefulness	1.760684	0.158419
Service Delivery Quality	**3.057997**	**0.030976**
Information Quality	0.766864	0.514773
System Quality	0.132035	0.940842

The MANOVA test results revealed that there was no statistically significant difference based on age for most of the variables. The participants only differed with regard to service delivery quality, where there was a statistically significant difference of p = 0.03.

Post hoc tests (Tukey HSD) were conducted to determine the practical significance of the results obtained by means of the ANOVA. The Turkey HSD test was not powerful enough to determine the paired differences in the data.

Table 6.39: Mean score and standard deviation (SD) - service delivery quality (academics' age)

Age	**No**	**Mean**	**SD**
18-25	3	1.809524	0.164957
26-35	57	2.108605	0.529136
36-45	49	1.955879	0.334198
46+	15	2.323810	0.510721
Total	124	2.067051	0.465371

Table 6.40: Results of ANOVA test based on academics' highest level of education

Analysis of Variance Marked effects are significant at p < .05000		
Variable	**F**	**p**
Value	**3.111780**	**0.028933**
System Simplicity	1.809318	0.149120
Infrastructure Services	**4.438317**	**0.005386**
System Reliability	1.701376	0.170394
Perceived Usefulness	2.002019	0.117401
Service Delivery Quality	2.022207	0.114430
Information Quality	1.837468	0.144008
System Quality	1.607498	0.191234

The MANOVA test results revealed that there was no statistically significant difference based on the highest level of education for most of the variables. The participants only differed with regard to infrastructure services, where there was a statistically significant difference of p = 0.005 and value, where the statistically significance difference was p = 0.028.

Post hoc tests (Tukey HSD) were conducted to determine the practical significance of the results obtained by means of the ANOVA. The Tukey HSD test results for significant difference of highest level of education with regard to value and infrastructure services is represented in Table 6.41.

Table 6.41: Mean score and standard deviation (SD) - infrastructure services and value (academics' highest level of education)

		Infrastructure Services		Value	
Highest Level of Education	**No**	**Mean**	**SD**	**Mean**	**SD**
Post Graduate Degree	1	3.500000		3.222222	
Honours Degree	2	2.500000	0.471405	2.402778	0.216060
Master's Degree	101	1.954125	0.459295	1.988586	0.430674
Doctorate/PhD	20	2.150000	0.702751	2.182639	0.774524
Total	124	2.006989	0.526588	2.036514	0.512651

Table 6.42: Tukey HSD – academics' highest level of education - infrastructure service and value results

Tukey HSD – Academics' Infrastructure Services Results Marked Differences are Significant at p < .05000				
R	**{1} M=3.2222**	**{2} M=2.4028**	**{3} M=1.9886**	**{4} M=2.1826**
{1} Post Graduate Degree		0.183325	**0.015504**	**0.044639**
{2} Honours Degree	0.183325		0.248260	0.553801
{3} Master's Degree	**0.015504**	0.248260		0.115385
{4} Doctorate/PHD	**0.044639**	0.553801	0.115385	

There is statistically significant difference where p = 0.015 between the responses of participants with post graduate degrees (mean = 3.50 and 3.22) and participants with Master's degrees (mean = 1.95 and 1.98), as well as a statistically significant difference of p = 0.044 between the responses of participants with post graduate degrees (mean = 3.50 and 3.22) and participants with a doctorate/PhD (mean = 2.15 and 2.18). Looking at the mean scores, it is evident that post graduate degree academic participants agreed more with regard to issues of infrastructure services and value.

Table 6.43: Results of ANOVA test based on academics' occupational level

Analysis of Variance Marked effects are significant at p < .05000		
Variable	**F**	**p**
Value	0.384879	0.681399
System Simplicity	**4.224990**	**0.016938**
Infrastructure Services	1.260719	0.287305
System Reliability	1.366094	0.259174
Perceived Usefulness	2.846576	0.062141
Service Delivery Quality	0.744186	0.477375
Information Quality	2.063409	0.131657
System Quality	2.653062	0.074708

The MANOVA test results revealed that there was no statistically significant difference based on occupational level for most of the variables. The participants only differed with regard to system simplicity, where there was a statistically significant difference of $p = 0.016$.

Post hoc tests (Tukey HSD) were conducted to determine the practical significance of the results obtained by means of the ANOVA. The Tukey HSD test was not powerful enough to determine the paired differences in the data.

Table 6.44: Mean score and standard deviation (SD) - system simplicity (academic occupation level)

Occupational Level	**No**	**Mean**	**SD**
Permanent	75	1.820000	0.391118
Contract	19	1.921053	0.449171
Part-time	25	2.160000	0.786871
Total	119	1.907563	0.520619

Table 6.45: Results of ANOVA test based on academics' period of employment

Analysis of Variance Marked effects are significant at p < .05000		
Variable	**F**	**p**
Value	2.398464	0.054051
System Simplicity	1.068070	0.375552
Infrastructure Services	**3.159802**	**0.016600**
System Reliability	1.423090	0.230624
Perceived Usefulness	2.019711	0.096205
Service Delivery Quality	0.697460	0.595200
Information Quality	**2.452267**	**0.049765**
System Quality	1.379665	0.245217

The MANOVA test results revealed that there was no statistically significant difference based on period of employment for most of the variables. The participants only differed with regard to infrastructure services, where there was a statistically significant difference of $p = 0.016$ and information quality, with a statistically significant difference of $p = 0.49$.

Post hoc tests (Tukey HSD) were conducted to determine the practical significance of the results obtained by means of the ANOVA. The Tukey HSD test was not powerful enough to determine the paired differences in the data.

Table 6.46: Mean score and standard deviation (SD) - infrastructure services and information quality (academics' period of employment)

		Infrastructure Services		Information quality	
Period of employment	**No**	**Mean**	**SD**	**Mean**	**SD**
0-11 months	26	2.092308	2.092308	2.064103	0.730414
1-5 years	53	1.898742	1.898742	1.867925	0.349540
6-10 years	23	1.884058	1.884058	1.891304	0.419261
11-20 years	16	2.312500	2.312500	1.958333	0.676319
20+	4	2.416667	2.416667	2.666667	1.054093
Total	122	2.008470	2.008470	1.952186	0.549847

Table 6.47: Results of ANOVA test based on academics' college

Analysis of Variance Marked effects are significant at p < .05000		
Variable	**F**	**p**
Value	**3.111780**	**0.028933**
System Simplicity	1.809318	0.149120
Infrastructure Services	**4.438317**	**0.005386**
System Reliability	1.701376	0.170394
Perceived Usefulness	2.002019	0.117401
Service Delivery Quality	2.022207	0.114430
Information Quality	1.837468	0.144008
System Quality	1.607498	0.191234

The MANOVA test results revealed that there was no statistically significant difference based on college for most of the variables. The participants only differed with regard to value, where there was a statistically significant difference of p = 0.028 and infrastructure services, where p = 0.005.

Post hoc tests (Tukey HSD) were conducted to determine the practical significance of the results obtained by means of the ANOVA. The Tukey HSD test results for significant difference of academics' college with regard to value and infrastructure services is represented in Table 6.48.

Table 6.48: Mean score and standard deviation (SD) - infrastructure services and value (academics' college)

		Infrastructure Services		Value	
College	**No**	**Mean**	**SD**	**Mean**	**SD**
College of Agriculture, Engineering and Science	1	3.500000	2.092308	2.064103	0.730414
College of Health Sciences	2	2.500000		3.222222	
College of Humanities	101	1.954125	0.471405	2.402778	0.216060
College of Law and Management Studies	20	2.150000	0.459295	1.988586	0.430674
Total	124	2.006989	0.702751	2.182639	0.774524

Table 6.49: Tukey HSD – academics' college infrastructure service and value results

Tukey HSD – Academics' Infrastructure Services Results - marked differences are significant at p < .05000				
R	**{1} M=3.2222**	**{2} M=2.4028**	**{3} M=1.9886**	**{4} M=2.1826**
{1} College of Agriculture, Engineering and Science		0.183325	**0.015504**	**0.044639**
{2} College of Health Sciences	0.183325		0.248260	0.553801
{3} College of Humanities	**0.015504**	0.248260		0.115385
{4} College of Law and Management Studies	**0.044639**	0.553801	0.115385	

There is statistically significant difference where p = 0.015 between the responses of participants in the College of Agriculture, Engineering and Science (mean = 3.50 and 3.22) and participants from the College of Humanities (mean = 1.95 and 1.98), as well as a statistically significant difference of p = 0.044 between the responses of participants from the College of Agriculture, Engineering and Science (mean = 3.50 and 3.22) and participants from the College of Law and Management Studies (mean = 2.15 and 2.18). Reflecting on the mean scores, it is evident that the College of Agriculture, Engineering and Science's academic participants agreed more on issues of infrastructure services and value.

6.3.5 Correlation Matrix Academics

A number of correlations of the variables were observed in the academics' results. These are represented in Table 6.50.

Table 6.50: Academics' correlation matrix

	Correlations (Copy of Data Academics) Marked correlations are significant at p < .05000 N=123 (Case wise deletion of missing data)							
Variable	**OV**	**SS**	**IS**	**SR**	**PU**	**SDQ**	**IQ**	**SQ**
OV	1.000000							
SS	**0.423157**	1.000000						
IS	**0.536197**	**0.429435**	1.000000					
SR	**0.613878**	**0.517871**	**0.527565**	1.000000				
PU	**0.554040**	**0.472601**	**0.464370**	**0.565700**	1.000000			
SDQ	**0.701047**	**0.474409**	**0.502778**	**0.588752**	**0.528117**	1.000000		
IQ	**0.571492**	**0.447378**	**0.592685**	**0.583613**	**0.536236**	**0.582108**	1.000000	
SQ	**0.566357**	**0.524551**	**0.507232**	**0.530865**	**0.475654**	**0.499116**	**0.463408**	1.000000

There is a linear relationship between OV and SR, where r = 0.61 and between OV and SDQ, where r = 0.70. The results represented are at a confidence interval of 0.95. The variables that have the strongest correlation, where r = 0.70, is the relationship between OV and SDQ. The results of the correlation between OV and SDQ are shown on the graph in Figure 6.18.

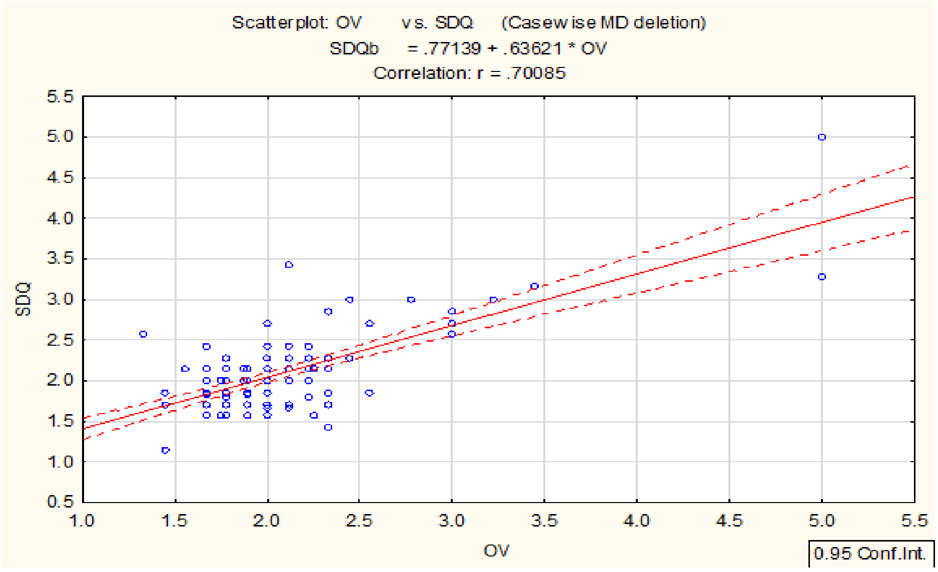


Figure 6.18: Academics' Correlation Matrix Graph (OV and SDQ)

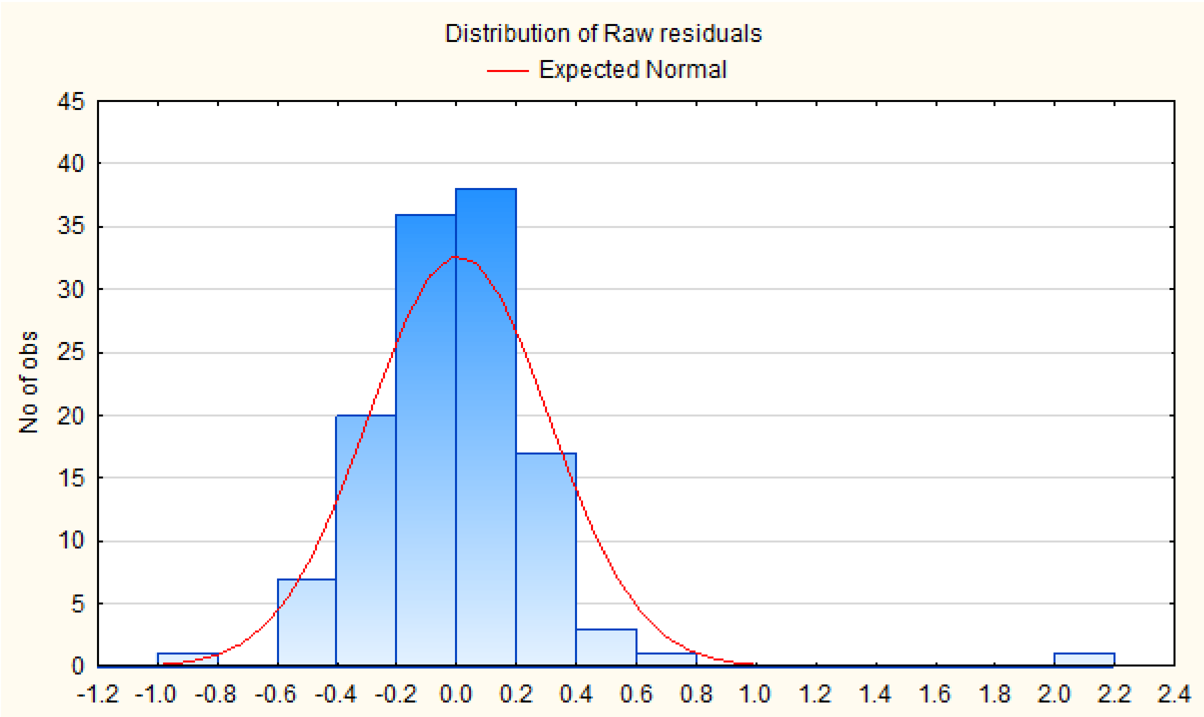


Figure 6.19: Test for normality (academics)

Figure 6.19 above represents the normality test for the academics' sample. It is evident from the graph that the sample was drawn from a normally distributed population.

6.3.6 Multiple Regression Analysis (Academics)

Table 6.51 represents the regression summary for the dependent variable organisational value/user satisfaction and these results are based on the modified results as represented in the rotated factor matrix (Table 6.31).

Table 6.51: Regression analysis for dependent variable – academics (N=123)

	Regression Summary for Dependent Variable: VALUE (Copy of Data Academic) $R = .79650713$ $R^2 = .63442361$ Adjusted $R^2 = .58746884$ $F(14,109) = 13.511$ $p < .00000$ Std. Error of estimate: .32927					
	b*	**Std. Err.**	**b**	**Std. Err.**	**t(115)**	**p-value**
Intercept			-0.124382	0.666034	-0.18675	0.852204
Gender	0.028877	0.059927	0.030428	0.063145	0.48187	0.630862
Race	0.112879	0.060645	0.065041	0.034943	1.86131	0.065394
Age	0.168584	0.087571	0.118505	0.061557	1.92512	0.056820
Status	-0.024326	0.069728	-0.015562	0.044605	-0.34888	0.727854
Experience	-0.090406	0.087352	-0.044203	0.042709	-1.03496	0.302978
HEL	-0.014985	0.063236	-0.017414	0.073489	-0.23696	0.813132
College	0.014881	0.062630	0.006862	0.028883	0.23760	0.812640
SS	-0.061851	0.077335	-0.060634	0.075812	-0.79979	0.425575
IS	0.056069	0.080723	0.054585	0.078587	0.69458	0.488794
SR	0.149417	0.085290	0.148955	0.085027	1.75186	0.082610
PU	**0.171973**	**0.082524**	**0.184958**	**0.088755**	**2.08392**	**0.039505**
SDQ	**0.373228**	**0.082802**	**0.411147**	**0.091214**	**4.50749**	**0.000017**
IQ	0.097457	0.084036	0.091507	0.078907	1.15969	0.248708
SQ	**0.159898**	**0.078401**	**0.134968**	**0.066177**	**2.03948**	**0.043821**

The $R = .79650713$ value represents the correlation coefficient of how much the independent variables correlates with the dependent variables. Adjusted $R^2 = .58746884$ indicates how much variance in the dependent variable is accounted for and this indicates that 58.7% of the variance in the dependent value is accounted for by the independent variables. This is an amount much less than 0.05, meaning that the adjusted R^2 is significantly different from zero, so the model is predicting the customer value. This is represented by the F test that was performed, where F (14,109) = 13.511 and p < .00000 Std. Error of estimate: .32927. b on the graph represents the unstandardised regression coefficient. The results indicate that if all the variables are held constant, then for every one-unit increase in service delivery quality, there will be a 0.41 increase in value; a one-unit increase in system quality will result in 0.13 increase in value and a one-unit increase in perceived usefulness will result in 0.18 increase in value.

Value is the dependent variable. Three variables revealed a positive influence over the dependent variable. This is represented in Figure 6.20.

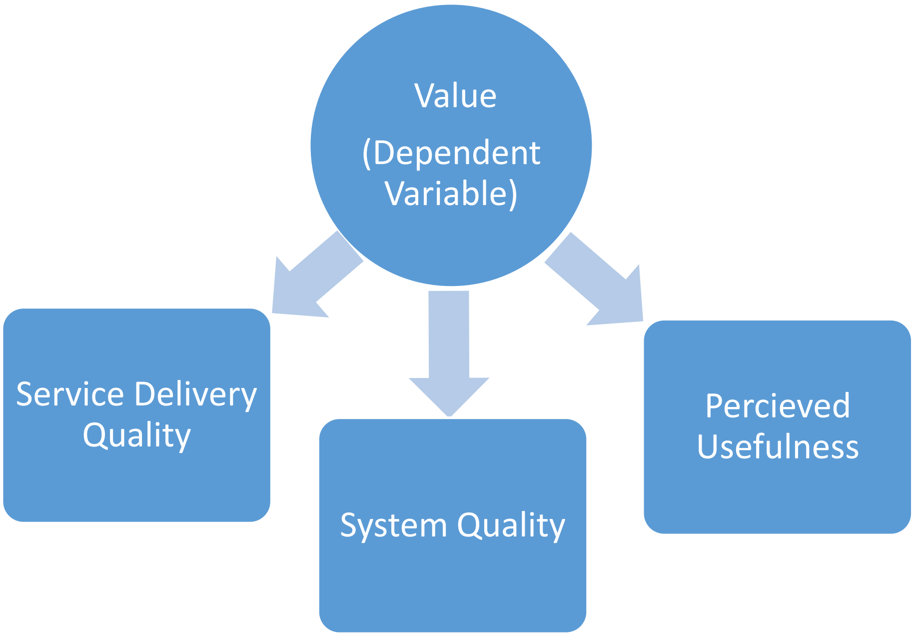


Figure 6.20: Regression summary for dependent variable – academics

The results in Figure 6.20 indicate that organisational value is dependent on three variables, namely service delivery quality, perceived usefulness and system quality.

6.4 THE QUANTITATIVE DATA PRESENTATION OF ICS STAFF RESULTS

This section presents the quantitative data collected from the ICS staff questionnaire.

6.4.1 Description of ICS Staff Participants' Demographic Profiles

The ICS staff's demographic profile revealed the information that is depicted in the pie charts that follow.

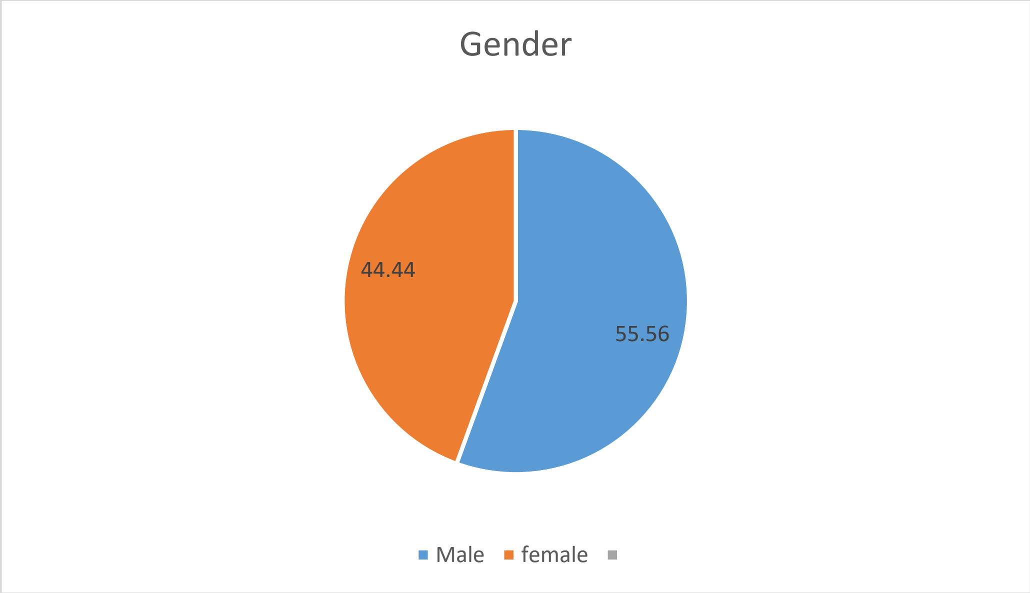


Figure 6.21: ICS staff's gender

55.56% of the ICS staff that participated in the questionnaire were male and 44.44% were female.

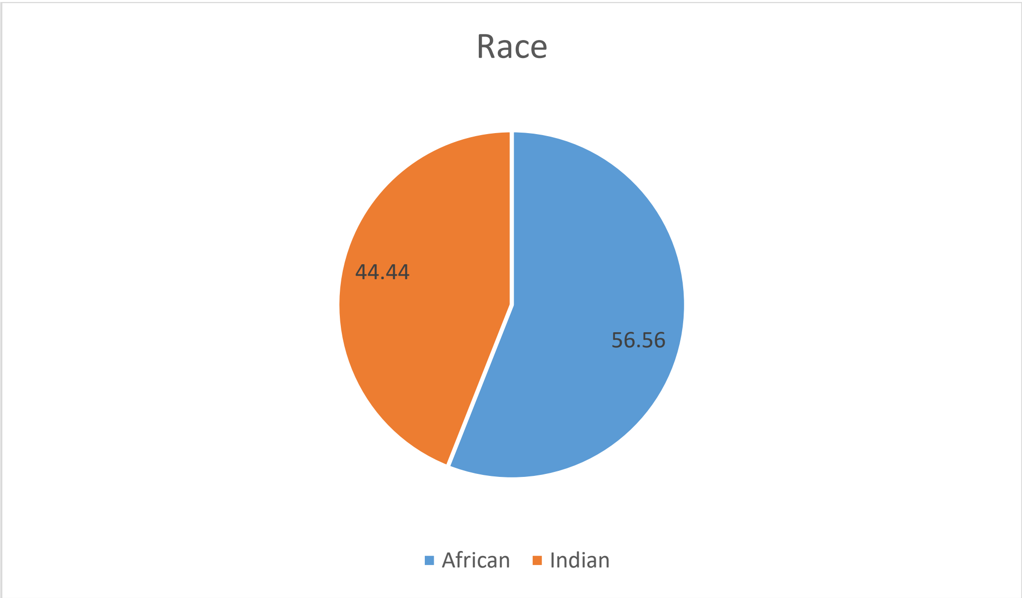


Figure 6.22: ICS staff's race

Only two race groups were represented amongst the ICS staff participants and these were blacks at 55.56% and Indians at 44.44%.

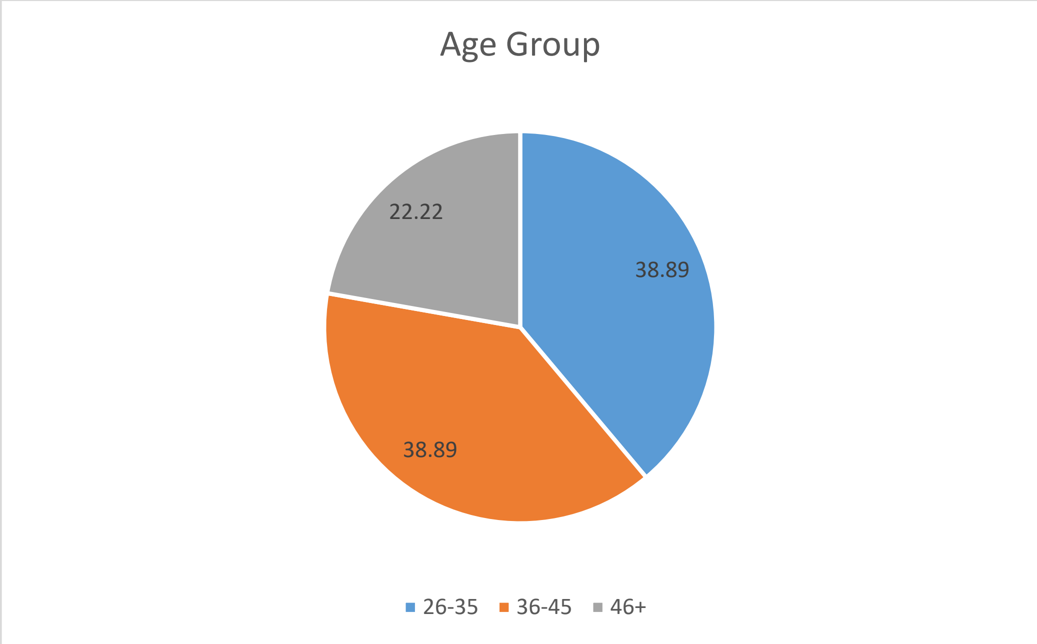


Figure 6.23: ICS staff's age groups

The majority of the participants were between 26 and 35 and 36 and 45, as both groups had an equal number of participants, each constituting 38.89% of the total.

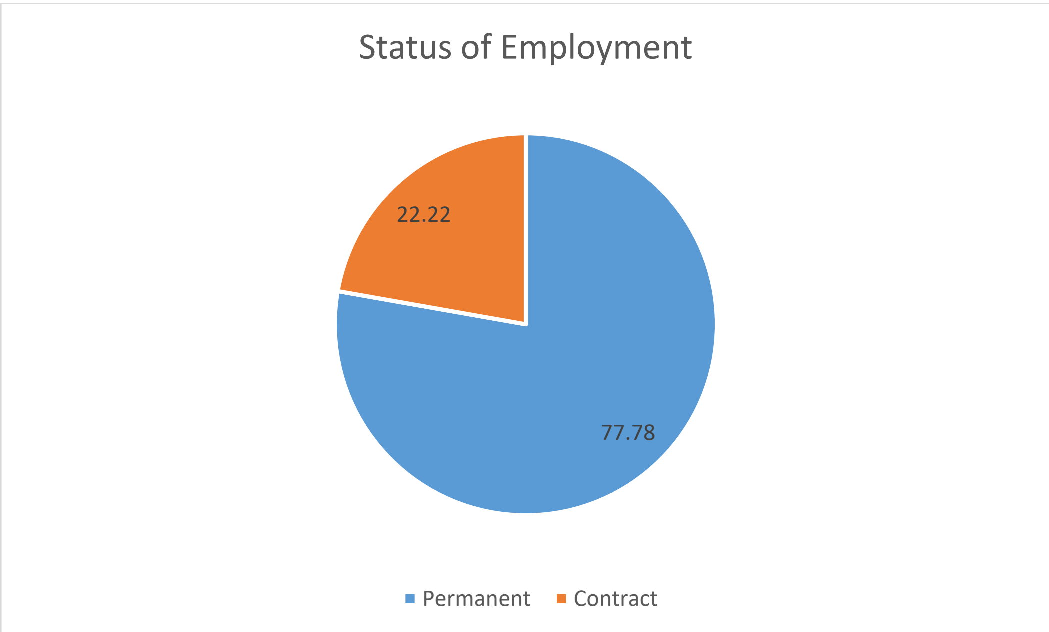


Figure 6.24: ICS staff's status of employment

77.78% of the participants were permanently employed with only 22.22% under contract.

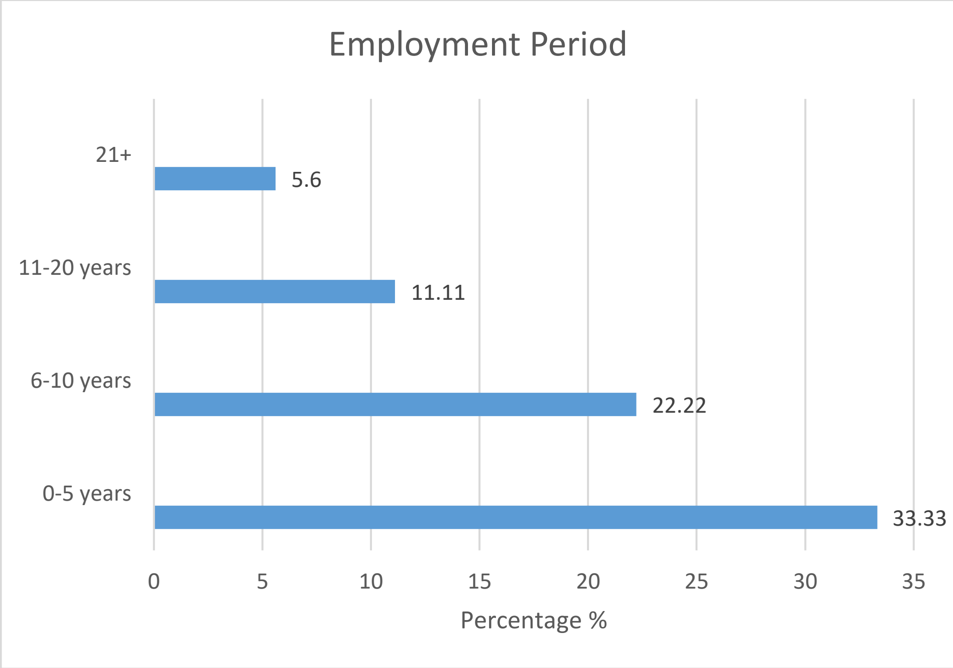


Figure 6.25: ICS staff's employment period

With regard to the level of experience within UKZN, there were a number of participants who had been with the university for a period of 1 to 5 years (33.33%), followed by 27.78% of the ICS staff participants who had been with the university for 6 to 10 years.

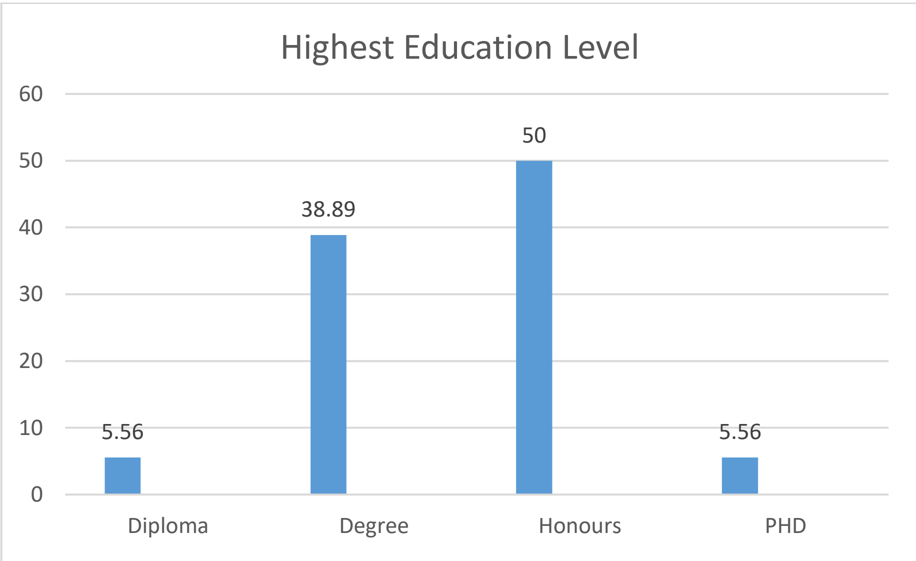


Figure 6.26: ICS staff's highest level of education

An examination of the ICS participants' education revealed that 1 (5.56%) participant had a diploma; 7 (38.89%) participants held an undergraduate degree; half of the participants (50%) had obtained an honours degree and only 1 (5.56%) participant had a Doctorate/PhD.

6.4.2 Presentation of ICS Staff Results

Table 6.52: IT infrastructure data presentation - ICS (%)

IS	Category	SA	A	N	D	SD
IS1	The ICS division provides me with technology, advice and support services related to the MOODLE system.	41.17	47.05	5.88	0	5.88
IS2	The ICS division provides me with a wide range of channel management services, such as electronic channels.	29.41	58.82	5.88	0	5.88
IS3	The ICS division enables me to receive and exchange information and knowledge with other lecturers' students by using electronic linkages and software applications.	17.65	70.58	5.88	0	5.88
IS4	The ICS division provides me with data management advice and consultancy.	29.41	58.82	5.88	0	5.88
IS5	The ICS division provides me with a wide range of security and risk management services e.g. security policies, disaster planning and firewalls.	41.17	29.41	23.53	0	5.88

IS	Category	SA	A	N	D	SD
IS6	The ICS division provides a wide range of communication services e.g. internet capabilities and broadband.	35.29	47.05	11.76	0	5.88
IS7	ICS provides a wide range of data management services.	35.29	52.94	5.88	0	5.88
IS8	ICS provides a wide range of IT facilities and management services, such as a large-scale processing/ mainframe and server farms.	17.64	64.70	11.76	0	5.88
IS9	**ICS provides a wide range of application infrastructure services e.g. mobile and wireless application middleware.**	**17.64**	**76.47**	0	0	5.88
IS10	ICS provides a wide range of IT management services e.g. IS planning, investment and monitoring.	5.88	64.70	23.52	0	5.88
IS11	ICS provides a wide range of research and development (R&D) services.	11.76	70.59	11.76	0	5.88
IS12	ICS provides a wide range of IT education services to users, such as training on ways to use IT.	5.88	70.58	17.64	0	5.88
IS	**Mean/Average %**	**24.01**	**59.31**	**10.78**	**0**	**5.88**

ICS staff members responded positively with regard to issues relating to IT infrastructure. The highest level of agreement was with the statement, "*ICS provides a wide range of application infrastructure services e.g. mobile and wireless application middleware*", as over 90% of the ICS staff participants agreed. The statements that were of concern and resulted in a lower level of agreement were, "*The ICS division provides me with a wide range of security and risk management services e.g. security policies, disaster planning and firewalls"* and *"ICS provides a wide range of IT management services e.g. IS planning, investment and monitoring*", where fewer than 75% of the ICS staff members agreed, meaning that almost 30% were between neutral and disagree/strongly disagree.

Table 6.53: System quality – ICS (%)

SQ	Category	SA	A	N	D	SD
SQ1	**I find the MOODLE system easy to use.**	**47.05**	**47.05**	5.88	0	0
SQ2	I find the MOODLE system easy to learn.	41.17	47.05	11.76	0	0
SQ3	The data in the MOODLE system is integrated and consistent.	0	52.94	41.17	5.88	0
SQ4	The MOODLE system always does what it should.	5.88	35.29	52.94	5.88	0
SQ5	The MOODLE system requires only the minimum number of fields and screens to achieve a task.	6.25	43.75	43.75	6.25	0
SQ6	The MOODLE system meets my requirements.	0	68.75	31.25	0	0
SQ7	The MOODLE system user interface can easily be adapted to one's personal approach.	6.25	56.25	25.00	12.50	0

SQ	Category	SA	A	N	D	SD
SQ8	The MOODLE system can easily be modified, corrected and improved.	0	70.58	29.41	0	0
SQ9	The MOODLE system includes all the necessary features and functions.	0	64.70	35.29	0	0
SQ	**Mean/Average %**	**11.84**	**54.04**	**30.71**	**3.39**	**0**

The MOODLE system quality at UKZN was rated by ICS staff as good, especially as 94% found MOODLE easy to use. This is confirmed by the response to the statement "*I find the MOODLE system easy to use*", as it was rated the highest by ICS staff members. What was not highly rated and where a number of ICS staff members remained neutral, was the statement, "*The MOODLE system always does what it should*". This statement had the highest percentage of ICS staff members who were neutral.

Table 6.54: Information quality – ICS (%)

IQ	Category	SA	A	N	D	SD
IQ1	The MOODLE system provides me with outputs that I need to maintain and support the system.	5.88	17.65	76.47	0	0
IQ2	The information from the MOODLE system is easy to understand.	5.88	29.41	64.70	0	0
IQ3	The essential information I need to set up my teaching in the MOODLE environment is available to me.	5.88	29.41	64.70	0	0
IQ4	**Information from the MOODLE system is in a form that is readily usable.**	**0**	**64.70**	35.29	0	0

IQ	Category	SA	A	N	D	SD
IQ5	The information in the MOODLE system is concise and sufficient for organising my course and teaching materials.	0	41.17	58.82	0	0
IQ6	Information in the MOODLE system is well formatted.	0	23.53	76.47	0	0
	The information in the MOODLE system is up-to-date enough to maintain and support the system.	0	52.94	47.05	0	0
IQ	**Mean/Average %**	**2.25**	**36.97**	**60.5**	**0**	**0**

The quality of the information in the MOODLE system was not highly rated, as most ICS staff members remained neutral with regard to most of the statements. The statements that most ICS staff members remained neutral on were, "*The MOODLE system provides me with outputs that I need to maintain and support the system"* and *"Information in the MOODLE systems is well formatted*". The statement that was mostly favourable and had many participants agreeing was, "*Information from the MOODLE system is in a form that is readily usable*".

Table 6.55: Service delivery quality – ICS (%)

SDQ	Category	SA	A	N	D	SD
SDQ1	I find MOODLE easy to navigate.	29.41	52.94	17.64	0	0
SDQ2	The MOODLE system is truthful about its offerings.	5.88	29.41	64.70	0	0
SDQ3	I can complete tasks quickly with e-learning.	5.88	58.82	35.29	0	0
SDQ4	MOODLE is always available for me to perform my activities.	12.50	62.50	25.00	0	0

SDQ	Category	SA	A	N	D	SD
SDQ5	MOODLE does not crash frequently.	17.64	41.17	35.29	5.88	0
SDQ6	MOODLE enables academic staff to deliver lectures, materials and feedback to students when promised.	5.88	58.82	35.29	0	0
SDQ7	The MOODLE system quickly delivers answers to students' queries.	17.64	52.94	23.52	5.88	0
SDQ8	MOODLE protects information relating to students' personal details and results.	5.88	64.70	29.41	0	0
SDQ9	MOODLE informs students what to do if their assignments are not marked.	11.76	52.94	35.29	0	0
SDQ10	MOODLE protects information related to the personal details of students, including their results.	0	76.47	23.53	0	0
SDQ11	MOODLE allows students-to-lecturer and student-to-student discussions online.	0	62.50	37.50	0	0
SDQ12	**MOODLE takes care of problems reported by academic staff and students promptly.**	**5.88**	**76.47**	17.64	0	0
SDQ13	MOODLE is well organised.	11.76	64.70	23.52	0	0
SDQ14	MOODLE loads its pages fast.	5.88	70.58	17.64	5.88	0
SDQ	**Mean/Average %**	**9.71**	**58.92**	**30.09**	**1.02**	**0**

Overall, the level of service delivery quality perceived by ICS staff members was high, with the statement "*MOODLE takes care of problems reported by academic staff and students promptly"* being rated higher than other statements, with over 80% of the ICS staff members agreeing with the statement. There were however, concerns with the results pertaining to the statement, "*The MOODLE system is truthful about its offerings*", as there was a high number of ICS staff members who were neutral in response to the statement.

Table 6.56: Perceived usefulness – ICS (%)

PU	Category	SA	A	N	D	SD
PU1	Using the MOODLE system enables me in my job to support the users and provide services more quickly.	11.76	35.29	47.05	5.88	0
PU2	MOODLE improves my job performance in supporting users and providing services.	5.88	35.29	47.05	11.76	0
PU3	The MOODLE system is useful to me, as it increases my productivity.	17.64	41.17	29.41	5.88	5.88
PU4	Using the MOODLE system makes it easier for me to do my job and to support the various users.	5.88	58.82	29.41	5.88	0
PU5	**The MOODLE system is useful in the work I do.**	**5.88**	**76.47**	11.76	5.88	0
PU	**Mean/Average %**	**9.41**	**49.41**	**32.96**	**7.05**	**1.17**

ICS staff members did not rate perceived usefulness highly. Most of the staff members remained neutral with regard to a number of the statements. The only statement that was highly rated and agreed upon was, "*The MOODLE system is useful in the work I do*", where over 82% of the ICS staff agreed with the statement. There were numerous ICS staff members (47%) who disagreed with the statements: "*Using the MOODLE* *system enables me in my job to support users and provide services more quickly"* and *"MOODLE improves my job performance in supporting users and providing services*".

Table 6.57: User satisfaction – ICS (%)

US	Category	SA	A	N	D	SD
US1	**I am satisfied with working with the MOODLE system.**	**11.76**	**70.58**	11.76	5.88	0
US2	Working with the MOODLE system meets my job expectations.	0	52.94	35.29	11.76	0
US3	**I am satisfied with using the MOODLE system's functions.**	**5.88**	**76.47**	5.88	11.76	0
US4	Working with the MOODLE system gives me a great sense of personal satisfaction.	0	64.70	23.53	11.76	0
US	**Mean/Average %**	**4.41**	**66.17**	**19.00**	**10.29**	**0**

ICS staff members were generally satisfied with the MOODLE system, as the user satisfaction statements yielded positive responses. The statements that elicited the highest level of agreement at over 80% were, "*I am satisfied with working with the MOODLE system"* and *"I am satisfied with using the MOODLE system's functions*". The statement that was concerning with regard to user satisfaction was, "*Working with the MOODLE system meets my job expectations*". This elicited a response of over 46% of ICS staff remaining either neutral or indicating some disagreement with the statement.

Table 6.58: Organisational value – ICS (%)

OV	Category	SA	A	N	D	SD
OV1	The MOODLE system enables UKZN to respond quickly to change and to develop teaching and learning techniques.	5.88	76.47	17.64	0	0
OV2	The MOODLE system establishes and maintains a good image and reputation for UKZN.	5.88	58.82	35.29	0	0
OV3	**The MOODLE system is aligned with UKZN's organisational goals.**	**0**	**81.25**	18.75	0	0
OV4	With MOODLE it is easier for UKZN to respond to change quickly.	11.76	64.70	23.52	0	0
OV5	The MOODLE system is cost effective.	35.29	52.94	11.76	0	0
OV6	**Through the MOODLE system it is easier to establish good relationships with the user community.**	**11.76**	**70.76**	11.76	0	0
OV	**Mean/Average %**	**11.76**	**67.49**	**19.78**	**0**	**0**

Positive results were found for the responses to the way in which ICS staff members find MOODLE contributing to organisational value. Most of the ICS staff agreed with the statements that "*The MOODLE system is aligned with UKZN's organisational goals", "The MOODLE system is cost effective"* and *"Through the MOODLE system it is easier to establish good relationships with the user community*". Overall, ICS staff members indicated that MOODLE does add to organisational value.

Table 6.59: Customer value – ICS (%)

CV	Category	SA	A	N	D	SD
CV1	The MOODLE system improves my work practices.	35.29	47.05	17.64	0	0
CV2	The MOODLE system contributes to my personal growth and development.	17.64	58.82	23.53	0	0
CV3	I have learnt much through the MOODLE system.	23.52	58.82	17.64	0	0
CV4	**The knowledge I have gained using the MOODLE system will be helpful in future with other systems.**	**23.52**	**64.70**	11.76	0	0
CV5	Knowing how to maintain and support the MOODLE system makes me more employable.	29.41	52.94	17.64	0	0
CV6	Overall, the MOODLE system is simplifying my life.	11.76	64.70	23.54	0	0
CV	**Mean/Average %**	**19.60**	**57.83**	**18.62**	**0**	**0**

None of the ICS staff members disagreed that MOODLE is adding to customer value and only a few were neutral about it. Over 70% of the ICS staff members agreed that MOODLE adds to customer value.

6.4.3 Measure of Validity and Reliability – ICS

Validity was tested using exploratory factor analysis (EFA), which is a statistical tool that was used to uncover the underlying structure of a relatively large set of variables. This measure resulted in the rotated factor matrix represented in Table 6.60.

Table 6.60: Rotated factor matrix – ICS

Variable	Factor Loadings (Varimax raw) (Copy of Data ICS.sta) Extraction: Principal Components (Marked loadings are >.700000)							
	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**	**Factor 6**	**Factor 7**	**Factor 8**
IS1	**0.92759**	0.050305	0.163954	-0.044757	0.065155	-0.056758	0.022435	0.210513
IS2	**0.91118**	0.043498	0.059891	0.108169	0.187163	-0.182327	-0.016807	0.124951
IS3	**0.87221**	0.147146	0.216246	0.192384	0.106768	-0.032648	0.045810	0.052317
IS4	**0.89175**	-0.061506	0.044747	-0.034386	-0.022489	-0.255911	0.080334	-0.233109
IS5	**0.83613**	0.066670	0.250324	-0.267217	-0.070847	-0.004207	-0.281988	0.140427
IS6	**0.89418**	-0.156857	-0.037082	0.022916	-0.049783	0.041007	0.068639	-0.327245
IS7	**0.85967**	-0.129196	0.128716	-0.050341	0.329401	0.016087	-0.122321	0.294878
IS8	**0.87226**	0.125550	0.230031	-0.115682	0.155119	-0.050740	-0.256266	0.032285
IS9	**0.93184**	0.036291	-0.239750	0.159748	0.049419	-0.031775	0.045464	-0.093126
IS10	**0.88677**	-0.184336	-0.037754	-0.163713	0.058967	0.267734	0.050851	0.018233
IS11	**0.89582**	0.048143	0.241002	0.183242	-0.111964	-0.165912	-0.177904	0.100487
IS12	**0.84206**	-0.294996	-0.007045	0.189602	0.198654	-0.057724	0.098563	0.049079
SDQ14	**0.84383**	0.165667	-0.067783	-0.331328	0.140919	-0.262625	0.229403	-0.007291
PU4	**0.72637**	0.092758	-0.402251	0.097409	0.200000	0.320609	0.256053	0.104704
SDQ6	0.00003	0.807219	0.311427	0.089833	0.160370	-0.347157	-0.001581	-0.276116
SDQ10	0.01696	0.931469	0.085191	-0.260856	-0.105409	0.004624	0.192978	0.020897
OV3	0.05132	0.749232	0.227942	-0.192191	-0.351022	0.163303	-0.082085	-0.196545
IQ1	0.23061	0.310999	**0.744927**	0.174922	0.283125	-0.158938	-0.031616	-0.146833
IQ3	0.29731	0.071908	**0.872013**	0.057362	0.020507	0.055702	-0.140064	-0.000139
SDQ12	-0.05851	0.208759	**0.813285**	0.141484	0.092155	0.085124	-0.076844	0.255914
SQ1	0.02952	-0.210322	0.163109	**0.920232**	0.109804	0.133657	0.168777	0.051079
SQ2	-0.01948	-0.266990	0.167785	**0.872963**	0.041036	-0.010717	0.002241	0.156845
SQ5	0.52806	-0.013186	-0.044248	**0.716190**	-0.259837	-0.259747	0.075947	0.017501
SDQ1	-0.02234	0.132948	0.156224	**0.827677**	0.025481	0.101561	0.083626	0.031190
SDQ2	-0.12550	-0.030078	-0.089512	-0.103483	**-0.704095**	-0.239448	0.578317	0.035725
SDQ3	-0.16266	-0.203987	0.102816	0.337627	**-0.758855**	-0.286214	0.075013	0.028149
PU2	0.45651	-0.106058	0.296828	0.054105	**0.792683**	-0.164001	-0.131762	0.079435
PU3	0.33383	-0.355264	0.074102	-0.073130	**0.775111**	0.181241	-0.048739	0.297367

Variable	Factor Loadings (Varimax raw) (Copy of Data ICS.sta) Extraction: Principal Components (Marked loadings are >.700000)							
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
OV2	-0.12325	-0.136317	0.058310	-0.178988	**-0.808598**	0.184009	0.061771	0.473712
SDQ11	-0.30435	0.037072	0.030329	-0.056891	-0.032407	**0.927795**	-0.127079	-0.049039
SDQ13	-0.03247	0.010603	-0.202568	0.130057	-0.089814	0.233615	0.843902	-0.134111
CV4	0.14635	0.006147	0.308343	0.202725	-0.018857	-0.241635	-0.162577	**0.862354**
OV6	-0.01353	0.123666	0.096478	-0.175738	0.082458	0.435207	-0.460797	**0.725414**
IQ6	0.14554	-0.444303	0.069897	-0.210962	-0.114654	-0.052933	0.293441	**0.783576**
Expl.Var	15.87035	4.472822	7.040830	5.983306	6.420148	5.173232	4.490014	5.971875
Prp.Totl	0.25191	0.070997	0.111759	0.094973	0.101907	0.082115	0.071270	0.094792

Table 6.61: ICS variable description

Variable	Description
IS1-12; SDQ14; PU4	Infrastructure Services
SDQ6, 10; OV3	Service Delivery Quality
IQ1,3, SDQ12	Information Quality
SQ1, 2, 5; SDQ1	System Quality
SDQ2-3; PU2-3; OV2	System Reliability
CV4; OV4; IQ6	Value

A limited number of items from the ICS results were excluded for further analysis, as their factor loading was below the cut-off value of 0.5. Other items were merged. Infrastructure services items merged with SDQ14 *(”MOODLE informs me if students have received feedback”)* and PU4, (*”MOODLE assists me to accomplish my tasks more quickly”*) and are now part of infrastructure services. SDQ6 and SDQ10, (*”MOODLE is always available for me to perform teaching activities”* and “*This site does not allow me to get full details of students’ records”)* merged with OV3 (“*The MOODLE system is aligned with the UKZN organisational goals”*). These items were grouped to form the variable SDQ, as they are more aligned with the service delivery quality. IQ1 (“*The MOODLE system provides me with sufficient information for my* *teaching needs"*), IQ3 ("*The essential information I need to set up my teaching in the MOODLE environment is available to me"*) and SDQ12 *("MOODLE protects information related to the personal details of students and their results")* and these items are now referred to as information quality. SQ1 ("*I find the MOODLE system easy to use"*), SQ5 ("*The MOODLE system requires only the minimum number of fields and screens to achieve a task"*) and SDQ1 ("*I find MOODLE easy to navigate"*) merged and the items are named system quality. SDQ2 and SDQ4 (*"MOODLE enables me to provide course information and knowledge to students"* and "*I am able to complete tasks quickly with MOODLE"*) merged with PU2 (*"MOODLE improves my job performance"*) and PU3 ("*The MOODLE system is useful to me in my studies"*), as well as OV2 (*"The MOODLE system establishes and maintains a good image and reputation for UKZN"*). These items are now named system reliability. CV4 (*"Overall, MOODLE is simplifying my life"*); OV4 (*"With MOODLE it is easier for UKZN to respond to change quickly"*) and IQ6 (*"Information in the MOODLE system is well formatted"*) have been renamed as value.

Cronbach's alpha is a tool that was used to measure internal consistency to indicate how closely the set of items in a group were related. This test was performed to measure reliability. The results are revealed in Table 6.62.

Table 6.62: Cronbach's alpha measure of reliability results – ICS staff

Variable	Cronbach's Alpha
IS	0.969792
SDQ	0.723214
IQ	0.859935
SQ	0.858308
SR	-0.69332
Value	-0.47872

According to Gliem and Gliem (2003), if the Cronbach's alpha coefficient is closer to 1.0, it means there is greater internal consistency of the items in the scale. The ICS staff results revealed a Cronbach's alpha that is close to 1.0 for IS, SDQ, IQ and SQ, meaning that there is greater consistency of the items in the scale. There is, however, a concern with regard to the results of SR and value, where the Cronbach's alpha coefficient is less than 1.

6.4.4 COMPARISON OF RESULTS BASED ON SELECTED DEMOGRAPHIC DATA (ICS STAFF)

The researcher conducted MANOVA, ANOVA and Tukey post hoc tests to determine if there were differences in the responses based on gender, race and age, highest level of education and level of experience. The results of the MANOVA, ANOVA and Tukey post hoc tests are revealed hereunder.

Table 6.63: ANOVA RESULTS based on ICS staff's gender

Analysis of Variance Marked effects are significant at $p < .05000$		
Variable	**F**	**p**
Infrastructure Services	0.576550	0.459435
Service Delivery Quality	0.576550	0.459435
Information Quality	0.576550	0.459435
System Quality	0.576550	0.459435
System Reliability	0.576550	0.459435
Value	0.576550	0.459435

The ANOVA test revealed that there was no statistically significant difference ($p < .05$) based on gender for all variables.

Table 6.64: Results of ANOVA test based on ICS staff's race

Analysis of Variance Marked effects are significant at p < .05000		
Variable	**F**	**p**
Infrastructure Services	0.025538	0.875166
Service Delivery Quality	0.025538	0.875166
Information Quality	0.025538	0.875166
System Quality	0.025538	0.875166
System Reliability	0.025538	0.875166
Value	0.025538	0.875166

The ANOVA test revealed that there was no statistically significant difference ($p < .05$) based on race for all variables.

Table 6.65: Results of ANOVA test based on ICS staff's age group

Analysis of Variance Marked effects are significant at p < .05000		
Variable	**F**	**p**
Infrastructure Services	**4.429729**	**0.032317**
Service Delivery Quality	**4.429729**	**0.032317**
Information Quality	**4.429729**	**0.032317**
System Quality	**4.429729**	**0.032317**
System Reliability	**4.429729**	**0.032317**
Value	**4.429729**	**0.032317**

The MANOVA test results revealed that there was a statistically significant difference based on age group for all the variables of $p = 0.032$.

Post hoc tests (Tukey HSD) were conducted to determine the practical significance of the results obtained by means of the ANOVA. The Tukey HSD test results for significant difference of age group is represented in Table 6.66.

Table 6.66: Mean score (ICS staff's age)

Age	Mean IS	Mean SDQ	Mean IQ	Mean SQ	Mean SR	Mean Value
26-35	2.134921	2.134921	2.134921	2.134921	2.134921	2.134921
36-45	2.087302	2.087302	2.087302	2.087302	2.087302	2.087302
46+	1.324074	1.324074	1.324074	1.324074	1.324074	1.324074
Total	1.972222	1.972222	1.972222	1.972222	1.972222	1.972222

Table 6.67: Tukey HSD – ICS staff's age group results

Tukey HSD – ICS Infrastructure Services Results Marked differences are significant at p < .05000			
R	**{1} M = 3.2222**	**{2} M = 2.4028**	**{3} M = 1.9886**
{1} 26-35		0.975244	**0.034342**
{2} 36-45	0.975244		**0.046817**
{3} 46+	**0.034342**	**0.046817**	

There is a statistically significant difference where p = 0.034 between the responses of participants in the 26-35 age group (mean = 2.13) and participants in the 46+ age group (mean = 1.32), as well as a statistically significant difference of p = 0.046 between the responses of participants in the 36-45 age group (mean = 2.08) and participants in the 46+ age group (mean = 1.32). Upon examination of the mean scores, it is evident that the younger group of ICS staff member participants between the ages of 26-25 agreed more on all variables.

Table 6.68: Results of ANOVA test based on ICS staff highest level of education

Analysis of Variance Marked effects are significant at p < .05000		
Variable	**F**	**p**
Infrastructure Services	0.410515	0.748171
Service Delivery Quality	0.410515	0.748171
Information Quality	0.410515	0.748171
System Quality	0.410515	0.748171
System Reliability	0.410515	0.748171
Value	0.410515	0.748171

The ANOVA test that was conducted revealed that there was no statistically significant difference ($p < .05$) based on highest level of education for all variables.

Table 6.69: Results of ANOVA test based on ICS staff period of employment

Analysis of Variance Marked effects are significant at p < .05000		
Variable	**F**	**p**
Infrastructure Services	1.502232	0.262766
Service Delivery Quality	1.502232	0.262766
Information Quality	1.502232	0.262766
System Quality	1.502232	0.262766
System Reliability	1.502232	0.262766
Value	1.502232	0.262766

The ANOVA test revealed that there was no statistically significant difference ($p < .05$) based on period of employment for all variables.

Table 6.70: ICS staff correlation matrix table variable explanation

Variable code	Variable Name
IS	Infrastructure services
SQ	Service quality
IQ	Information quality
SDQ	Service delivery quality
SR	System Reliability
Value	Organisational/Customer Value
R	Correlation

Table 6.71: ICS staff correlation matrix

Variable	Correlations (Copy of Data ICS) Marked correlations are significant at p < .05000 N=17 (Case wise deletion of missing data)					
	IS	SQ	IQ	SDQ	SR	Value
IS	1.000000					
SQ	0.368320	1.000000				
IQ	0.398832	0.414786	1.000000			
SDQ	0.196465	**0.675489**	0.165455	1.000000		
SR	**0.642729**	0.326070	**0.526266**	0.038430	1.000000	
Value	0.081304	0.296102	0.421280	0.402220	0.041937	1.000000

Positive correlations are evident in the relationships between system reliability and infrastructure service, where r=0.64; and information quality and system reliability, where r=0.52. The strongest correlation was between service delivery quality and service quality, where r=0.68. This is represented on the graph in Figure 6.27. The correlation results are at 0.95 confidence intervals.

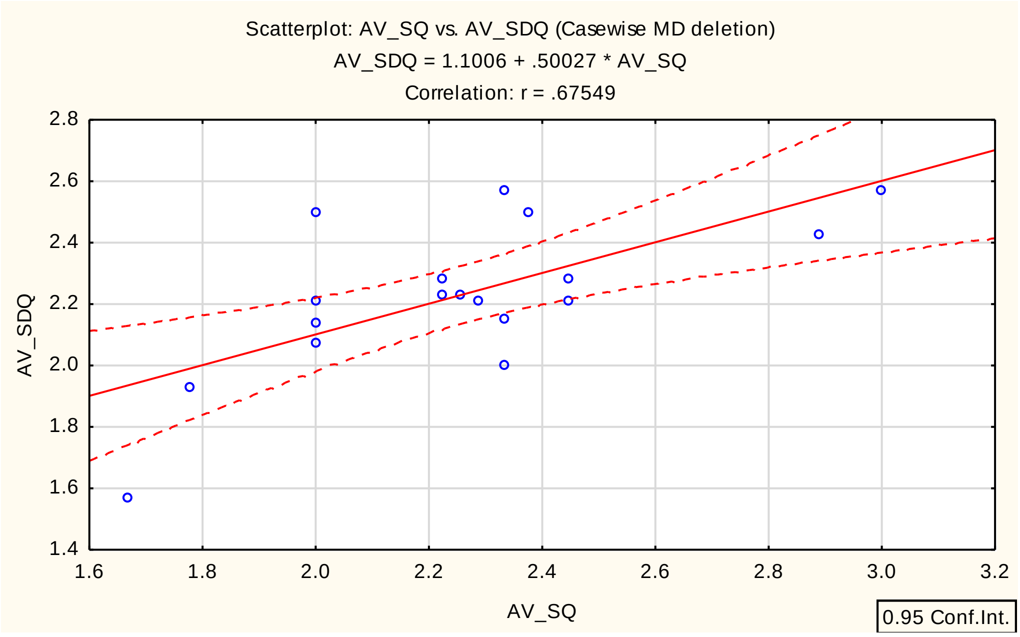


Figure 6.27: ICS correlation matrix graph representation

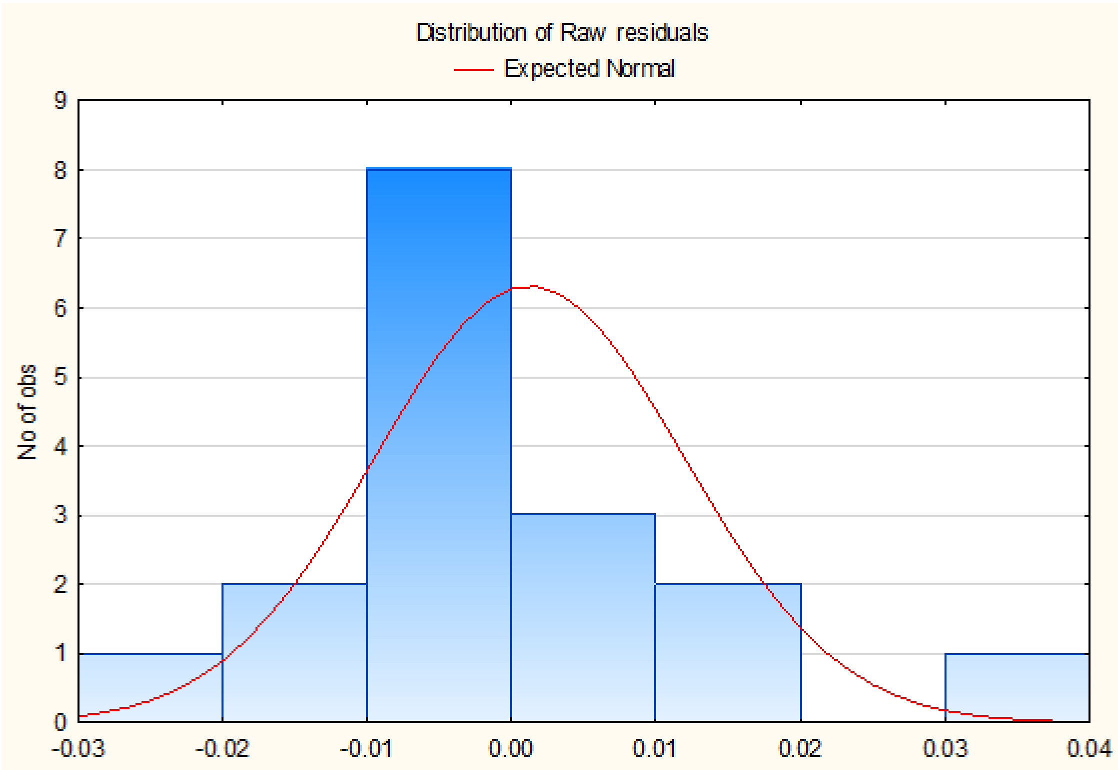


Figure 6.28: Test for normality (ICS staff)

Figure 6.28 represents the normality test for the ICS staff sample. It is evident from the graph that the sample was drawn from a normally distributed population.

6.4.5 Multiple Regression Analysis (ICS Staff)

Multiple regression analysis was conducted to determine which of the independent variables predicts value and which variable is dependent. The multiple regression analysis was suitable for this study as it allowed for a simultaneous investigation to determine how well a set of variables can predict a certain outcome. Table 6.72 presents the regression summary for proposed dependent variable values and these results are based on the modified results presented in the rotated factor matrix (Table 6.60).

Table 6.72: Regression analysis for proposed dependent variable, value – ICS staff (N=17)

	Ridge Regression Summary for Dependent Variable: Value (Copy of Data ICS) L =.10000 R = .99026543 R^2 = .98062562 Adjusted R^2 = .93800198 F(11,5)=23.007 p<.00142 Std. Error of estimate: .12402					
Intercept	**b***	**Std. Err.**	**b**	**Std. Err.**	**t(479)**	**p-value**
			0.136023	0.532555	0.255416	0.808576
Gender	0.004514	0.071187	0.004432	0.069892	0.063408	0.951899
Race	0.003251	0.082432	0.003192	0.080932	0.039444	0.970063
Age	-0.019267	0.105874	-0.012753	0.070081	-0.181981	0.862746
Employment Status	-0.011130	0.089643	-0.012679	0.102114	-0.124165	0.906022
Employment Period	0.001784	0.099993	0.000843	0.047265	0.017845	0.986453
Highest Level of Education	-0.009932	0.089355	-0.005657	0.050893	-0.111151	0.915820
IS	0.193744	0.176752	0.193744	0.176752	1.096131	0.322987
SDQ	0.193744	0.176752	0.193744	0.176752	1.096131	0.322987
IQ	0.193744	0.176752	0.193744	0.176752	1.096131	0.322987
SQ	0.193744	0.176752	0.193744	0.176752	1.096131	0.322987
SR	0.193744	0.176752	0.193744	0.176752	1.096131	0.322987

The results did not indicate which value is the dependent variable's value, as there was an ill-conditioned matrix.

6.5 COMPARISON OF THE THREE GROUPS (STUDENTS, ACADEMICS & ICS STAFF) OF PARTICIPANTS' RESULTS

The results pertaining to all variables from three stakeholders' (students, academic staff and ICS staff) surveys are displayed in the figures that follow. The graphs indicate the overall average of the statements related to the variables, including infrastructure services, system quality, information quality, service delivery quality, perceived usefulness, user satisfaction, customer value and organisational value. From the results it is evident that there were not many differences in the responses from all three stakeholder groups (students, academic staff and ICS staff), as the results were mostly positive. There were mostly agree and strongly agree responses from all three stakeholder groups, as represented in the graphs that follow.

6.5.1 Infrastructure services

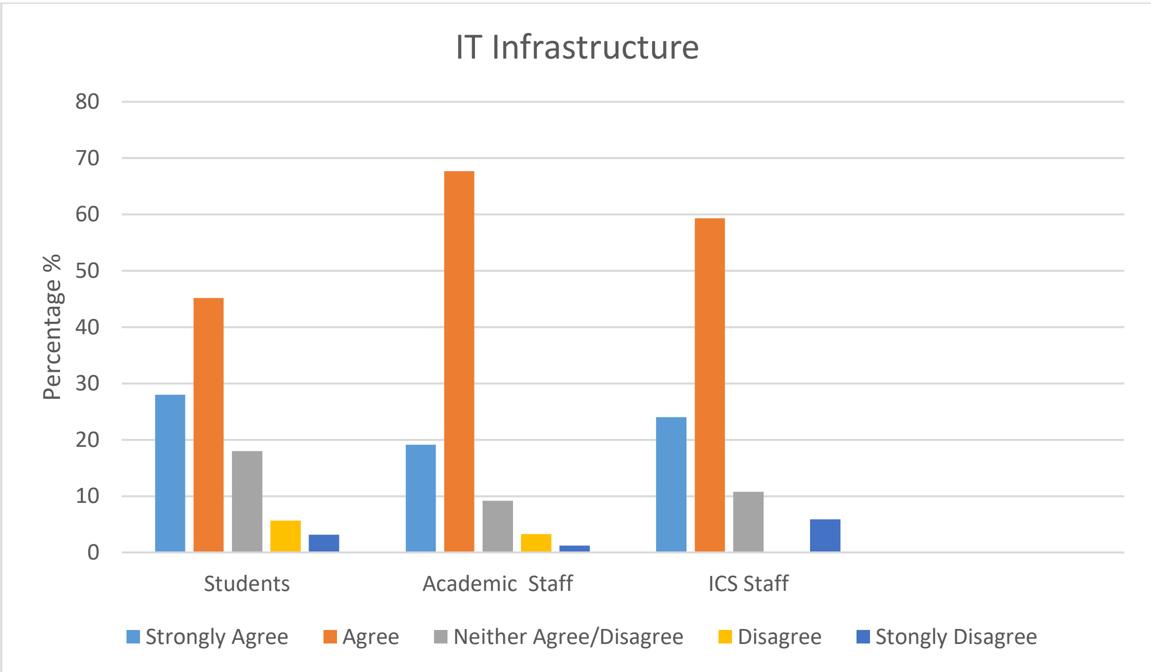


Figure 6.29: IT Infrastructure (students, academics and ICS)

6.5.2 System quality

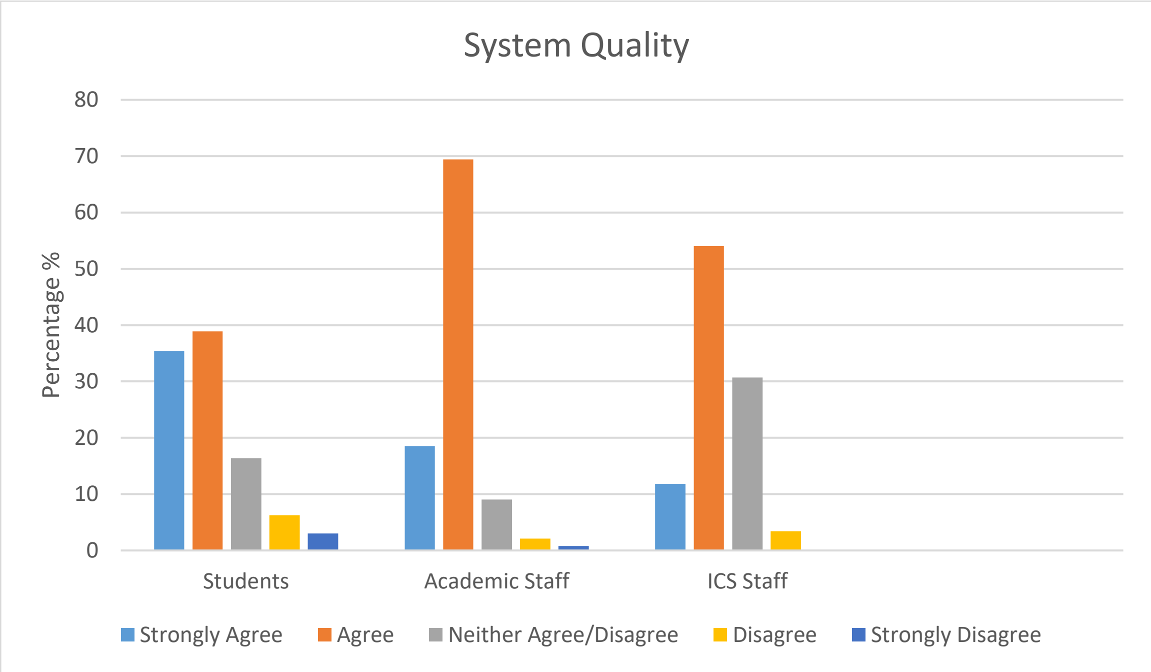


Figure 6.30: System quality (students, academics and ICS)

6.5.3 Information quality

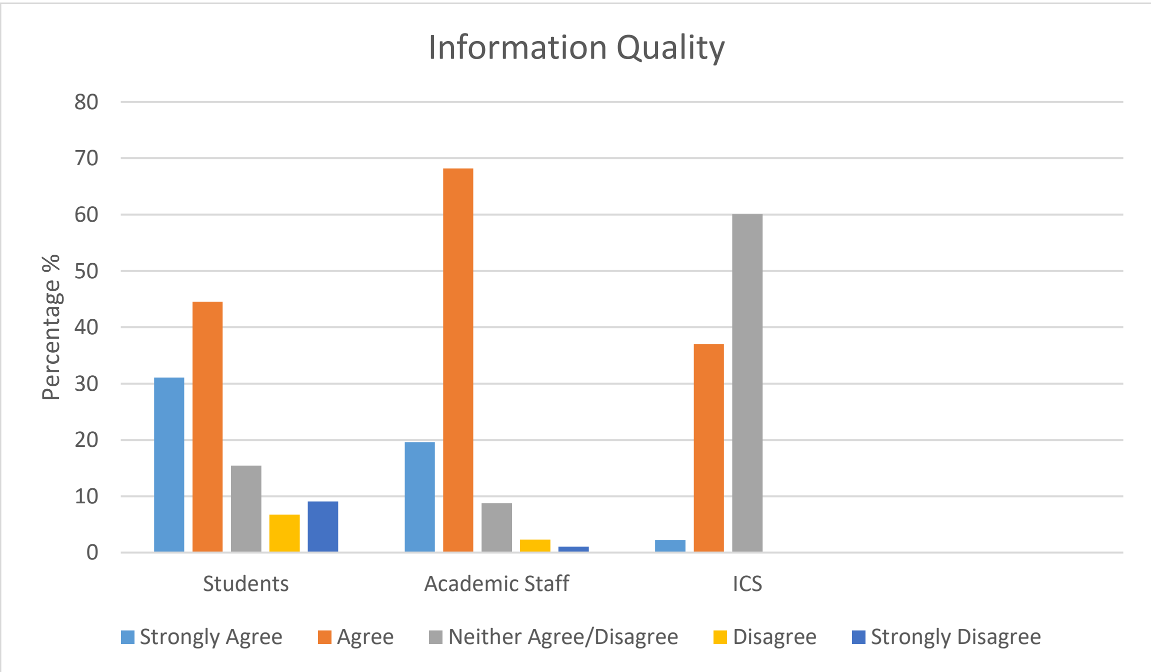


Figure 6.31: Information quality (students, academics and ICS)

6.5.4 Service delivery quality

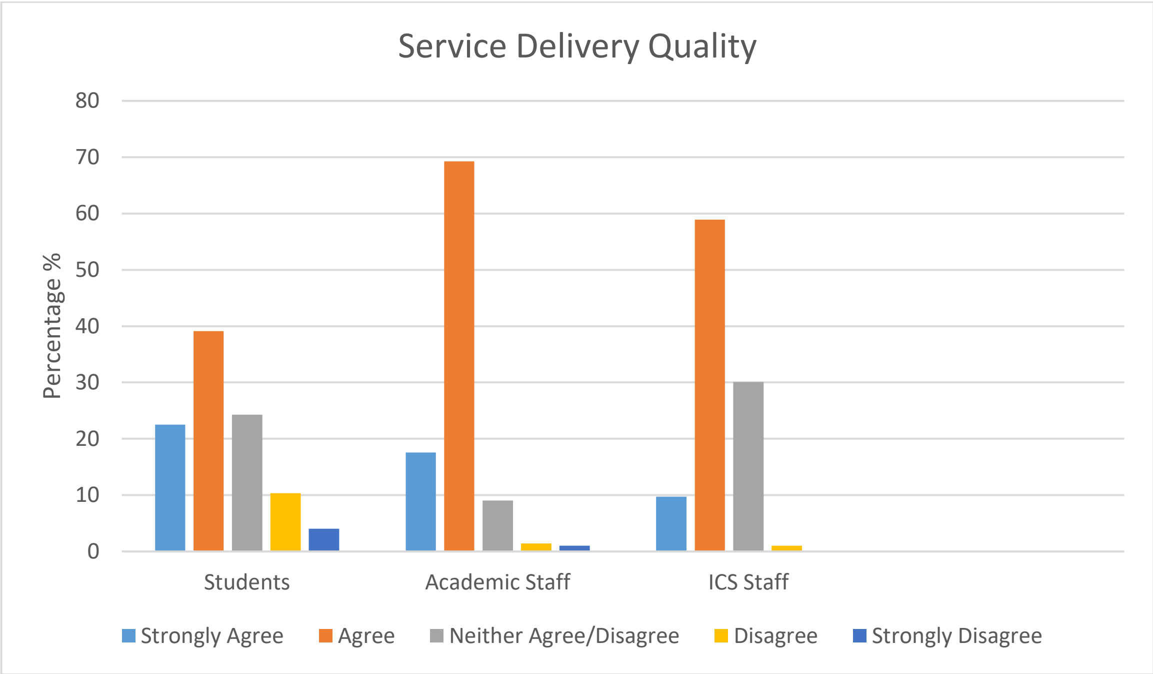


Figure 6.32: Service delivery quality (students, academics and ICS)

6.5.5 Perceived usefulness

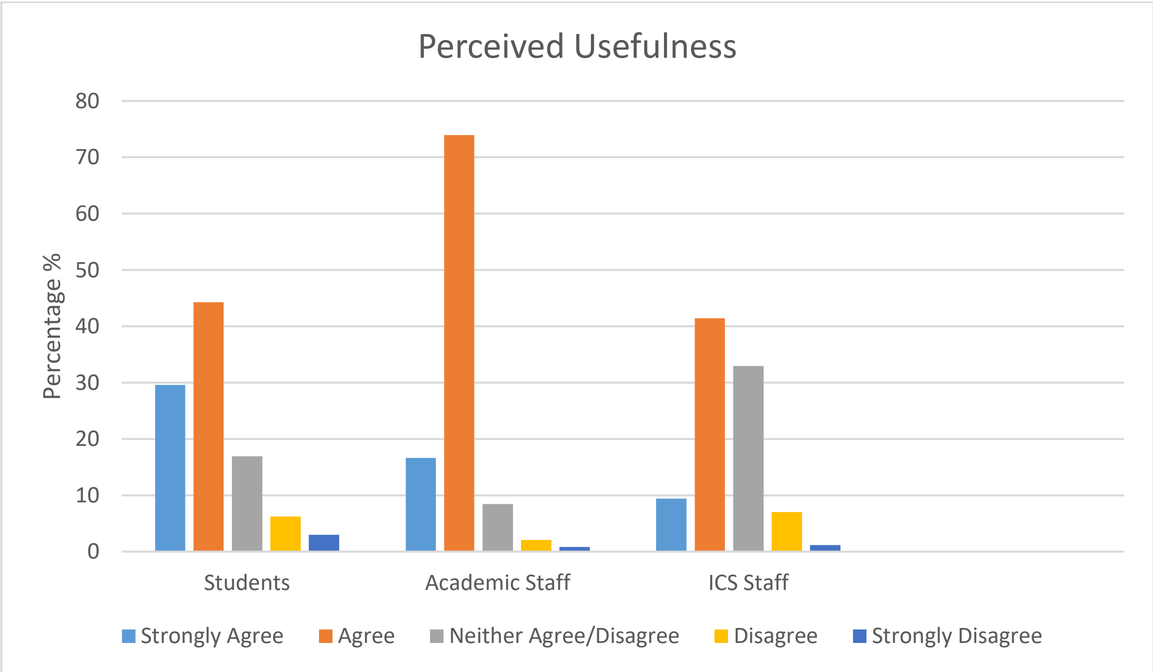


Figure 6.33: Perceived usefulness (students, academics and ICS)

6.5.6 User satisfaction

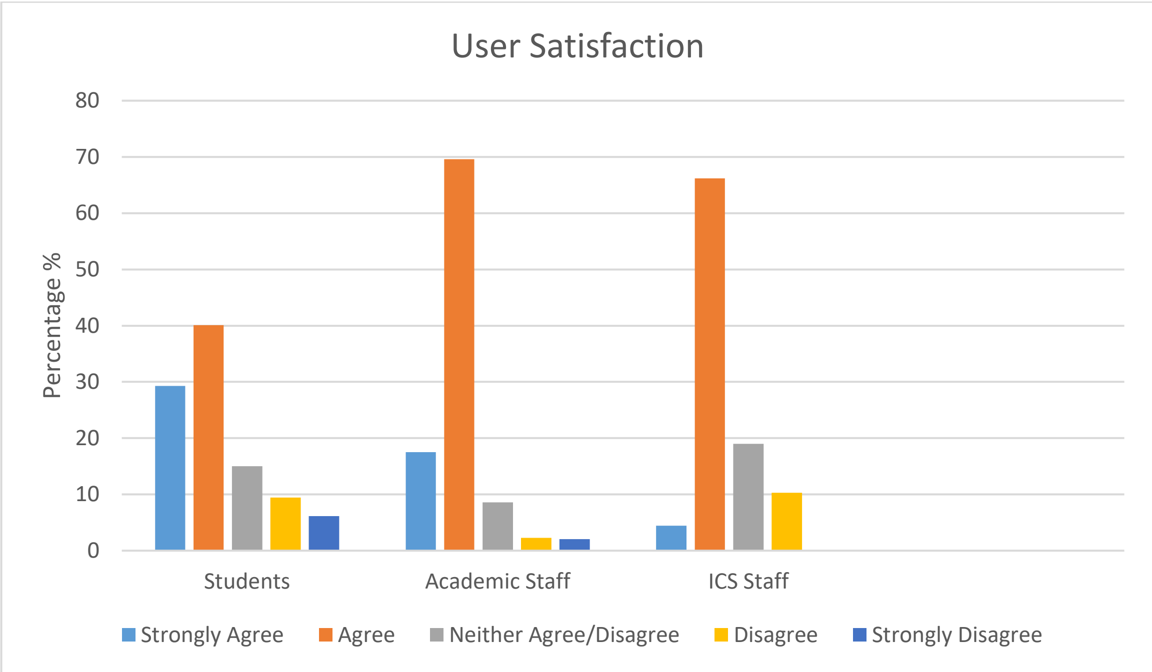


Figure 6.34: User satisfaction (students, academics and ICS)

6.5.7 Customer value

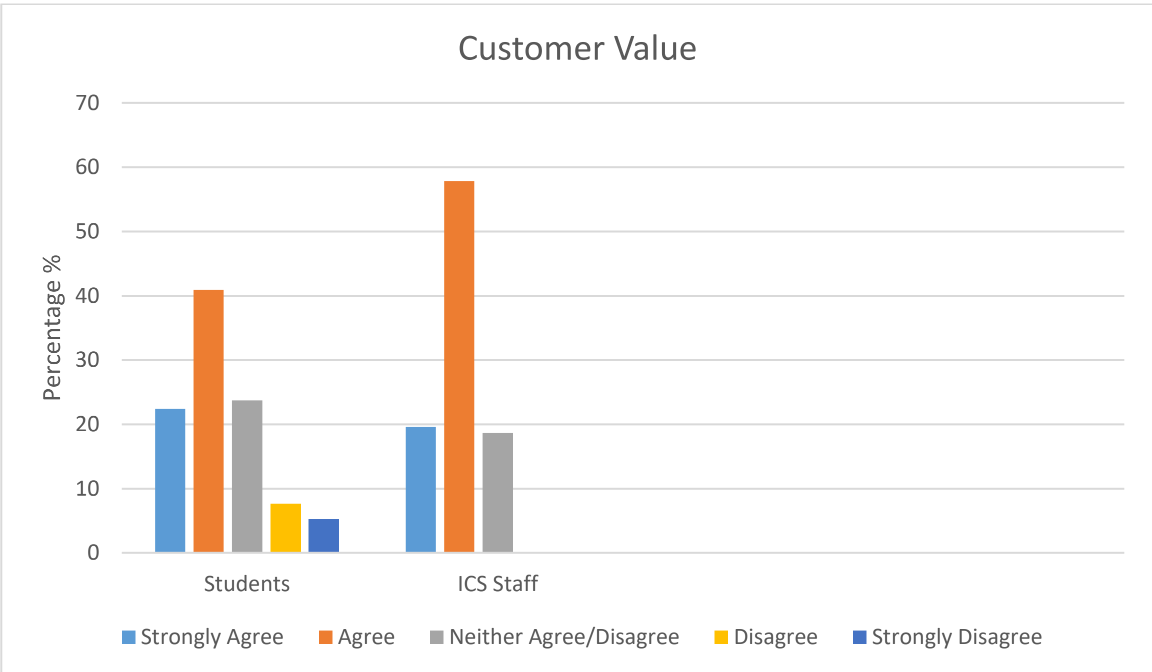


Figure 6.35: Customer value (students and ICS)

6.5.8 Organisational value

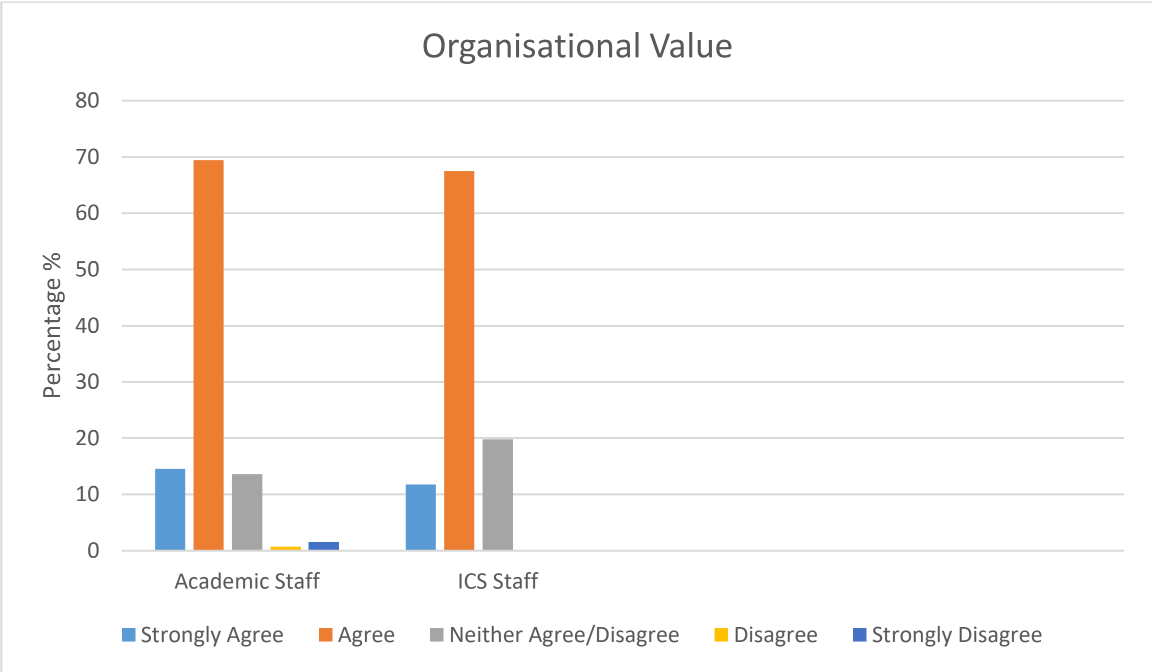


Figure 6.36: Organisational value (academics and ICS)

6.6 CONCLUSION

This chapter presented the quantitative data that was collected from three stakeholders, namely students, academic staff and ICS staff members. The data were presented using tables, figures and graphs and were explained in words. The percentages from three stakeholder participants' results, reliability and validity test results obtained by means of Cronbach's alpha and exploratory factor analysis respectively, MANOVA, ANOVA and Tukey HSD tests were presented and explained. A correlation matrix was presented and briefly explained in the chapter, as well as the regression summary of dependent variables, including demographic variables. Tests for normality were conducted and the results were presented in the form of graphs. The chapter concluded with a comparison of the results obtained from all three stakeholders. These results were presented in graphs. From the graphs that were presented, it could be seen that all stakeholders' results were similar, as most of the variables indicated positive results, implying that all stakeholders view the MOODLE system as a good system. Chapter 7 presents a discussion of the findings of the qualitative and quantitative results in conjunction with the relevant literature.

CHAPTER 7

DISCUSSION OF FINDINGS

7.1. INTRODUCTION

This chapter presents a discussion of the results that were obtained from the literature review and the qualitative and quantitative data. The results of the qualitative and quantitative sections of the study were presented in Chapters 5 and 6 respectively and this chapter presents a discussion thereof.

7.1.1 Use of learner management system (LMS)

With regard to the question pertaining to the way in which the LMS is used in delivering teaching and learning, the main understanding amongst the participants was that firstly, the LMS was introduced in answer to the demand for technology and as an enhancement tool. According to Bystrova et al. (2015), e-learning was introduced due to the increased use of technology. Online learning enhances education and the learning experience (Cheung et al., 2016). Hidayat (2017) holds that there is a demand for electronic learning readiness because of globalisation. There is a way in which to counter the influence of globalisation and this is by improving the education system. Hidayat (2017) argued that using media in teaching and learning could result in the generation of interests, motivation and desires, the stimulation of learning activities and the enhancement of learners' psychological state.

Secondly, the choice of MOODLE as an LMS at UKZN was mainly because MOODLE is free and user-friendly. According to Khoza (2016), MOODLE is free open-source software that users can download without needing permission or a license and most learners find MOODLE easy to use. Zainuddin et al., (2016) also mentioned that MOODLE is a free open-source platform. The authors added that the use of this platform is usually motivated by ease of adaptability, its simplicity and the open-source configuration. The ease of use of technology is linked to intrinsic motivation, where the quality of the tool is important (Bandlow and Bucley, 2016). Cheung, Chan, Brown and Wan (2016) added that knowing how to use the technology plays a significant role in the perceptions of the users' ease of use.

Thirdly, participants mentioned that e-learning is used for blended learning, where there is a need to allow for interfaces between students and lecturers beyond the classroom. According to Kabassi, Dragonas and Ntouzevic-Pilika (2015), the internet has had a remarkable impact on all aspects of life, including learning. This has influenced online activities in traditional learning and this influence is known as blended learning. Blended learning is when institutions combine face-to-face learning with online learning (Graham et al., 2013). This is done with the aim of both methods of learning complementing each other (Poon, 2013). According to Shorey et al. (2018), one of the solutions to the challenges that are faced in using e-learning and traditional face-to-face learning on their own, is the utilisation of blended learning. Adams et al. (2017) hold that blended learning empowers the faculties with the tools that they need to address the various needs of the students, as blended learning is a learner-centred approach.

Lastly, participants indicated that the LMS used at UKZN is mainly used for uploading notes, obtaining students' feedback through evaluations and discussion forums and for students to access study material online at their own convenience. Kabassi et al. (2015) mentioned that the main tools that LMS is used for are: asynchronous and synchronous communication; content development and delivery and formative and summative assessment. Asynchronous and synchronous communication includes forums, chats and email. Content development and delivery includes links to internet resources, learning objects, learning resources and files. Formative and summative assessment includes the tools that are utilised for self-evaluation, such as multiple choice questions. According to participants in this study, MOODLE is not being used to its maximum capacity, as there are numerous other functions available on MOODLE that most academics do not utilise, such as assessment tools. There is not enough engagement and discussion on MOODLE. Zainuddin et al., (2016) indicated that the MOODLE platform provides numerous capabilities that are not used to their full capacity. MOODLE was created to assist in the creation of online courses with the aim of focusing on interaction and collaboration (Parathnandh et al., 2014). Currently, UKZN is not fully utilising MOODLE and is not benefiting fully from MOODLE (Chicioreanu and Cosma, 2017).

7.1.2 Essential factors for successful and sustainable e-learning

Participants agreed that a combination of factors is required for e-learning systems to be successful.

Well trained staff and staff members who are willing to be trained. Nguyen, Newby and Macaulay (2015) indicated that there are a number of benefits that information technology provides for organisations and one of these benefits is a sustainable competitive advantage. This is the reason that staff members should be trained on how to use information technology so that the organisations can benefit from IT. It is important that ICS staff are competent and understand pedagogy, as well as the software, so that they are able to offer support to users. Proper IT infrastructure, where the server can handle anything that is put on it, networking, Wi-Fi, hardware and backups, maintenance of the MOODLE system and computer training for students who do not have the computer skills are all needed.

Engagement with staff and all stakeholders to minimise resistance. The most important role players in all organisational activities are the stakeholders (Al-Sabawy, 2013). According to Maric (2013), education institutions can have the best systems in the world but what is most important is the actual use of these systems by the stakeholders, as e-learning systems are no good unless perceived as useful by the stakeholders. One of the participants highlighted the importance of regular discussions and engagements with champions/experts and research in the field of e-learning so that the institutions are able to gain a broader understanding of the way in which MOODLE works and how they can make it more effective.

Significant financial investment is needed to upgrade the system and implement e-learning successfully. According to Nguyen et al. (2015), information technology has encountered a number of challenges with regard to implementation. Lack of resources, more specifically capital resources, has limited information technology skills. Baker (2016) highlighted the importance of money and that investing in students could have a positive effect on higher education students' outcomes. Policy-makers must be advised on the critical choices that they make regarding institutions' finances. Management has an important role with regard to finances, as they allocate the budgets. If management does not agree with the importance of e-learning, they will not understand the budget that is needed to ensure that e-learning becomes a success. According to Nguyen et al. (2015), the execution of projects often fails or is hindered due to a lack of support from management.

Evaluation of e-learning systems. For institutions to gain an understanding of the system, feedback from the users with regard to their opinions of the current MOODLE system's performance is necessary and a comprehensive evaluation of the system should be undertaken. Once the shortcomings of the MOODLE system are known, it can be upgraded to make it more user-friendly. Thuseethan, Achchuthan and Kuhanesan (2014) hold that selecting the appropriate technique for the evaluation of an LMS depends on the complexity and functionality of that system. The authors suggested two approaches for evaluating an LMS, namely evaluating the usability of the LMS and testing the effectiveness of the LMS.

These factors are essential for the successful and sustainable implementation of e-learning and are supported by current literature on the subject, with a number of authors highlighting the importance of student engagement, technical expertise, faculty engagement, faculty support of teaching and learning, infrastructure and support systems, e-learning environment and infrastructure, institutional support, didactical standards, e-learning competence of teachers, attitude of educators, presentation and delivery of course content, course development, course structure, students' preparation, student support, continuous evaluation and revision, evaluation and assessment and role of change agents (Vovides et al., 2014; Queiros and de Villiers, 2016; Alhomod and Shafi, 2013; Yew and Jambulingam, 2015; Bruhn-Suhr, 2004).

There is however new information that has emerged from participants pertaining to the factors that are essential for the success and sustainable implementation of e-learning. These factors are finances, regular discussions and engagement with champions/experts and research in the field of e-learning, so that the institutions are able to gain a broader understanding of the way in which MOODLE works and how they can make it more effective. Most of the literature highlights the importance of engagement with students, faculty and academic staff and not much emphasis is placed on engagement with all stakeholders. A number of participants stressed the importance of including all stakeholders with regard to engagement.

7.1.3 Role of stakeholders in successful e-learning implementation

A stakeholder analysis was conducted by reviewing existing literature and it was found that there are a number of stakeholders who perform a role in ensuring e-learning's success. These stakeholders are students, academic staff, employees, admin and executive management, technical providers, accreditation bodies, government, NGOs and parents of students (Asiyai, 2015; Leisyte & Westerheijden, 2014).

The stakeholders that were mentioned in common amongst participants were students and academic staff. This concurs with what a number of authors have mentioned in that most studies on e-learning ignore numerous stakeholders who should be taken into consideration, as most research focuses on students and academics as the only stakeholders (Al-Sabawy, 2013; Sudfelt et al., 2016). A number of participants did however, include ICS staff as stakeholders, the university teaching and learning office, management, quality assurers, administrators and the education department. The stakeholders that were identified by participants are discussed in detail next.

Students - Participants emphasised that students are the main stakeholders, as universities' main objective is to cater for students by facilitating teaching and learning. According to Abidin (2015), as students receive the service, they are the primary stakeholders. Participants mentioned that students have a responsibility to drive the need for MOODLE and one of the ways in which that can be achieved is by pressuring academics to use MOODLE. Participants added that students have a responsibility to ensure that they make use of the benefits associated with MOODLE and must be ethical in their conduct when using MOODLE. Literature highlighted the need for ethical conduct. Asiyai (2015) wrote that students should avoid issues that might lead to misconduct. Wagner et al., (2008) stated that students have numerous concerns with regard to e-learning, as listed hereunder.

- It is a different learning environment that requires certain skills for the students to be successful. Students must be computer literate, as technical sophistication is a necessity.
- With e-learning students will have access to vast quantities of information from several sources. Students must be critical thinkers with evaluation skills to sort through this information for what they need.

- E-learning forces students to be more independent than they would be with traditional learning. This implies that students must be motivated and committed to learning, so that e-learning can be effective for them.

The participants confirmed these students' concerns but indicated that there is more to their concerns than those listed in literature. Participants indicated that students are concerned about challenges of a technical nature regarding their work being lost in the system. Some students do not have data available at their place of residence and no smart phone, making access to MOODLE difficult for them when away from the university. At times, when at the university, the computers connected to the Local Area Network (LAN) are either unavailable or already occupied. Students are also concerned about the security of their information on the MOODLE system.

Academics - Academics have an important part to play in implementing teaching and learning (Shonola and Joy, 2014). They are responsible for guiding the educational experiences of students (Wagner et al., 2008). According to participants in this study, academics have a responsibility to use the MOODLE system and to explore the various tools and functions that the system offers. Literature has highlighted that academics' concerns are *firstly,* not having enough confidence to use the ICT devices (Maric, 2013), *secondly*, resistance to change, as some academics require evidence that these new technologies will simplify their lives (Shonola and Joy, 2014) and *lastly*, academic staff are concerned about whether or not their students will accept the e-learning tools. One of the main concerns expressed by the academic staff that was highlighted by the participants, is trepidation about changing the system that has been working for them for years. They are reluctant to change.

Technical Providers/ICS Staff - ICS staff's main role, as identified by participants, is to provide technical service. ICS staff has an added responsibility to ensure that the MOODLE system is operational, user friendly, easy to access and works effectively. Technical support should always be available, as it affects the stakeholders' willingness to use the system (Alhomod and Shafi, 2013). ICS staff members also have concerns, as they are continuously stressed about the increase in the number of MOODLE users and whether or not the MOODLE system will be able to accommodate such a large number. They are concerned about problems occurring on the system that they have not previously encountered and perhaps not being able to ensure that the system is always functional. Wagner et al., (2008) hold that stakeholders have high expectations and that technical support providers should be able to live up to these expectations. This adds pressure to the technical staff.

University Teaching and Learning Centre (UTLO) - should be the driver of e-learning. This department is responsible for consultation and engagement with various stakeholders, including deans of teaching and learning. Holtham (2005) mentioned the importance of developing and sustaining teaching and learning champions and stated that this can be achieved by creating a network of employees who are committed to enhancing and promoting teaching and learning. According to Howell and Higgins (1990), a champion is a person who is creative and innovative and can make a meaningful contribution. The UTLO needs such champions, especially during the e-learning implementation process, as innovation is needed for it to be a success. For institutions to see innovation within their teaching and learning centres, a number of events need to take place. According to Hannan (2001), innovation in teaching and learning will most likely occur when the innovator recognises a need for change, institutions' policies support innovation and all employees, including management, express an interest in the outcomes of innovation and the resources being made available for innovation.

Accreditation bodies/QPA - These are the assessors of the quality of the education being offered by institutions. Accreditation bodies are responsible for ensuring that higher education institutions' courses meet the minimum requirements (Wagner et al., 2008). According to Eaton (2015), accreditation is when the institutions use external quality reviews for examining the institutions' programmes for quality improvement and assurance. Participants revealed that it is important for quality assurance staff members to work with academics to improve the quality of information loaded on MOODLE. They also have a responsibility to conduct evaluations to gain information from students pertaining to the course content that is loaded on MOODLE. Mabizela et al. (2014) hold that it is not easy for universities to develop the appropriate learning content at the standards required for academic and professional excellence without involving and engaging with professional bodies for assistance and guidance. It is the responsibility of the professional body to ensure that they develop a well-articulated conception of the outcome competencies of graduates when they enter the profession. Should there be a university that does not achieve these outcomes, the accreditation body has the duty to withhold accreditation from that institution (Mabizela et al., 2014).

Management - One of the participants emphasised the need for management to be involved with MOODLE and claimed that a number of managers have no idea how MOODLE works, as they have never used the MOODLE system. Management's role is to provide effective leadership to all stakeholders in the field of teaching and learning (Asiyai, 2015). It is for this reason, amongst others, that management should know and understand the way in which MOODLE works so that they can provide more effective leadership in this regard. Management has the power to obtain resources and also has the final say over whether or not e-learning will be implemented (Sudefelt, 2016). It is for this reason that management should understand how MOODLE works in order to understand the benefits and invest in ensuring that there are enough resources for implementing e-learning. According to Fitzgerald, Bruns, Sonka, Furco and Swanson (2016), management has the responsibility to inculcate a civic ethos throughout the institution by giving voice to it in public forums and to create the infrastructure for support, as well as to establish new and sustainable policies. Management should involve all stakeholders when drafting policies.

Administrators - administrators are the people who are responsible for uploading certain documents on MOODLE for students and academic staff. Some of the class test marks are captured by academics, which is why they need to know how MOODLE works. A study was conducted by Rockwell, Schauer, Fritz and Marx (1999), which highlighted that, with regard to distance learning, administrators have several concerns with regard to issues concerning time, cost, instructional design, policy, instructor-student relationships and training. Fitzgerald et al. (2016) hold that administrators have the responsibility of fostering conversations within their institutions. They are the middle men between the students and management, as they are the people who communicate with both and must bridge the gap between the two, ensuring that the two communicate and understand each other with regard to issues related to MOODLE. Fitzgerald et al. (2016) recommended that the administrators should evaluate the merits of engagement within the historically prominent outreach units to ensure that there is a potential contribution to an engaged institution.

7.1.4 Evaluation methodology model for assessing e-learning systems' success

The evaluation methodology model was used to measure the e-learning LMS, (MOODLE), which is used at UKZN. The results gathered from the empirical study, together with the information gathered through secondary data collection (literature review), are discussed next.

Infrastructure services: The results pertaining to infrastructure services from the perspective of three stakeholders (students, academic staff and ICS staff), revealed that all three stakeholders were positive about issues related to infrastructure services. The academic staff had the highest positive rating, implying that they are satisfied with the infrastructure services that are currently in place. Negative responses were few in number. This positive result will work to the institutions advantage, as information technology infrastructure is important for a basic data system and communication within the technological framework (Jabbouri et al., 2016). Shibambu and Ditsa (2017) hold that IT infrastructure has become a vital tool in daily operations. When testing IT infrastructure, there were four critical components (Weill and Vitale, 2002). These components were: shares and standard application; shared IT services; human IT infrastructure and IT components (Weill and Vitale, 2002). These were tested in the survey where participants had to answer the following questions: "The *ICS division provides me with technology, advice and support services related to the MOODLE system"; "The ICS division provides me with a wide range of facilities to perform MOODLE activities"; "The ICS division enables me to receive and exchange information and knowledge with other lecturers and students by using electronic linkages and software applications"; "The ICS division provides me with data management advice and consultancy"; "The ICS division provides me with a wide range of electronic channels such as emails, websites and call centres to connect"* and *"The ICS division provides me with MOODLE service with a high level of technical security"*. Moore (2018) has a different perspective of the critical elements of IT infrastructure in that the focus should be on systems, objectives, evaluation and personnel. The study did not focus on these elements, as the aim was to measure the success of the e-learning system in use at UKZN. One of the main concerns of students that was revealed by empirical qualitative and quantitative study, was the security of their information on MOODLE. According to Durairaj and Manimaran

(2015), challenges relating to technical security issues are problematic and lead to constraints when using technology. Bose and Sarddar (2017) emphasised the importance of ensuring the smooth and secure integration of students' requirements and the protection of material.

System quality: When testing system quality, the main objective was to understand and measure the system quality characteristics advanced by Sarrab et al. (2015), namely usability, performance, functionality, availability and dependability. The following statements match the characteristics for measuring system quality: Usability: "*I find the MOODLE system easy to use"* and *"I find the MOODLE system easy to learn".* Performance: "*The MOODLE system always does what it should"* and *"The MOODLE system requires the minimum number of fields and screens to achieve a task".* Functionality: "*The MOODLE system includes all the necessary features and functions".* Availability: "*The MOODLE system meets my requirements".* Dependability: "*The MOODLE system always does what it should."*

System quality was highly rated by most stakeholders who participated, including students, academic staff and ICS staff members. The level of acceptance can be seen in Figure 7.2. According to Sheikhtaheri et al. (2014), when a system performs with speed and reasonability, it can be concluded that the system is flexible and reliable. This implies that the system is seen by most participants in the study as reliable and flexible. Flexibility of the system is when the system is able to adapt to the changing environment and demands of users (Al-Debei, 2014). What is of concern is that more than 30% of the ICS staff remained neutral with regard to the statements pertaining to system quality.

Information quality: When selecting information people generally make sure that they select information that is of good quality (Mai, 2013). For this and many other reasons it is necessary to ascertain stakeholders' perceptions of information quality. When the words information quality are used in higher education institutions, the reference is usually about output quality, which incorporates publications, academic programmes, information pertaining to courses, research events and seminars (Al-Debei, 2014). The study made use of questions relating to the characteristics of information quality as outlined by Freeze et al. (2010) and Al-Samarraie et al. (2017). The characteristics were completeness, timeliness, currency, comparability, meaningfulness, relevance, accuracy, reliability, conciseness, precision, understandability and format. During the study it was noted that both students and academic staff participants responded positively to questions pertaining to information quality and agreed that the system is of a high quality. This is illustrated in Figure 7.3. A worrying factor is that the majority of the ICS staff remained neutral. According to Mai (2013), information quality depends on the context, which needs to be understood. This could be the reason for the ICS staff members remaining neutral, as it is possible that their perspective was in a different context to that of students and academic staff members. ICS staff are sometimes experts in technology and their view is more in-depth, as they have an idea of the technological systems' capabilities.

Service Delivery Quality: According to Nejadjavad and Gilaninia (2016), service delivery quality is a measure of the way in which customers' needs for services are met by the services that are provided. To measure service delivery, the SERVQUAL scale was used (Wong and Huang, 2011). SERVQUAL includes five service quality dimensions, namely reliability, assurance, tangibles, empathy and responsiveness. These were tested among three stakeholders, namely students, academic staff and ICS staff members. Questions were asked to test each of the five dimensions. Table 7.1 presents the dimensions and the questions to which the stakeholders responded with regard to each dimension.

Table 7.1: Five dimensions and stakeholders' responses

Dimensions	Description
Reliability	Accuracy, dependability and reliability, where the system is available at any time and from anywhere (Uppal et al., 2017; Akter et al., 2013). *"MOODLE is always available for me to perform my activities".* *"MOODLE does not crash frequently".*
Assurance	The staff should have confidence, inspire trust and be competent in a way that they are able to apply their expertise (Carroll et al., 2016). *"MOODLE enables academic staff to deliver lectures, materials and feedback to students when promised".* *"The MOODLE system delivers answers to students' queries quickly".*

Dimensions	Description
Tangibles	Physical appearance of facilities, personnel, equipment and communication material (Uppal et al., 2017). *“MOODLE is well organised”.*
Empathy	Empathy implies individualising the attention that the service provider provides to its customers so that the service provider appears to be caring (Uppal et al., 2017). *“MOODLE protects information related to the personal details of students and their results”.*
Responsiveness	High quality, speedy service (Uppal et al., 2017; Carroll et al., 2016). *“I am able to complete tasks quickly with e-learning”.* *”The MOODLE system quickly delivers answers to students’ queries”.* *“MOODLE loads its pages fast”.*

Source: Adapted from Wong and Huang (2011) and researcher’s own construction.

The study revealed that overall, the stakeholders were satisfied with the service delivery quality of MOODLE, as there was an agreement level of over 60% across the board. There were however concerns, as a number of students and ICS staff, approximately 20% in each group, were neutral with regard to service delivery quality. This should be noted because stakeholders are the most important people for ensuring that e-learning becomes a success and their views should be heard and taken seriously.

Perceived Usefulness: Al-Debei (2014) and Tarhini et al. (2017) emphasised that perceived ease of use is related to the perceived usefulness and system usage. The implication is that for users to utilise the system, the system must be easy to use. The data that were collected from the three stakeholders revealed that most of the participants were positive about the perceived usefulness of the system. Academics had the largest percentage when it came to perceived usefulness, as over 80% of the academics responded positively. Students and ICS staff also responded positively with a higher than 50% level of agreement. All this can be seen in Figure 7.5. According to Al-Debei (2014) and Tarhini et al. (2017), this result indicates that most of the participants find the MOODLE system easy to use. More than 15% of the participants from the three stakeholder groups felt differently and were not positive about the perceived usefulness. According to Al-Samarraie et al. (2017), this necessitates that higher education institutions must improve and enhance the utility value (helpful e-learning tasks) and information quality, as this will increase the users' perceptions of the usefulness of the system.

User Satisfaction: A test was conducted to determine to what extent MOODLE meets the users/stakeholders' needs. Freeze et al. (2010) indicated that a user satisfaction test should be undertaken to measure the success of the interaction between users and the information system. User satisfaction was rated highly by students, academics and ICS staff members, as there was an agreement level of more than 70%. It appears that numerous stakeholders are satisfied with the MOODLE system. Sugianto and Tojib (2015) hold that there are several contributing factors to user satisfaction, namely efficiency, ease of use, confidentiality, security, information content, layout, timeliness, communication and convenience of access. Most stakeholders responded positively to statements relating to the contributing factors with the security factor being of concern. The qualitative interview results also highlighted the concerns of users with regard to the issue of security of their information on the MOODLE system.

Customer Value: Customer value was tested among two stakeholder groups, namely students and ICS staff members. According to Leroi-Werelds et al. (2014), customer value is when the customers base their opinion about the products and services on the way that product or service was delivered to them. It is therefore important to present the products and services in an appropriate manner. Students are MOODLE's customers in that the service/product was designed for them as the main users. More than 60% of the students and ICS staff members were satisfied with MOODLE, with the highest level of satisfaction being expressed for the statement "*Overall, MOODLE is simplifying my life*". Weinstein and McFarlane (2017) mentioned that for customers' needs to be met, service providers must go the extra mile and deliver more than just enough to meet the customers' basic needs.

Organisational Value: Pandey (2013) highlighted the benefits of e-learning for the organisation. These were tested and the results revealed the following points of interest.

- Costs: Over 80% of the academic and ICS staff agreed that e-learning reduces costs, *"The MOODLE system is cost effective*".

- Productivity: More than 90% of the academics and more than 80% of the ICS staff members agreed with the statement "*The MOODLE system enables UKZN to respond quickly to change and to develop teaching and learning techniques*".
- Alignment with organisational goals: More than 80% of the academics and ICS staff members agreed with the statement "*The MOODLE system is aligned with UKZN's organisational goals*".

The overall results regarding organisational value for both academic and ICS staff members indicated a higher than 80% level of agreement with MOODLE being beneficial to organisational value.

Overall, the results from all three stakeholder groups, namely students, academics and ICS staff members, were similar, as MOODLE was generally rated in a positive light. The results revealed that stakeholders view MOODLE positively and have accepted MOODLE as an enhancing tool for teaching and learning. There are however areas of concern with regard to MOODLE that need to be considered before the full implementation of e-learning in higher education institutions.

The MANOVA/ANOVA tests for demographics revealed the following results. The ANOVA test that was conducted revealed that there was no statistically significant difference ($p < .05$) based on gender for all variables for all three stakeholders (students, academic staff and ICS staff). The MANOVA test results revealed that there was no statistically significant difference based on race for most of the variables for students as well as academic staff. What was interesting to note was that the student participants only differed with regard to service delivery quality, where there was a statistically significant difference of $p = 0.048$. There was only statistically significant difference where $p = 0.048$ between the responses of black and Indian students. The Indian student participants agreed more on issues of service delivery quality than black student participants. Secondly, the academic participants only differed with regard to value, where there was a statistically significant difference of $p = 0.008$. There was a statistically significant difference where $p = 0.041$ between the responses from black and coloured academics; a statistically significant difference where $p = 0.004$ between responses from Indian and coloured academics and a statistically significant difference where $p = 0.044$ between white and coloured academics. It was evident that coloured academic participants agreed more on issues of value than other participants. It was however noteworthy that the ANOVA test conducted for the ICS participants revealed that there were no statistically significant differences ($p < .05$) based on race for all variables.

The MANOVA test results revealed that there was no statistically significant difference based on age for most of the variables for student and academic participants. Student participants only differed with regard to infrastructure services, where there was a statistically significant difference of $p = 0.01$. It is however important to note that post hoc tests (Tukey HSD) were conducted to determine the practical significance of the results obtained through ANOVA but the Tukey HSD test was not powerful enough to determine the paired difference in data. This means that we cannot really determine which age group differed or agreed more with infrastructure services. Academic participants differed with regard to service delivery quality, where there was a statistically significant difference of $p = 0.03$. As with the students' results, the academic Tukey HSD test was not powerful enough to determine the paired differences. The ICS participants' MANOVA results revealed that there was a statistically significant difference based on age group for all the variables, with a statistically significant difference of $p = 0.032$. There was a statistically significant difference where $p = 0.034$ between the responses of participants in the 26-35 age group and participants in the 46+ age group, as well as a statistically significant difference of $p = 0.046$ between the responses of participants in the 36-45 age group and participants in the 46+ age group. It was evident that the younger group of ICS participants between the ages of 26-35 agreed more on all variables.

The MANOVA test results revealed that there was no statistically significant difference based on the highest level of education for most of the variables for student and academic participants. Student participants only differed with regard to infrastructure services, where there was a statistically significant difference of $p = 0.01$. Further tests (Tukey HSD) revealed that Doctorate/PhD student participants agreed more on issues of infrastructure services. Academic participants only differed with regard to infrastructure services, where there was a statistically significant difference of $p = 0.05$ and a statistically significant difference of $p = 0.028$ for value. Further Tukey HSD tests revealed that post graduate degree academic participants agreed more on issues of infrastructure services and value. The ICS participants' results revealed that there was no statistically significant difference ($p < .05$) based on highest level of education for all variables.

Academic participants' results of the MANOVA test revealed that there was no statistically significant difference based on occupational level for most of the variables, except for system simplicity, where there was a statistically significant difference of $p = 0.016$. The Tukey HSD test could not indicate which occupational level was in more agreement with system simplicity.

The MANOVA test results revealed that there was no statistically significant difference based on period of employment for most of the variables for academics. The participants only differed with regard to infrastructure services, where there was a statistically significant difference of $p = 0.016$ and information quality with $p = 0.49$. The paired differences could not be determined by the Tukey HSD test. ICS participants' ANOVA test revealed that there was no statistically significant difference ($p < .05$) based on period of employment for all variables.

The MANOVA test results revealed that there was no statistically significant difference based on college for most of the variables for students. The student participants only differed with regard to service delivery quality, where there was a statistically significant difference of $p = 0.013$ but the colleges that were paired could not be confirmed. Academic participants' results revealed that there was no statistically significant difference based on college for most of the variables. The participants only differed with regard to value, where there was a statistically significant difference of $p = 0.028$ and infrastructure services, where there was a statistically significant difference of $p = 0.015$ between the responses of participants in the College of Agriculture, Engineering and Science and participants from the College of Humanities, as well as a statistically significant difference of $p = 0.044$ between the responses of participants from the College of Agriculture, Engineering and Science and participants from the College of Law and Management Studies. The College of Agriculture, Engineering and Science's academic participants agreed more on issues of infrastructure services and value.

The correlation results of the three stakeholder groups, namely students, academics and ICS staff members, revealed three different but strong mutual relationships. There was a relationship between service reliability and system quality, a relationship between service delivery quality and organisational value and a relationship between service delivery quality and system quality. Lee, Ariff, Shoki, Zakuan and Sulaiman (2016) identified a relationship between system quality and customer value. The ICS results of correlation indicated that all the variables were strongly correlated. Table 7.6 presents the various correlations revealed by the empirical study.

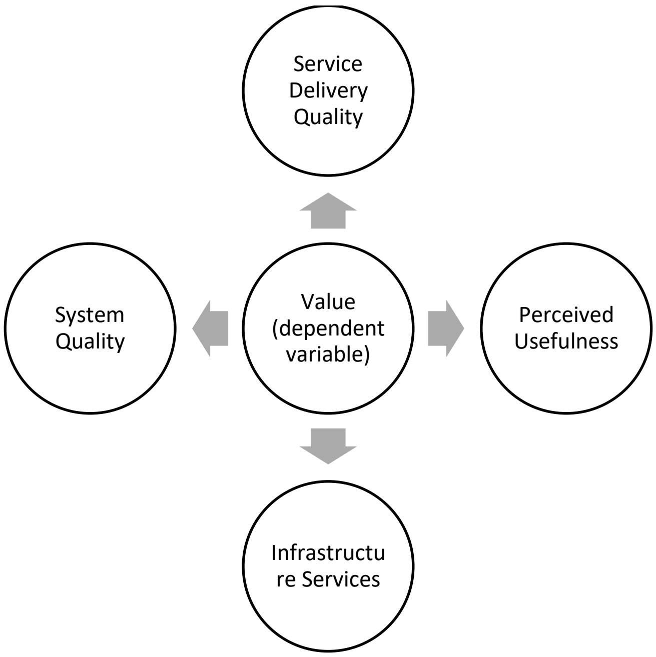
Table 7.2: Correlation of students, academic staff and ICS staff results

Relationship	Students	Academic Staff	ICS Staff
Information quality & service delivery quality	✓		✓
Information quality & system quality	✓	✓	✓
Service delivery quality & system quality	✓	✓	✓
Perceived usefulness & service delivery quality	✓		✓
Organisational value & perceived usefulness			✓
Service delivery quality & organisational value		✓	✓
Information quality & infrastructure services	✓	✓	✓
Organisational value & information quality		✓	✓
Perceived usefulness & infrastructure services			✓
Information quality & perceived usefulness			✓
Service reliability & service quality	✓	✓	✓
Service reliability & information quality	✓	✓	✓
Service simplicity & service reliability		✓	✓
Service reliability and organisational value		✓	✓
Service reliability and infrastructure services		✓	✓
Service reliability and service delivery quality		✓	✓
Service simplicity and service quality		✓	✓

Source: Researcher’s own construction

It was evident that there were a number of relationships between the variables. Some variables indicated stronger positive correlations than others. According to Al-Debei (2014), the perceived usefulness of the e-learning system is affected by the information quality. This is in conjunction with the information gathered from ICS staff, where perceived usefulness had a strong correlation with information quality. Wong and Huang (2011) hold that there is a positive relationship between perceived usefulness and system quality. The results revealed that this statement is true, as there were strong correlations between system quality and service delivery quality, as well as service delivery quality and perceived usefulness. This was seen from the results of three stakeholder groups, namely students, academic staff and ICS staff members. It is important to understand this relationship, as the success of the system is significantly affected by the system's quality (Wong & Huang, 2011). Al-Samarraie et al. (2017) highlighted the importance of higher education institutions in enhancing utility value, as information quality is one of the drivers of perceived usefulness. The ICS staff results indicated a strong correlation between information quality and perceived usefulness. According to Freeze et al. (2010), one of the contributing factors to students' satisfaction with the system is when the system contributes to the learning outcomes in a way that results in the system being perceived as being useful. Al-Samarraie et al. (2017) added that if the quality of the information is high, this will increase the user satisfaction. In this case it was grouped with organisational and customer value. The academic staff correlation revealed that there is a strong relationship between user satisfaction (organisational and customer value) and information quality. The students and ICS staff results also revealed this but indirectly through other variables, where information quality and service delivery quality indicated a strong correlation between students, which links to customer and organisational value, and information quality.

Multiple regression was conducted using the students, academics and ICS staff members' results. Gravetter and Forzano (2012) noted that multiple regression analysis is a statistical process used to find the most accurate prediction equations. The results revealed that value is a dependent variable. The students' results revealed that value is dependent on service delivery quality, perceived usefulness and infrastructure services. The academics' results revealed that value is dependent on service delivery quality, perceived usefulness and system quality. The ICS results, however, did not identify a dependent variable. The students' and academics' results were similar in that they both revealed value as a dependent variable that is dependent on service delivery quality and perceived usefulness. The students' and academics' results indicated that if the university wishes to achieve organisational and customer value, they should improve the service delivery quality and perceived usefulness. The two stakeholders' (students and academics) results also revealed that value is dependent on infrastructure services and system quality. Figure 7.1 illustrates the dependent variable and the variables on which it is dependent. This should provide guidance to HEIs that if they wish to increase value to customers and the organisation, they need to focus more on the four variables upon which value is dependent.



Source: Researcher's own construction

Figure 7.1: Multiple Regression Analysis

7.2 CONCLUSION

This chapter presented a discussion of the findings from both the literature review and the empirical study. All four research objectives were discussed with regard to the data that were collected. The results were from the literature review and six different types of stakeholders, namely students, academic staff, ICS staff, management, support staff and quality assurance staff members at UKZN. The chapter ended by highlighting the correlations between the various evaluation methodology model components from the quantitative study and the multiple regression analysis discussion. Chapter 8 concludes the research with a summary of the entire research paper.

CHAPTER 8

CONCLUSION AND RECOMMENDATIONS

8.1 INTRODUCTION

This chapter presents the summary of the research, including the study's contribution to literature and recommendations for future research. The research questions that the study aimed to address are revised and there is a concise review of the research question and answers. During the summary of the study all chapters are summarised, thus presenting a summarised overview of why the study was conducted, how the study was conducted, where it was conducted and what the findings of the study revealed in conjunction with each research objective.

The main purpose of this study was to put the model for measuring e-learning system success at the University of KwaZulu-Natal into practice, with the aim of identifying the factors that are hindering the success of the e-learning system in order to minimise them. E-learning is viewed as the future in education and substantial amounts of money have been invested in e-learning systems to ensure their success.

8.2 CRITICAL RESEARCH QUESTIONS ADDRESSED IN THE STUDY

In answering the research questions and addressing the research objectives, the researcher conducted a literature review to gather information that is already available to answer the research questions. The information from the literature review was insufficient to address the research problem. This resulted in an empirical study to gain a more in-depth understanding of the problem and the way in which to address that problem. The researcher conducted the empirical research using a mixed methods approach, where both qualitative and quantitative methods were employed to answer the research questions. Some of the findings from the empirical study were congruent with the results from the literature review but others were not, as new information came to light from the empirical study.

8.3 RESEARCH QUESTION 1

How is a learner management system utilised in teaching and learning?

A learner management system is used as a teaching and learning tool to complement traditional learning. This is known as blended learning. Graham et al. (2013) defined blended learning as face-to-face learning combined with electronic learning with the aim of improving the activities of higher education institutions. Participants highlighted that the demand for technology necessitated the inclusion of technology. This led to e-learning LMSs being introduced as enhancement tools. The literature review was undertaken in conjunction with the empirical study and a number of statements with regard to e-learning were found to be common to both, one being that online learning is used for enhancing the learning experience in education (Shamsuddin, Abu Bakar, Makhtar, Wan Isa, Rozaimee and Yusof, 2016).

Participants indicated that the LMS in use at UKZN is mainly used for uploading notes, obtaining students' feedback by means of evaluations and discussion forums and for students to access the study material online at their own convenience. The literature review revealed that an LMS is for lecturers to upload learning materials for students and to initiate discussion forums (Sibanda and Donnelly, 2014). Participants did however highlight that MOODLE at UKZN is not currently being used to its maximum capacity, as not enough engagement and discussion is taking place on MOODLE. Apart from the LMS being useful for teaching and learning by the uploading of notes and discussion forums, Munoz et al. (2015) wrote that the LMS performs a supportive role for the people who are responsible for managing the content and academic processes. The LMS acts as a monitoring and evaluation tool (Parathnandh et al., 2014).

8.4 RESEARCH QUESTION 2

Which factors are necessary for the successful and sustainable implementation of e-learning?

The literature review indicated that there are numerous factors that play a role in ensuring that e-learning becomes a success. Participants in the empirical study revealed several factors for ensuring that e-learning becomes a success. What was interesting to note was that a few factors that were highlighted by the participants are important for ensuring the success of e-learning were not covered in the existing literature. These are discussed in the paragraphs that follow.

Engagement with staff and stakeholders in an effort to make them less resistant to implementing, or being involved with, e-learning. These engagements could be achieved by means of discussions with champions/experts in the field of e-learning to understand how MOODLE can be used to its maximum capacity.

Finance as a form of capital resource is needed, as information communication technology systems are costly to buy and to maintain. Management has to budget for the implementation of e-learning, as projects often fail due to a lack of support from management.

E-learning systems should be evaluated from time to time to receive feedback from stakeholders on the MOODLE system. This will assist in improving the learner management system in a way that will be beneficial for the end user.

Other factors that are essential for the successful and sustainable implementation of e-learning are those that were identified in the literature and by participants. These include: the importance of student engagement; technical expertise; faculty engagement; faculty support; teaching and learning; infrastructure and support systems; e-learning environment and infrastructure; institutional support; didactical standards; e-learning competence of teachers; attitude of educators; presentation and delivery of course content; course development; course structure; student preparation;

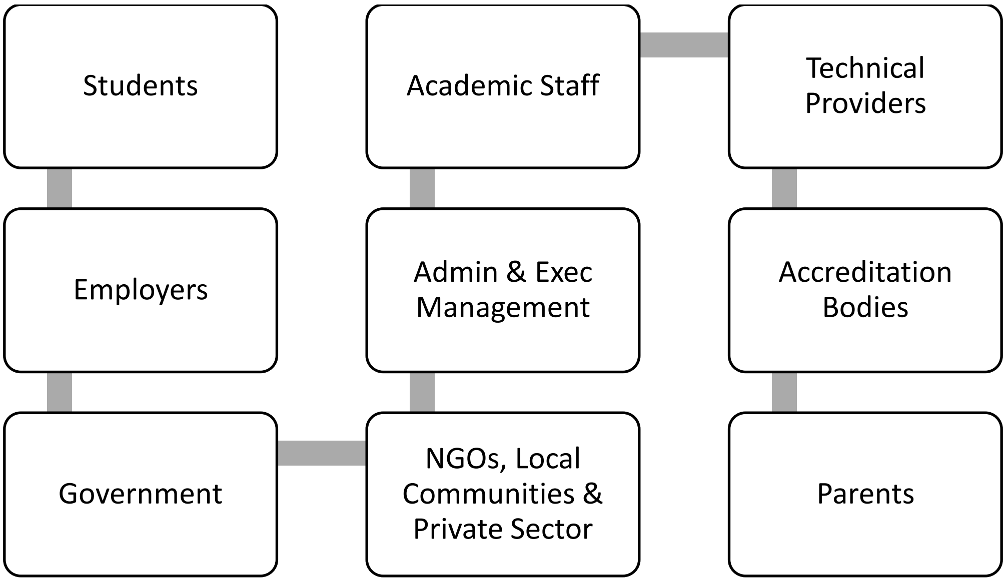
student support; continuous evaluation and revision; evaluation and assessment and the role of change agents.

The collection of secondary data revealed that one of the ways in which HEIs can ensure that their organisations successfully implement e-learning is by means of quality standards. Quality standards can be improved by benchmarking. In section 2.15 benchmarking was defined as a process involving an organisation comparing itself to other organisations (Alexander and Golja, 2007). The HEIs will benefit from a number of factors associated with benchmarking and these include organisations being able to determine how best they can ensure that their customers' needs are met, they can identify their strengths and weaknesses and gain innovative ideas in a cost-effective way.

8.5 RESEARCH QUESTION 3

What are the stakeholders' roles in ensuring that the implementation of e-learning is a success?

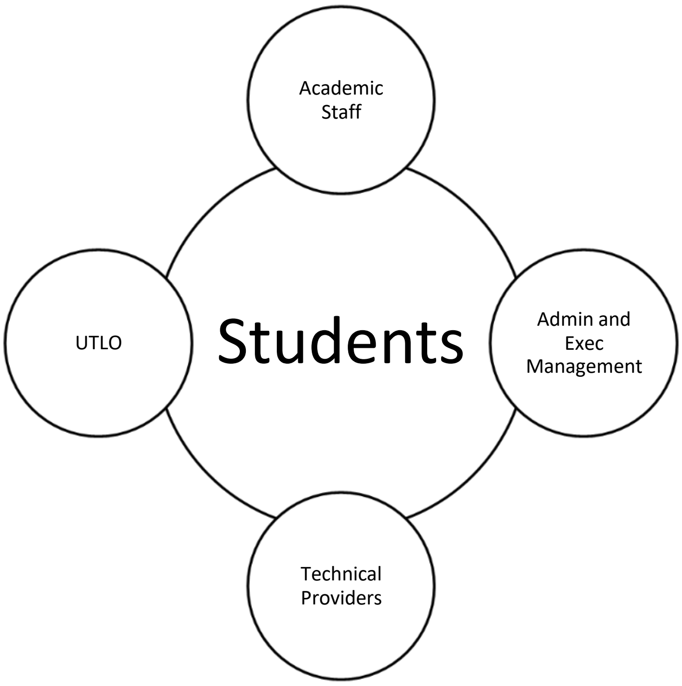
The study revealed that there are several stakeholders that have a role in ensuring that the implementation of e-learning is a success. These stakeholders have a responsibility and a role to perform. The stakeholders do however, have concerns with the introduction of e-learning. The literature review highlighted these concerns and the empirical research supported the literature but new information came to light with regard to stakeholders' concerns. The stakeholders identified in literature are represented in Figure 8.1.



Source: Adapted from Asiyai (2015)

Figure 8.1: Stakeholders as identified in existing literature

In the empirical study, participants identified stakeholders in e-learning as those depicted in Figure 8.2.



Source: Researcher's own construction

Figure 8.2: Stakeholders as identified in the empirical study

This is an indication that educational institutions need to understand that there are more stakeholders in e-learning than students alone. Most participants named students and academic staff as stakeholders. The literature review revealed that most studies pertaining to e-learning focus on students as stakeholders (Al-Sabawy, 2013). The empirical study did however reveal information that was not found in the literature, which highlights the importance of the university's teaching and learning office as a stakeholder in e-learning, as it is a driver of e-learning.

Stakeholders have several concerns with regard to e-learning, as mentioned in the literature review as well as the empirical study. However, participants highlighted the following concerns that were not covered in the current literature.

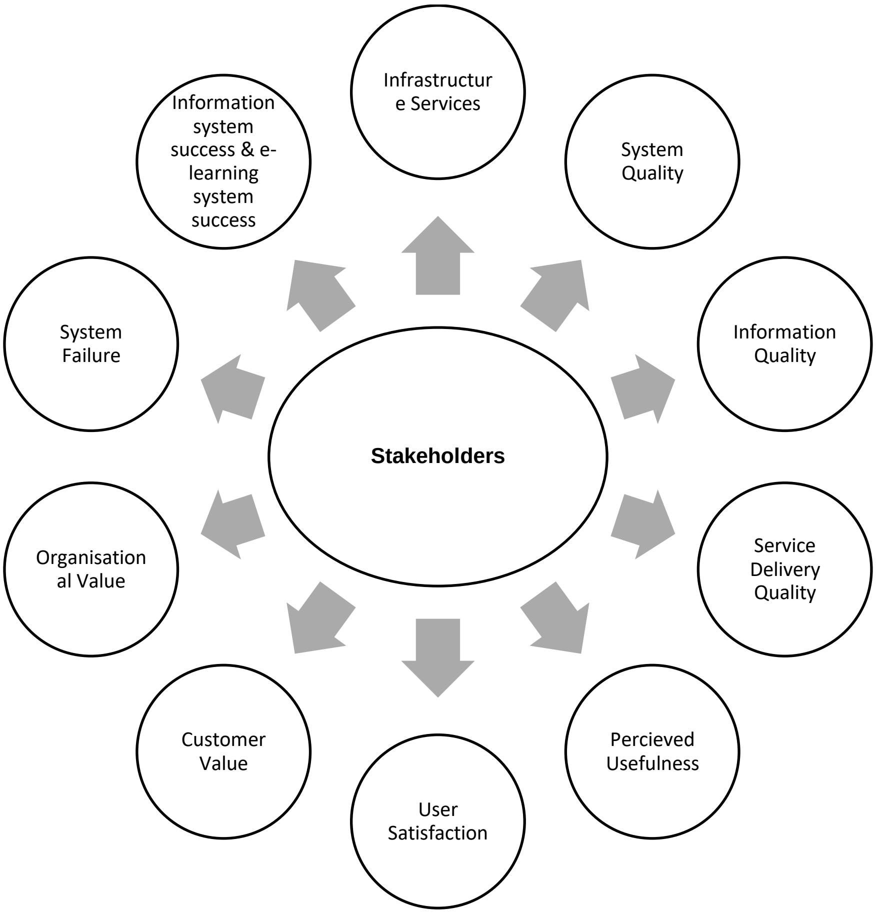
- Technical challenges, with students being concerned about their work being lost in the system.
- A number of students do not have access to data at their residence, nor do they have smart phones, making access to MOODLE difficult for them, as they can only access it while at the university if the computers on the Local Area Network (LAN) are available.
- Students are concerned about the security of their information in the MOODLE system.
- Technical providers are concerned that a problem could occur in the MOODLE system that they have never come across before and they might not know how to repair it.
- Technical providers are concerned about ensuring that the system remains functional.

8.6 RESEARCH QUESTION 4

How can universities use the evaluation methodology model to assess e-learning systems' success?

8.6.1 The proposed model for assessing e-learning systems

The proposed evaluation methodology model, with the addition of the tenth component (stakeholder analysis) that was not initially part of the model, was used for assessing the e-learning MOODLE system at the University of KwaZulu-Natal. The proposed model with the addition of stakeholder analysis in the centre of the figure is illustrated in Figure 8.3.



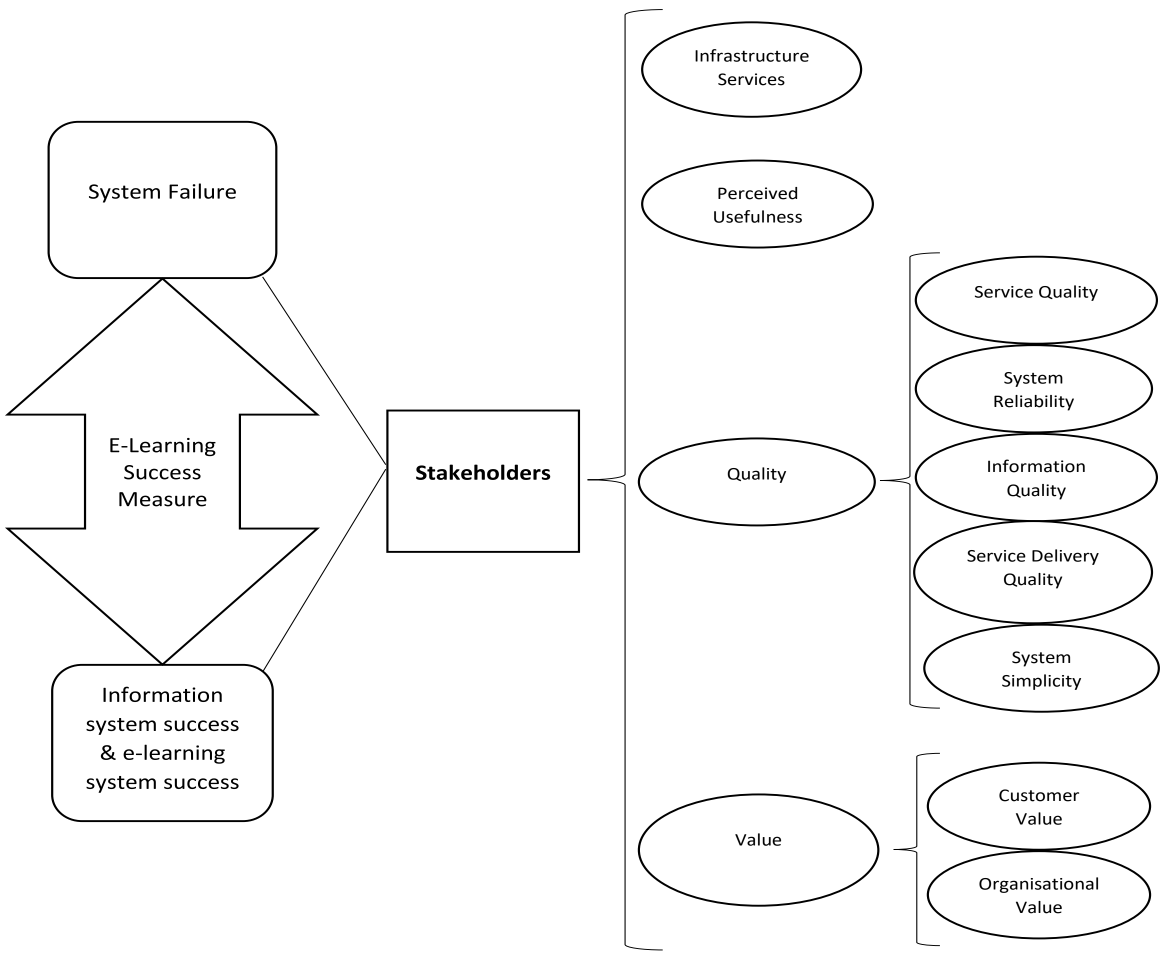
Source: Adapted from Al-Sabawy (2013) and Maric (2013)

Figure 8.3: Proposed model for evaluating e-learning systems

A qualitative study was conducted with three stakeholder groups, namely management, support staff and quality assurance staff members, who were interviewed and asked questions with regard to the variables in the evaluation methodology model. The quantitative study included three stakeholders, namely students, academic staff and ICS staff members from whom information was gathered with regard to the variables in the evaluation methodology model. The results of both the qualitative and quantitative studies undertaken at UKZN were positive, as all variables were rated positively by most participants, as indicated in Chapter 7 where the findings were discussed. Overall, the MOODLE system at UKZN was viewed as being a beneficial tool for enhancing teaching and learning at the university. There are however challenges, of which the institution needs to take note. One of the most worrying concerns is the issue of security of users' information. Users should be educated with regard to this issue to put their minds at ease.

8.6.2 Empirical study (revised model)

The proposed model in Figure 8.3 was tested and the results led to a number of the variables being merged and others separated. This led to a revised model being formed. This model is depicted in Figure 8.4.



Source: Researcher's own construction

Figure 8.4: Revised Evaluation Methodology Model

The revised model differs from the initial evaluation methodology model that was adopted from Al-Sabawy (2013). The revised evaluation methodology model was constructed after the empirical results revealed that a number of variables in the model should be grouped and others divided. Figure 8.4 indicates that to measure e-learning system success, one needs to measure the system failure, information system success and e-learning system success. The stakeholder variable is important for determining the system failure as well as the information system and e-learning system success. An analysis of the stakeholders should be undertaken and the results must be used, as these stakeholders should be included in the study to determine the infrastructure services, perceived usefulness, quality, system simplicity and value. According to Chua and Dyson (2004), system quality, system reliability, information quality, system simplicity and service delivery quality are all characteristics of quality. This is the reason for them being grouped as one variable referred to as quality. Reliability is a quality characteristic. It comprises maturity, fault tolerance and recoverability (Chua and Dyson, 2004). Maturity is when most of the faults in the software have been eliminated over time; fault tolerance is when the software is capable of handling errors and recoverability is the ability of the software to resume working and restoring lost data after failure (Chua and Dyson, 2004). According to Ramayah, Ahmad and Lo (2010), the reliability of an e-learning system is said to have influence over its usage. Alla, Faryadi and Fabil (2013) mentioned that it is not just about ensuring reliability, it is also about showing how the content is produced, as this will develop a sense of trust in the users. This is an indication that trust is closely linked to reliability.

Two variables from the initially proposed evaluation methodology model were separated, namely system delivery quality, which separated and formed an additional variable named system reliability, and system quality, which separated and formed another variable named system simplicity.

8.6.3 Summary of ANOVA tests (significance)

The ANOVA tests were performed to determine the demographic details' impact on the responses. These results revealed that firstly, gender had no statistically significant difference for all three stakeholders, namely students, academics and ICS staff. Secondly, race results indicated that the Indian students agreed more on issues of service delivery than did black students. Coloured academics agreed more with value than the Indian and black academic staff. The ICS staff however, reflected no statistically significance difference with regard to race. Thirdly, age results revealed that there was a statistically significant difference with regard to infrastructure service for students and with regard to service delivery quality for academics but further tests could not determine the age groups that differed. ICS results indicated that there was a statistically significant difference with all variables. The younger generation, between the ages of 26 and 35, agreed more on all variables. Fourthly, highest level of education results revealed that Doctorate/PhD students agreed more on infrastructure services, while academics with post graduate degrees agreed more on infrastructure services and value. ICS staff had no statistically significant difference. Fifthly, period of employment results indicated that academics differed on infrastructure services but the exact period of employment that was more in agreement could not be determined. Lastly, academic college students differed on service delivery quality but it is not clear which college was more in agreement and academics differed with regard to infrastructure services, where the College of Agriculture, Engineering and Science agreed more on infrastructure services.

8.6.4 Measure of similarity and difference

It is always of interest during research for one to show the relationship or link between people or objects (Easterby-Smith, Thorpe and Jackson, 2002). The measure of similarity and difference is performed when one wishes to ascertain the causes and effects of various factors. An example given by Easterby-Smith, Thorpe and Jackson (2002) is how the absence of a performance management system could affect employees' morale and productivity in an organisation. To determine the similarity, correlation statistics are utilised. According to Easterby-Smith et al. (2002), correlation statistics is the matching of items to determine the relationships between the variables. Kruger and Welman (2000) hold that correlation is the description of the relationship between two variables. Correlation coefficients vary between -1 and +1 and these indicate a total negative or positive relationship respectively, with the midpoint being zero, which indicates that there is no relationship (Easterby-Smith et al., 2002). Correlations where the coefficient (*r*) is -1, 00 represents a perfect inverse relationship, while a coefficient of +1, 00 indicates a perfect direct relationship. A coefficient close to zero indicates causal relationships (Kruger and Welman, 2000). All the correlation coefficients in the quantitative study were above 0.5, indicating that the relationships were close to perfect, direct relationships. In this study it was revealed by the quantitative data collected from students that several relationships existed between the evaluation methodology model's variables. All variables were linked, either directly or indirectly.

It is therefore in the interest of the HEIs to ensure that quality, perceived usefulness and infrastructure services are improved to increase the value of the organisation to customers. The results of the multiple regression analysis revealed that value is a dependent variable that is dependent on quality, perceived usefulness and infrastructure services. This means that if institutions wish to improve value, be it customer or organisational value, the quality, perceived usefulness and infrastructure are important variables to consider.

8.7 CONTRIBUTION TO STUDY, PRACTICE AND BODY OF KNOWLEDGE

This study has made a significant contribution to the body of knowledge in the ways described below.

- The evaluation methodology model has ten variables. The eleventh variable, namely stakeholder analysis, was identified by the researcher and was proposed and tested in the study, thus adding to the current body of knowledge.
- As seen in the existing literature, most studies do not go beyond understanding the perceptions of students. Students are not the only stakeholders to consider when evaluating e-learning systems. This study went beyond considering only students as stakeholders, as a stakeholder analysis was conducted and six of those stakeholders identified in the stakeholder analysis were included in the study. These were students, academic staff, technical providers, quality assurance staff members, support staff and management. This study therefore contributed to literature in that the results obtained from the study were from several stakeholders, thus providing a broader understanding of the way in which internal stakeholders perceive e-learning systems.
- The evaluation methodology model was modified to include the eleventh variable, namely stakeholders. A number of sub-variables were merged and

others were separated to form additional sub-variables. This led to a new model being proposed for future use in measuring the success of e-learning in HEIs. The new proposed model is presented in Figure 8.4 and the model is explained.

- The responses from the students' questionnaire in the empirical study revealed that customer value is a variable that is dependent on service delivery quality, IT infrastructure services and perceived usefulness. This implies that it is advisable for HEIs to focus on improving the IT infrastructure, perceived usefulness and the level of service delivery quality if they wish to increase value for their customers. The academic staff questionnaire responses revealed that organisational value is a variable that is dependent on service delivery quality, perceived usefulness and system quality. These results highlight the importance of service delivery quality and perceived usefulness as variables that should be improved upon to increase customer and organisational value.
- The qualitative empirical study allowed new information to be found with regard to the issue discussed next.
- Factors that are necessary for the successful and sustainable implementation of e-learning: The new factors that were identified by the empirical study were finances, engagement with experts in the field of e-learning, (not only engagement with stakeholders), and research in the field of e-learning. These additional requirements are necessary for ensuring that e-learning becomes a success. The study also found new stakeholders' concerns with regard to the implementation of e-learning.
    - The concerns of stakeholders: technical challenges and users losing work in the system. Lack of access to the LMS outside the campus, as a number of students do not have access to computers and data to be able to access the MOODLE system when they are off campus.
    - Security of students' information on the LMS. Students are worried about security related issues and how secure their information is in MOODLE.
    - Technical providers are concerned about their ability to deal with any as yet unidentified challenges in the LMS and their responsibility for ensuring that the system remains functional.

8.8 LIMITATIONS OF THE STUDY

Creswell (2002) holds that the limitations of a mixed methods study are:

- that the time required to complete a mixed methods study can be lengthy and
- that the resources required to collect and analyse the data are costly.

The researcher experienced the following limitations.

- The participants did not initially participate in the survey when it was posted on the UKZN notice board. There were a limited number of responses, which led to the researcher having to physically hand out hard copies of the questionnaire to potential participants.
- There were numerous stakeholders that the researcher wished to include in the study but due to time and resource constraints it was not feasible.
- Due to time and resource constraints the researcher could only conduct the study at UKZN. If the resources and time had been available, the research could have included all South African higher education institutions that are currently utilising learner management systems.

8.9 RECOMMENDATIONS

Based on the identified challenges with the implementation of e-learning, the following recommendations were made.

- Awareness among the academic community needs to be created with regard to the benefits associated with e-learning.
- Internet accessibility and stability should be improved.
- Increased university management support for the adoption and use of e-learning is advised, such as financial and infrastructural support.
- Provision for adequate training.

8.10 IMPLICATIONS FOR FUTURE RESEARCH

Based on the findings that emanated from this study, research still needs to be conducted to discover ways to minimise the challenges faced with the implementation of e-learning. The following facets are possible focus areas for future research.

- As this study was conducted at only one institution and on only one type of learner management system, it would be beneficial in the e-learning field for a similar study to be conducted at different institutions that have a learner management system other than MOODLE.
- There is a need to conduct a study that includes all the stakeholders of e-learning to gain a broader understanding of e-learning. The current study focused on internal stakeholders and there is no perception of the system from the external stakeholders' perspective. The perceptions of external stakeholders would be beneficial in reaching more accurate conclusions.
- This study answered research questions one to three with the qualitative data collection and parts of research question four were included in the qualitative data collection. Research question four was mostly answered by the quantitative study. In future it would be important to conduct a qualitative study with regard to question four to gain an in-depth understanding of students', academics' and ICS staff members' views of the e-learning system. A qualitative study of the evaluation methodology model's variables will allow for a clearer understanding of the reasons for the stakeholders (students, academics and ICS staff members) responding the way they did.

8.11 THE AUTOBIOGRAPHICAL REFLECTION

When I began this research study, the thought in my mind was earning a PhD so that I could be called 'doctor' one day. At my work place at the time, this type of qualification (PhD) was not recognised, so when I began this journey I knew it was basically for me to increase my knowledge. Little did I know that I was destined for academia, I always say the academic life chose me. I have heard a number of comments from people about my writing skills and some have even asked me if I do not want to go into academia. My answer was always no. To my surprise that is exactly where I am right now, a lecturer at Nelson Mandela University.

The start of my PhD journey was challenging, from struggling to find a supervisor for more than a year to finally meeting a supervisor who was willing to supervise me. I remember our first meeting when I showed him my proposal and he, well not in such harsh words, told me that what I had written was nonsense. I still remember exactly what he said looking at my proposal topic, “We don’t investigate at a PhD level, this is a master’s study”. I had to go, confused at exactly what the difference is between a master’s and a PhD. Eventually, as time went by, I finally got the hang of it and understood the difference.

My second challenge came when I was ready to defend my topic. Something told me to call the department that I intended to include in my study. I found that there was a task team working on a similar project as mine and they were therefore not interested in my study. I remember being so stressed, as I had put in months of work to formulate the proposal. I eventually recovered from that and had a proposal that was ready to be defended. When my proposal was accepted I said to myself “phew” the most difficult hurdle has been overcome. Little did I know what was yet to come.

Every day I spent reading and jotting down ideas while working on my literature chapters. I was affected in such a way that some nights I could not sleep because an idea would hit me and I would wake up and start writing about it just to make sure I did not forget. Through the literature review process I learnt how to raise arguments and to use different modes of sources. I found myself even going into YouTube to watch videos so I could understand some concepts. The literature review chapters can be a tiring and tedious process, which is why I began running as a hobby and I made sure that I took some running breaks. By working on the literature review chapters I am now able to critically analyse information and raise valid arguments that I am able to back up with literature.

The research methodology section was another challenge, as I was only familiar with qualitative methods but my PhD study required that I undertake a mixed methods study. I had to engage a number of sources to gain an in-depth understanding of the mixed methods approach. Having to choose a research paradigm that best suits the study is not an easy task and requires a good understanding of all methods so that one can motivate why the selected method would be best for one’s study. Another skill gained, as I now know way more about research methodologies than I did when I began my PhD.

Then the challenge of data collection. I often receive online surveys that I ignore but little did I know that it would happen to me one day. There I was sending my questionnaire online for participants and I received just more than 20 responses when I needed at least 500 responses. I had to physically, by myself, print the questionnaires and hand them out to participants while begging them to participate. I spent days moving from one lecture room to the next trying to distribute and collect my questionnaires. I even went to canteens while students were enjoying their lunch but I am glad to say that my strategy paid off. Then came the qualitative data collection and I had to arrange interviews. It seemed as if none of my participants were ever available for interviews but eventually, after many attempts, I managed to conduct the interviews. One of the lessons that I learnt through the data collection process is patience. A PhD will humble you, no matter who you are.

I remember sitting with the collected data for two months, not sure what to do with it or where to begin with the analysis. I learnt how to correctly code qualitative data and I had to go for a quick course on how to analyse and present quantitative data. This course is where I was assisted by a colleague. On the bright side, I gained skills that I would have never gained if I had outsourced the work. I am now confident that if anyone needs someone to look at their statistics using the Statistica tool, I will be more than happy to help.

This study has provided me with the skills that I will need going forward in my academic career. I feel that this research study has empowered me to be a mentor, or a supervisor to students that are about to take on their journeys in any type of research in my field. I now have a broader understanding of the MOODLE system and e-learning as a whole and am confident to be part of the e-learning communities of practice.

8.12 SUMMARY OF THE CHAPTER

This chapter provided a brief overview of the entire research project. It represented every step that the researcher took from Chapter 1 to Chapter 7. Important aspects within the research questions were highlighted. The four research objectives were covered and explored and results of each research objective presented briefly. The results of the qualitative study provided new information that contributed to the study. The results of the empirical quantitative study led to a new model for measuring e-learning systems being proposed. The chapter emphasised the way in which the research contributed to the existing body of knowledge. Recommendations for future research in the field were proposed and the researcher wrote an autobiographical reflection of the PhD journey.

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Annexure A: Letter from the Language Practitioner

One Stop Solution
24 Firenze Gardens
Warbler Road
Cotswold Ext
Port Elizabeth
6045
www.onestopsolution.co.za

TO WHOM IT MAY CONCERN

I, Michele van Niekerk, declare that I have done the language editing for the dissertation of:

Ayanda Pamella Msomi (204004182)

entitled:

A MODEL FOR MEASURING E-LEARNING SYSTEMS SUCCESS IN SOUTH AFRICAN UNIVERSITIES: A CASE STUDY OF THE UNIVERSITY OF KWAZULU-NATAL (UKZN)

Submitted in fulfilment of the requirements for the degree of Doctor of Philosophy (Leadership Studies) in the Faculty of Management Studies at the University of KwaZulu-Natal.

I cannot guarantee that the changes that I have suggested have been implemented nor do I take responsibility for any other changes or additions that may have been made subsequently.

Any other queries related to the language and technical editing of this treatise may be directed to me at 076 481 8341.

Signed at Port Elizabeth on 14 November 2018

……………………………………
Mrs M van Niekerk

Annexure B: Ethical clearance

UNIVERSITY OF KWAZULU-NATAL

INYUVESI YAKWAZULU-NATALI

05 July 2017

Ms Ayanda Pamella Msomi (204004182)
Graduate School of Business & Leadership
Westville Campus

Dear Ms Msomi,

Protocol reference number: HSS/0799/017D
Project title: A model for measuring E-Learning Systems success in South African universities: A case study of the University of KwaZulu-Natal (UKZN)

Full Approval – Expedited Application

In response to your application received on 15 June 2017, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and FULL APPROVAL for the protocol has been granted.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

....

Dr Shenuka Singh (Chair)

/ms

Cc Supervisor: Dr Muhammad Hoque
Cc Academic Leader Research: Dr Emmanuel Mutambara
Cc School Administrator: Ms Zarina Bullyraj

Humanities & Social Sciences Research Ethics Committee
Dr Shenuka Singh (Chair)
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Website: www.ukzn.ac.za

1910 - 2010
100 YEARS OF ACADEMIC EXCELLENCE

Founding Campuses: Edgewood Howard College Medical School Pietermaritzburg Westville

Annexure C: Gatekeepers letter

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

18 May 2017

Ms Ayanda Pamella Msomi (SN 204004182)
Graduate School of Business
College of Law and Management Studies
Westville Campus
UKZN
Email: mpuaya@gmail.com

Dear Ms Msomi

RE: PERMISSION TO CONDUCT RESEARCH

Gatekeeper's permission is hereby granted for you to conduct research at the University of KwaZulu-Natal (UKZN), towards your postgraduate studies, provided Ethical clearance has been obtained. We note the title of your research project is:

"A Model for Measuring E-Learning Systems Success in South African Universities: A case study of the University of KwaZulu-Natal (UKZN)".

It is noted that you will be constituting your sample as follows:

- by perfoming interviews with students, staff members and ICT staff on all five Campuses.

- with a request for responses on the website. The questionnaire must be placed on the notice system http://notices.ukzn.ac.za. A copy of this letter (Gatekeeper's approval) must be simultaneously sent to (govenderlog@ukzn.ac.za) or (ramkissoonb@ukzn.ac.za).

Please ensure that the following appears on your questionnaire/attached to your notice:

- Ethical clearance number;
- Research title and details of the research, the researcher and the supervisor;
- Consent form is attached to the notice/questionnaire and to be signed by user before he/she fills in questionnaire;
- gatekeepers approval by the Registrar.

You are not authorized to contact staff and students using 'Microsoft Outlook' address book.

Office of the Registrar
Postal Address: Private Bag X54001, Durban, South Africa
Telephone: +27 (0) 31 260 8005/2206 **Facsimile:** +27 (0) 31 260 7824/2204 **Email:** registrar@ukzn.ac.za
Website: www.ukzn.ac.za

1910 - 2010
100 YEARS OF ACADEMIC EXCELLENCE

Founding Campuses: Edgewood | Howard College | Medical School | Pietermaritzburg | Westville

Annexure D: Consent form

Dear Respondent,

PhD Research Project

Researcher: Ayanda Pamella Msomi (0027 83 364 5195)

Email Address: mpuaya@gmail.com

Supervisor: Dr. Muhammad Hoque (0027 31 260 8943)

Email Address: hoque@ukzn.ac.za

Research Office: Ms Mariette Snyman (0027 31 260 8350)

Email Address: Snymanm@ukzn.ac.za

I, Ayanda Pamella Msomi, (Student Number: 204004182), a Doctor of Philosophy Leadership studies student at the Graduate School of Business and Leadership, of the University of KwaZulu-Natal, kindly invite you to participate in a research project entitled:

A Model for Measuring E-Learning Systems Success in South African Universities: A case study of the University of Kwazulu-Natal (UKZN).

The Purpose of the Study: The main objective of the study is use the evaluation methodology model to measure the success of e-learning system at UKZN and to answer the following research questions:

1) How is learner management system utilised in teaching and learning?
2) Which factors are necessary for successful and sustainable implementation of e-learning?
3) What are the stakeholders' role in ensuring that e-learning implementation is a success?
4) How can universities use the evaluation methodology model to assess e-learning systems success?

Through your participation I hope to answer the critical questions raised above. This research would therefore assist in establishing recommendations to allow the South African Higher Education Institutions to develop and formulate eLearning strategies and policies which are of better quality after considering what the different e-learning stakeholders have to say about the e-learning systems.

Your participation is this project is voluntary. You may refuse to participate or withdraw from the project at any time with no negative consequences. There would be no monetary gain emanating from participating in this research. Confidentiality and anonymity of records identifying you as a participant will be maintained by the Graduate School of Business and Leadership, University of KwaZulu-Natal.

If you have any questions or concerns about completing the questionnaire or about participating in this study, you may contact me or my supervisor, the details of which are listed above.

The interview should take about 45 minutes to complete. I hope you will take some of your precious time to be interviewed.

Sincerely

Student/Researcher Signature: ………………….. Date:

……………………………

This page is to be retained by the participant.

UNIVERSITY OF KWAZULU-NATAL

INYUVESI YAKWAZULU-NATALI

Graduate School of Business and Leadership

Dear Respondent,

PhD Research Project

Researcher: Ayanda Pamella Msomi (0027 83 364 5195)

Email Address: mpuaya@gmail.com

Supervisor: Dr. Muhammad Hoque (0027 31 260 8943)

Email Address: hoque@ukzn.ac.za

Research Office: Ms Mariette Snyman (0027 31 260 8350)

Email Address: Snymanm@ukzn.ac.za

Research Project Title:

A Model for Measuring E-Learning Systems Success in South African Universities: A case study of the University of Kwazulu-Natal (UKZN).

CONSENT

I ……………………………………………………………………………………………………..
(Full names of participant)

Working for ………………………………………………………………………………………… (Full company name)

Hereby confirm that I fully understand the contents of this document and the nature of the research project and I consent fully to participating in the research project.

I hereby **consent / do not consent** to have this interview recorded.

I understand that I am at liberty to withdraw from the project at any time, should I so desire.

SIGNATURE OF PARTICIPANT: ………………………………………

DATE: ……………………………………...

Annexure E: Questionnaires

Qualitative Questionnaire

1. What is your view on the way Moodle is currently used at University of KwaZulu-Natal?
2. From your experience what would you say is the role of each stakeholder in ensuring the success of e-learning in higher education institutions?
3. In your opinion what are the factors that are essential for successful and sustainable implementation of e-learning in higher education institutions?
4. What is you view of the following
    a. System quality
    b. System delivery quality
    c. Infrastructure services
    d. Information quality
    e. Perceived usefulness
    f. User satisfaction
    g. Customer service

Quantitative Questionnaires

Students Survey

Questionnaire

Voluntary Participation

UNIVERSITY OF KWAZULU-NATAL

GRADUATE SCHOOL OF BUSINESS & LEADERSHIP

PhD Research Project

Researcher: Ayanda Msomi (083 364 4195)

Supervisor: Dr Muhammad Hoque (031 260 8690)

Research Office: Ms M Snyman (031-260 8350)

The purpose of this questionnaire is to solicit information from participants regarding e-Learning at Ukzn. The information and ratings you provide us will go a long way in helping us identify the possible correlation. The questionnaire should only take 10-15 minutes to complete. In this questionnaire, you are asked to indicate what is true for you, so there are no “right” or “wrong” answers to any question. If you wish to make a comment please write it directly on the booklet itself. Make sure not to skip any questions.

Thank you for participating.

DEMOGRAPHIC INFORMATION

GENDER:

Please indicate your GENDER	**Tick Appropriate box**
Male	
Female	

RACE:

Please indicate your RACE	**Tick Appropriate box**
African	
Indian	
White	
Coloured	

AGE:

Please indicate your AGE	**Tick Appropriate box**
18-25	
26-35	
36-45	
46+	

EDUCATIONAL LEVEL:

Please indicate your EDUCATIONAL LEVEL	**Tick Appropriate box**
No Matric	
Matric	
Diploma	
Degree	

Post Graduate Degree	
Honours Degree	
Master’s Degree	
Doctorate/PhD	

COLLEGE:

Please indicate which COLLEGE you are enrolled in	**Tick Appropriate box**
College of Agriculture, Engineering and Science	
College of Health Sciences	
College of Humanities	
College of Law and Management Studies	

COURSE:

Please indicate the COURSE you are enrolled for	

STATUS:

Please indicate your enrolment STATUS	**Tick Appropriate box**
Full Time Student	
Part Time Student	

QUESTIONS

Please tick the suitable box	Strongly Disagree	Disagree	Neither Disagree/Agree	Agree	Strongly Agree
IT Infrastructure Services					
ICS division provides me with technology advice and support services related to the Moodle system	1	2	3	4	5
The division of ICS provides me with a wide range of facilities to perform Moodle activities such as access to the library	1	2	3	4	5
ICS division enables me to receive and exchange information and knowledge with lecturers and other students by using electronic linkages and software applications	1	2	3	4	5
The ICS division provides me with data management advice and consultancy	1	2	3	4	5
The ICS division provides me with a wide range of electronic channels such as emails, website and call centres to connect	1	2	3	4	5
The ICS division provided me with Moodle service with a high level of technical security	1	2	3	4	5
System Quality					
I find the Moodle system easy to use	1	2	3	4	5
I find the Moodle system easy to learn	1	2	3	4	5
The data in Moodle system is integrated and consistent	1	2	3	4	5
The Moodle system always does what it should	1	2	3	4	5
The Moodle system requires only the minimum number of fields and screen to achieve a task	1	2	3	4	5
The Moodle system meets my requirements	1	2	3	4	5

The Moodle system includes all the necessary features and functions for my study	1	2	3	4	5
Information Quality					
The Moodle systems provides me with the outputs I need	1	2	3	4	5
The information from the Moodle system is easy to understand	1	2	3	4	5
The information I need from the Moodle system is always available to me	1	2	3	4	5
Information from the Moodle system is in a form that is readily usable	1	2	3	4	5
The information on the Moodle system is concise	1	2	3	4	5
Service Delivery Quality					
I find Moodle easy to navigate	1	2	3	4	5
I am able to complete tasks quickly with Moodle	1	2	3	4	5
Moodle is well organised	1	2	3	4	5
Moodle loads its pages fast	1	2	3	4	5
Moodle is always available when I have to complete and perform learning activities	1	2	3	4	5
Moodle does not crush frequently	1	2	3	4	5
Moodle makes lectures, materials and feedback available within a suitable time frame	1	2	3	4	5
With Moodle I get feedback about my queries quickly	1	2	3	4	5
I feel my information as a student is protected on Moodle	1	2	3	4	5
Moodle is convenient for me to change curriculum	1	2	3	4	5
Moodle allows me to engage on online discussions with other students	1	2	3	4	5

Moodle allows me to discuss issues with my lecturers	1	2	3	4	5
Moodle assists me with administrative challenges such as unmarked assignments and way forward	1	2	3	4	5
Perceived Usefulness					
Using the Moodle system makes it easier for me to do my studies	1	2	3	4	5
Moodle improves my study performance	1	2	3	4	5
The Moodle systems is useful to me in my studies	1	2	3	4	5
Moodle makes me to accomplish my tasks more quickly	1	2	3	4	5
User Satisfaction					
If I had to choose between doing my studies online and face-to-face I would choose online	1	2	3	4	5
I am satisfied with my decision to study at a university that is using Moodle	1	2	3	4	5
I am satisfied with the performance of the Moodle system	1	2	3	4	5
I feel that Moodle serves my needs well	1	2	3	4	5
Customer Value					
I believe that with Moodle I have received value for money	1	2	3	4	5
Moodle has assisted me to gain an understanding of concepts and principles in my study area that I do not believe I would have gained without Moodle	1	2	3	4	5
Overall Moodle is simplifying my life	1	2	3	4	5

End of the Questionnaire

Thank you for taking the time to complete the questionnaire

Academic Staff Survey

Questionnaire

Voluntary Participation

UNIVERSITY OF KWAZULU-NATAL

GRADUATE SCHOOL OF BUSINESS & LEADERSHIP

PhD Research Project

Researcher: Ayanda Msomi (083 364 4195)

Supervisor: Dr Muhammad Hoque (031 260 8690)

Research Office: Ms M Snyman (031-260 8350)

The purpose of this questionnaire is to solicit information from participants regarding e-Learning at Ukzn. The information and ratings you provide us will go a long way in helping us identify the possible correlation. The questionnaire should only take 10-15 minutes to complete. In this questionnaire, you are asked to indicate what is true for you, so there are no “right” or “wrong” answers to any question. If you wish to make a comment please write it directly on the booklet itself. Make sure not to skip any questions.

Thank you for participating.

DEMOGRAPHIC INFORMATION

GENDER:

Please indicate your GENDER	Tick Appropriate box
Male	
Female	

RACE:

Please indicate your RACE	Tick Appropriate box
African	
Indian	
White	
Coloured	

AGE:

Please indicate your AGE	Tick Appropriate box
18-25	
26-35	
36-45	
46+	

OCCUPATIONAL LEVEL

Please indicate your OCCUPATIONAL LEVEL	Tick Appropriate box
Permanently employed	
Contract	
Part-time	

PERIOD OF EMPLOYMENT

Please indicate your AGE	Tick Appropriate box
0-11 months	
1-5 years	
6-10 years	
11-20 years	
20+	

EDUCATIONAL LEVEL:

Please indicate your EDUCATIONAL LEVEL	Tick Appropriate box
No Matric	
Matric	
Diploma	
Degree	
Post Graduate Degree	
Honours Degree	
Master's Degree	
Doctorate/PhD	

COLLEGE:

Please indicate which COLLEGE you are lecturing in	Tick Appropriate box
College of Agriculture, Engineering and Science	
College of Health Sciences	
College of Humanities	
College of Law and Management Studies	

QUESTIONS

Please tick the suitable box	Strongly Disagree	Disagree	Neither Disagree/Agree	Agree	Strongly Agree
IT Infrastructure Services					
ICS division provides me with technology advice and support services related to the Moodle system	1	2	3	4	5
The division of ICS provides me with a wide range of facilities to perform Moodle activities	1	2	3	4	5
ICS division enables me to receive and exchange information and knowledge with other lecturers students by using electronic linkages and software applications	1	2	3	4	5
The ICS division provides me with data management advice and consultancy	1	2	3	4	5
The ICS division provides me with a wide range of electronic channels such as emails, website and call center's to connect	1	2	3	4	5
The ICS division provided me with Moodle service with a high level of technical security	1	2	3	4	5
System Quality					
I find the Moodle system easy to use	1	2	3	4	5
I find the Moodle system easy to learn	1	2	3	4	5
The data in Moodle system is integrated and consistent	1	2	3	4	5
The Moodle system always does what it should	1	2	3	4	5
The Moodle system requires only the minimum number of fields and screen to achieve a task	1	2	3	4	5
The Moodle system meets my requirements	1	2	3	4	5

The Moodle system includes all the necessary features and functions for teaching	1	2	3	4	5
Information Quality					
The Moodle systems provides me with information that is sufficient for my teaching needs	1	2	3	4	5
The information from the Moodle system is easy to understand	1	2	3	4	5
The essential information I need to setup my teaching in Moodle environment is available to me	1	2	3	4	5
Information from the Moodle system is in a form that is readily usable	1	2	3	4	5
The information on the Moodle system is concise and enough for organising my course and teaching materials	1	2	3	4	5
Information in the Moodle systems is well formatted	1	2	3	4	5
Service Delivery Quality					
I find Moodle easy to navigate	1	2	3	4	5
Moodle enables me to provide the course information and knowledge to students	1	2	3	4	5
I am able to complete tasks quickly with Moodle	1	2	3	4	5
Moodle is well organised	1	2	3	4	5
Moodle loads its pages fast	1	2	3	4	5
Moodle is always available for me to perform teaching activities	1	2	3	4	5
Moodle does not crush frequently	1	2	3	4	5
Moodle makes me to deliver lectures, materials and feedback to students when promised	1	2	3	4	5
Moodle enables me to deliver answers to students about their queries quickly	1	2	3	4	5

This site does not allow me to get full details of students records	1	2	3	4	5
Moodle does not share the feedback of assignments of each student with other students	1	2	3	4	5
Moodle protects information related to personal details of students and results	1	2	3	4	5
Moodle allows me to engage on online discussions with other students	1	2	3	4	5
Moodle tells me if students received feedback	1	2	3	4	5
Moodle takes care of problems and students enquiries promptly	1	2	3	4	5
Moodle allows me to discuss issues with my students	1	2	3	4	5
Perceived Usefulness					
Using the Moodle system makes it easier for me to do my job	1	2	3	4	5
Moodle improves my job performance	1	2	3	4	5
The Moodle systems is useful to me in my studies	1	2	3	4	5
Moodle makes me to accomplish my tasks more quickly	1	2	3	4	5
User Satisfaction					
I prefer e-learning as opposed to teaching face-to-face	1	2	3	4	5
Based my experience with the Moodle system I am satisfied with using the system	1	2	3	4	5
I am satisfied with the performance of the e Moodle system	1	2	3	4	5
I feel that Moodle serves my needs well	1	2	3	4	5
Customer Value					
The Moodle system improves my work practices	1	2	3	4	5

Through Moodle there is a lot that I have learnt	1	2	3	4	5
Using the Moodle systems gives me a sense of accomplishment	1	2	3	4	5
Overall Moodle is simplifying my life	1	2	3	4	5
Organisational Value					
The Moodle system enables Ukzn to respond quickly to change and develop the teaching and learning techniques	1	2	3	4	5
The Moodle system establishes and maintains a good image and reputation for Ukzn	1	2	3	4	5
The Moodle systems are aligned with the Ukzn organisational goals	1	2	3	4	5
With Moodle it is easier for Ukzn to respond to change quickly	1	2	3	4	5
The Moodle system is cost effective	1	2	3	4	5
Through Moodle systems it is easier to establish good relationships with user community	1	2	3	4	5

End of the Questionnaire

Thank you for taking the time to complete the questionnaire

ICT Staff Survey

Questionnaire

Voluntary Participation

UNIVERSITY OF KWAZULU-NATAL

GRADUATE SCHOOL OF BUSINESS & LEADERSHIP

PhD Research Project

Researcher: Ayanda Msomi (083 364 4195)

Supervisor: Dr Muhammad Hoque (031 260 8690)

Research Office: Ms M Snyman (031-260 8350)

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Thank you for participating.

DEMOGRAPHIC INFORMATION

GENDER:

Please indicate your GENDER	Tick Appropriate box
Male	
Female	

RACE:

Please indicate your RACE	Tick Appropriate box
African	
Indian	
White	
Coloured	

AGE:

Please indicate your AGE	Tick Appropriate box
18-25	
26-35	
36-45	
46+	

OCCUPATIONAL LEVEL

Please indicate your OCCUPATIONAL LEVEL	Tick Appropriate box
Permanently employed	
Contract	
Part-time	

PERIOD OF EMPLOYMENT

Please indicate your AGE	Tick Appropriate box
0-11 months	
1-5 years	
6-10 years	
11-20 years	
20+	

EDUCATIONAL LEVEL:

Please indicate your EDUCATIONAL LEVEL	Tick Appropriate box
No Matric	
Matric	
Diploma	
Degree	
Post Graduate Degree	
Honours Degree	
Master’s Degree	
Doctorate/PhD	

QUESTIONS

Please tick the suitable box	**Strongly Disagree**	**Disagree**	**Neither Disagree/Agree**	**Agree**	**Strongly Agree**
IT Infrastructure Services					
ICS division provides me with technology advice and support services related to the Moodle system	1	2	3	4	5
The division of ICS provides me with a wide range of channel management services like electronic channels	1	2	3	4	5
ICS division enables me to receive and exchange information and knowledge with other lecturers students by using electronic linkages and software applications	1	2	3	4	5
The ICS division provides me with data management advice and consultancy	1	2	3	4	5
The ICS division provides me with a wide range of security and risk management services e.g. security polices, disaster planning and firewalls	1	2	3	4	5
The ICS division provides a wide range of communication services e.g. internet capabilities, broadband	1	2	3	4	5
ICS provides a wide range of data management services	1	2	3	4	5
ICS provides a wide range of IT facilities management services like a large scale processing/ mainframe, server farms	1	2	3	4	5
ICS provides a wide range of application infrastructure services e.g. mobile and wireless application middleware	1	2	3	4	5
ICS provides a wide range of IT management services e.g. IS planning, investment and monitoring	1	2	3	4	5
ICS provides a wide range of research and development (R&D) services	1	2	3	4	5

ICS provides a wide range of It education services to users such as training on how to use IT	1	2	3	4	5
System Quality					
I find the Moodle system easy to use	1	2	3	4	5
I find the Moodle system easy to learn	1	2	3	4	5
The data in Moodle system is integrated and consistent	1	2	3	4	5
The Moodle system always does what it should	1	2	3	4	5
The Moodle system requires only the minimum number of fields and screen to achieve a task	1	2	3	4	5
The Moodle system meets my requirements	1	2	3	4	5
The Moodle system user interface can be easily adopted to one's personal approach					
The Moodle system can be easily modified, corrected and improved					
The Moodle system includes all the necessary features and functions	1	2	3	4	5
Information Quality					
The Moodle systems provides me with outputs that I need to maintain and support the system	1	2	3	4	5
The information from the Moodle system is easy to understand	1	2	3	4	5
The essential information I need to setup my teaching in Moodle environment is available to me	1	2	3	4	5
Information from the Moodle system is in a form that is readily usable	1	2	3	4	5
The information on the Moodle system is concise and enough for organising my course and teaching materials	1	2	3	4	5
Information in the Moodle systems is well formatted	1	2	3	4	5

The information in the Moodle system is up-to-date enough to maintain and support the system	1	2	3	4	5
Service Delivery Quality					
I find Moodle easy to navigate	1	2	3	4	5
Moodle system is truthful about its offerings	1	2	3	4	5
I am able to complete tasks quickly with e-learning	1	2	3	4	5
Moodle is well organised	1	2	3	4	5
Moodle loads its pages fast	1	2	3	4	5
Moodle is always available for me to perform my activities	1	2	3	4	5
Moodle does not crush frequently	1	2	3	4	5
Moodle enables academic staff to deliver lectures, materials and feedback to students when promised	1	2	3	4	5
Moodle system quickly delivers answers to students queries	1	2	3	4	5
Moodle protects information relating to students personal details and results	1	2	3	4	5
Moodle tells students what to do if their assignments are not marked	1	2	3	4	5
Moodle protects information related to personal details of students and results	1	2	3	4	5
Moodle allows students to lectures and students to students discussions online	1	2	3	4	5
Moodle takes care of problems reported by academic staff and students promptly	1	2	3	4	5
Perceived Usefulness					
Using the Moodle system enables me in my job to support the users and provide the services more quickly	1	2	3	4	5

Moodle improves my job performance in supporting the users and providing the services	1	2	3	4	5
The Moodle systems is useful to me as it increases my productivity	1	2	3	4	5
Using the Moodle system makes it easier for me to do my job and to support the different users	1	2	3	4	5
Moodle systems are useful in the work I do	1	2	3	4	5
User Satisfaction					
I am satisfied with working with Moodle system	1	2	3	4	5
Working with Moodle system meets my job expectations	1	2	3	4	5
I am satisfied with using the Moodle system functions	1	2	3	4	5
Working with Moodle systems gives me a great sense of personal satisfaction	1	2	3	4	5
Customer Value					
The Moodle system improves my work practices	1	2	3	4	5
Moodle system contributes to my personal growth and development	1	2	3	4	5
I have learnt much through Moodle systems	1	2	3	4	5
The knowledge I have gained using Moodle system will be helpful in future with other systems	1	2	3	4	5
Knowing how to maintain and support the Moodle system makes me more employable					
Overall Moodle is simplifying my life	1	2	3	4	5
Organisational Value					
The Moodle system enables Ukzn to respond quickly to change and develop the teaching and learning techniques	1	2	3	4	5

The Moodle system establishes and maintains a good image and reputation for Ukzn	1	2	3	4	5
The Moodle systems are aligned with the Ukzn organisational goals	1	2	3	4	5
With Moodle it is easier for Ukzn to respond to change quickly	1	2	3	4	5
The Moodle system is cost effective	1	2	3	4	5
Through Moodle systems it is easier to establish good relationships with user community	1	2	3	4	5

End of the Questionnaire

Thank you for taking the time to complete the questionnaire