UNIVERSITY OF KWAZULU-NATAL

THE USE OF MOBILE TECHNOLOGY FOR M-LEARNING IN IMPROVING ECONOMICS STUDENTS' PASS RATE AT THE UNIVERSITY OF KWAZULU-NATAL

By

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DECLARATION

I **Sidwell Sabelo Nkosi** declare that:

(i) The research reported in this thesis, except where otherwise indicated, is my original Research.

(ii) This thesis has not been submitted for any degree or examination at any other university.

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ABSTRACT

In order to create a knowledge-driven and knowledge-dependent economy and society, South African needs to address educational inequalities that are the result of the past government. The current government is trying its best to provide accessible quality education for everyone. The researchers revealed that there are parts of South Africa that do not have access to quality education. According to research, students from low-income societies are scoring lower marks compared to students from high-income societies at both secondary and tertiary levels of education. Most researchers believe that students from low-income societies either have no access to educational resources or they have outdated or insufficient educational resources. This situation has been highlighted by appalling metric (grade 12) annual results. Students who scored lower marks at secondary school level are unlikely to perform outstandingly at university.

This study is aimed at examining the effect of the use of mobile technology in academic activities at the University of KwaZulu-Natal. In order to identify determinants of students' academic performance in the College of Law and Management Studies at UKZN, this study conducted regressions with a recorded data in two different educational production functions, namely Ordinary Least Squares and Logistic Regression Model. The production function method was adopted to examine and explain the effect of mobile technology in education. The mobile technology was treated as the factor determinant for academic performance, as shown:

$P_{ij} = \beta_1 + \beta_2$hours of study $+ \beta_3$class attendance $+ \beta_4$tutorial attendance $+ \boldsymbol{\beta_5}$**m-technology** $+ \beta_6$race $+ \beta_7$gender $+ \beta_8$location $+ u_{ij}$………………………………………………….…………… (1).

The cumulative distribution function was used to examine the probability of passing economics, provided that a student is using mobile technology during studying.

$\text{Logit } (P_{ij}) = Y_i \, \beta + U_i$ ………………….............………………………………………… (2).

The overall results show that students that are using mobile technology perform better than those that isolate the usefulness of mobile technology. The results also show that more students are

willing to adopt mobile technology in their studies as it creates efficiency and installs discipline to students. The students that are using mobile technologies, for e-learning are work ready compared to the students that are still relying on a traditional way of study.

Keywords: UKZN, M-technology, Production function, Students' academic performance.

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ABBREVIATIONS, ACRONYMS AND DEFINITIONS OF TERMS

ADO: Academic Development Office. This is the committee that is purposed to improve the quality and effectiveness of teaching and learning in tertiary education and to allow tertiary education system to reach its educational goals.

BCom Acc: Bachelor of Commerce in Accounting.

BCom General: Bachelor of Commerce (Extended Curriculum).

BCom Law: Bachelor of Commerce-Law.

BCom: Bachelor of commerce.

Course: The collection of modules that are examined, i.e. a formal component of a qualification.

DBMS: Data Base Management Systems.

ECON102: This module is an introduction to macroeconomics. The operation of the money market is examined, and the main components of expenditure (consumption, investment, government spending and net exports) are used to build simple macroeconomic models. Fiscal and monetary policy tools and their ability to influence key macroeconomics concerns of inflation, unemployment and growth are assessed.

ECON201: Economics 201. This second level module introduces students to intermediate macroeconomics and applications. It has ECON102 as a prerequisite and mainly covers theories of income determination and

employment, the trade-off between inflation and unemployment, and fiscal and monetary policies and their impact on output, employment and prices.

EDX   A non-profit company that provides massive open online courses.

FMS: Faculty of Management Studies.

HEIs: Higher Educational Institutions.

HTML: Hypertext markup language.

ISTN100:   This module is the basic end-user computing concepts. Computer hardware (input, processing, output and storage). Theory and application of systems software (operating systems) and applications software (word processing, spreadsheets, presentation graphics, database, internet and email). Information networks and data communications. Databases and database management systems.

ISTN101:   This module provides an understanding of organisational systems, planning, and decision processes, and how information and systems are used in organisations. Organisational Systems (business processes, management levels, business decisions); Systems theory and concepts, including systems components and relationships; Information systems in organisations (decision-support, roles of people using, developing and managing systems, societal and ethical issues relating to IS & T use, business applications of spreadsheets and databases, types of information systems in business); The Systems Development Life Cycle, Information system security; E-Business.

ISTN102:   This module provides an introduction to Systems Analysis & Design, Web Page Design and Programming in a business context. Content: Information Systems management; Systems Analysis and Design; Human-Computer Interaction; Web page design; Hypertext Markup Language (HTML) and Web Page creation; Programming fundamentals.

ISTN103:   The aim of this module is to provide an introduction to Systems Analysis and Design, Web Page Design and Business Applications. Content: Information Systems Management; Systems Analysis and Design; Human-Computer Interaction; Web-Page Design, Web-Page Creation; Business Applications for packaged software, Systems Auditing.

LMS: Learning Management System.

MMLE: Multimedia Learning Environments.

Module: a separate course of study for which credits may be obtained. Modules are designated as being at level 0, usually taken in an access/extended programme at UKZN, level 1 (first year), level 2 (second year), level 3 (third year), level 4 (fourth year), level 7 (Honours and Postgraduate diplomas), level 8 (Masters), and level 9 (Doctoral).

MOOC: Massive Open Online Courses.

M-learning: is the ability to obtain or provide educational content on personal pocket devices like PC (Computer), tablets and smart phones.

M-technology: is the technology that is portable, for example: PC (computers), tablets or smart phones.

Pass Rate: Refers to the number of students, shown as a percentage, who were successful in a particular assessment (examination or test). It is calculated as a percentage of the total number of students who passed the assessment divided by the total number of students who actually write the assessment.

Prerequisite: A module which must have been passed, with at least the minimum mark required by the relevant Faculty, before registration for the proposed module is permitted.

Throughput Rate: The total number of students who graduate from a HEI each year, as a percentage of the total number of students enrolled in that institution.

UKZN: (the newly merged) University of KwaZulu-Natal after 2004.

UKZN CLMS School of Economics:

University of KwaZulu-Natal, College of Law and Management Studies-School of Economics

CHAPTER 1

THE IMPACT OF STUDENTS' BACKGROUND ON THEIR ACADEMIC PERFORMANCE

1.1 INTRODUCTION

The South African government, societies and parents are confident that children and young adults obtain the quality education, skills and capabilities from the schools and universities, to fully equip them for the labour market (Vijay Reddy, 2012). The government facilitated the accessibility of education to everyone and allocated funds to improve educational performance outcome (Dwolatzky, 2014). Regardless of huge investments in education, reports and researches show that some of the previously disadvantaged schools are still performing far below expected (Dwolatzky, 2014). In 62 countries, South African secondary schools' mathematics and science are graded the lowest by World Economic Forum (Dwolatzky, 2014).

The University of KwaZulu-Natal is situated in the KwaZulu-Natal province which is counted as one of the biggest provinces in the country. The KwaZulu-Natal province is rated in the top three of the country's biggest rural provinces and it largely contributes to 53% of the country's learners that come from rural areas (Mail&Guardian, 2016). Students from low-income households and communities are expected to score lower than those who are from high-income societies (Vijay Reddy, 2012). The schools that are situated in low-income societies are given insufficient resources and most of these schools provide education to students who do English as their second or third language (Vijay Reddy, 2012). Students from low-income communities scored 9% lower in 2016 grade 12 pass rate in contrast to 2015 (Mail&Guardian, 2016).

Most of the schools within the KwaZulu-Natal province are feeder schools for the University of KwaZulu-Natal. The University of KwaZulu-Natal takes approximately 56 079 students per year (depending on the availability of space) (Mike, 2014). Students who scored lower at secondary level are unlikely to perform outstandingly at university (Essack, 2014).

The University of KwaZulu-Natal uses Moodle as the online learning management system, where information regarding modules' slides or notes, modules' outlines, test seat numbers and test results are posted. To diffuse and maximise the teaching and the learning potential of the system, all modules' study material are uploaded to the Moodle learning site. To be certain that all the University of KwaZulu-Natal's students gain access to this essential information for their tests and examinations, the university made it a ground requirement that new entrant students and second years' students must have a personal computer or tablet. The university has further facilitated internet accessibility to all the university residences (UKZN, 2016). This helps students with seamless access to all the online sources of information prepared and provided by the university and other recommended sources of information.

This study will examine the failure rate at the University of KwaZulu-Natal. The failure rate that is an issue of concern in this study is not the failure rate of the University of KwaZulu-Natal compared to any other universities but it is the internal failure rate that is continuously increasing compared to the previous years. The trend is observed by the number of students who graduate at the minimum prescribe time for a degree. Looking at the period from 2004 to 2012, a total of 42% of students graduated at the minimum prescribed time for the degree, 19.45% was academically excluded, 6.98% voluntary dropped out with good academic records and 31.39% is still studying (Mike, 2014). The study will narrow its focus on testing if the use of mobile technology and m-learning can improve the economics students' pass rate at the University of KwaZulu-Natal.

1.2 BACKGROUND OF THE STUDY

The University of KwaZulu-Natal has a number of libraries across its different five campuses, namely Westville, Edgewood, Pietermaritzburg, Nelson R Mandela school of Medicine and Howard College. This means that students are provided with access to a vast pool of information. The university provides library orientation programmes to the students to make them aware of the libraries and the amount of information that is available there (UKZN, 2016). A study by (Nkosi, 2012), shows that students use the library for reading lecture notes and social gatherings. His study further reveals that the students can not locate and retrieve the important information they are looking for in the library. Students are not getting enough emphasis from their academic staff to

use the library resources (Nkosi, 2012). The only time students will use the library is when they have assignments and they would hustle to obtain the relevant information despite the technology provided to them to help them get information easily (Nkosi, 2012). This will not only negatively affect the academic performance of the students but it will disadvantage them in the workplace as well.

The University of KwaZulu-Natal experienced challenges within its various schools relating to throughput rate (Essack, 2014). There are many schools within the University of KwaZulu-Natal, this makes it difficult for this study to analyse each and every school. The focus will be narrowed to the School of Economics at the University of KwaZulu-Natal Westville Campus. The modules that are analysed in this study are Economics 102 and Economics 201. The pass rate for Economics 102 module from 2013, 2014 and 2015 is 69.20%, 67.48% and 80.36% respectively. Economics 102 module shows an upward trend, but in 2014 there is a slight decline which is offset by the outstanding performance for 2015. Informing the students about the sources of information available to them and encouraging them to consult with tutors, may improve their results (Nkosi, 2012).

First-year economics modules are a prerequisite to second-year economics modules (UKZN, 2016). The performance for Economics 201 module from 2013, 2014 and 2015 is 65.68%, 65.26% and 78.53% respectively. Economics 102 module and Economics 201 module, both have upward trends but Economics 201 module is relatively below Economics 102 module. This is a problem because it results in student overcrowding in a class by a percentage of 1.83 for Economics 201 module in 2016. This shrinks the expectations that the 2016 Economics 201module pass rate will be better compared to the last year's pass rate. The higher the failure rate for Economics 102 module and Economics 201 module, might result in the university taking fewer new entrant students who want to study economics. This is an issue of concern, not only for UKZN but all the South African higher education institutions. Thus improving the quality and equity of student academic performance remains the priority for the South African higher education (Vithal, 2015).

The broadness of the transition between high school (grade 12) education and university education (first year) also contributes to failure rate and drop out of the first year's students at the University

of KwaZulu-Natal. The issues regarding first-year students at the University of KwaZulu-Natal have become the core area of research for the past ten years. All the studies done in this area of research show that there is higher failure rate at first year and drop out (Essack, 2014). The University of KwaZulu-Natal School of science has experienced a student drop out of two-fold in a row, this adversely affects the graduation rate. First year's students failure rate links back to high schools' education since high schools are required to provide the best education to their learners. Most of the secondary schools are under resourced and some of the teachers are under qualified, thus their problems are shifted to the universities. Students are required to meet the minimum requirements in order to be accepted at the UKZN, but because they are from disadvantaged schools they find it very difficult to cope at the university.

The advancement in the level of technology has made the mobile devices the most attractive learning tool for educational purposes, hence the University of KwaZulu-Natal recently adopted the use of mobile technology for its learning purposes. The integration of mobile technology and teaching and learning gives hope that the pass rate at the University of KwaZulu-Natal will improve (UKZN, 2016). The implementation of these technological tools goes hand in hand with certain challenges, which if disregarded may defeat the purpose of the implementation of m-technology (Ramorola, 2013). The challenges may include the attitude and usage of these tools by academic staff and students, affordability of these technologies, unavailability of technology policy, lack of teachers/lecturers qualified in technology integration and maintenance of these technologies (Baran, 2014). Adequate time and resources are therefore needed to effectively integrate technology into education.

1.3 RESEARCH PROBLEM

The University of KwaZulu-Natal is faced with financial problems and high failure rates; as in many other South African universities (Bokana, 2011). The adoption of m-technology is an attempt to solve both financial issues and failure rates simultaneously. This technology has the potential to reduce the amount of money the university spends on papers and printers (UKZN, 2016). Shifting from hard copies to soft copies is good for the environment, as less pollution will be produced. This study investigates if the introduction of mobile technology in UKZN will help improve the students' pass rate in the school of economics.

1.4 RESEARCH OBJECTIVES

The objectives of this study are:

1. **To analyse the role played by mobile technology in secondary and tertiary institutions.**

2. **To assess the degree of UKZN economics students' exposure to educational mobile technology.**

3. **To assess the extent to which economics students use Learning Management System in UKZN.**

4. **To examine economics students' attitude towards the use of mobile technology for educational purposes.**

1.5 RESEARCH QUESTIONS

The Research Questions:

The following research questions aim to provide answers to the study:

1. **What role does mobile technology play in secondary and tertiary institutions?**

2. **What degree of exposure does UKZN economics students have on mobile technology?**

3. **To what extent do economics students use Learning Management Systems in UKZN?**

4. **What is the attitude of economics students towards the use of mobile technology for educational purposes?**

1.6 HYPOTHESIS TESTING

H_0: Use of mobile technology for m-learning will not increase pass rate at UKZN.

H_1: Use of mobile technology for m-learning will increase pass rate at UKZN.

1.7 LITERATURE REVIEW

The University of KwaZulu-Natal is experiencing high dropout and failure rates in the economics modules. The gatekeepers for a range of different degree programmes and qualifications in the Faculty of Law and Management Studies are now concerned about this low throughput rate (Bokana, 2011). The blame for this poor performance is linked to many factors, including poor secondary education of the students, larger transition between university and secondary level. Other researchers' opinion based upon this matter is that economics is a difficult subject hence high failure rate is expected (Bokana, 2011). The academic performance for the College of Law and Management is the microcosm for South Africa.

Tertiary education is seen as the cure for severe economic, political and social problems like unemployment, inflation and poverty. Therefore, the higher failure rate and dropout rate hinders the students' progress and the country's economic progress. The South African's government together with the private sector are investing a lot of money in education but the outcome is disappointing (Bokana, 2011). The adoption of mobile technology in the academic environment can diffuse education and ensure equal access to quality education.

The availability of portable devices like personal computers, smartphones, tablets and internet access has altered the social and economic lifestyle of modern people (EL-Hussein, 2010). People are using these mobile technologies and the internet to get access to emails, news, financial information (Kateryna, 2015). These devices are popular to people because of their mobility and wireless functions (EL-Hussein, 2010). M-learning is used to provide education in different organisations. It may be used for content delivery or specific training intended for a job training, performance support or an extra access to learning material for secondary and higher education institutions for students (EL-Hussein, 2010). Health professionals are using podcasts as a form of mobile learning, which is lately an important technological tool (Kalludi, 2015).

Open Australia University is regarded as the pioneer of e-learning. It experienced a doubled amount of student enrolment after fully introducing e-learning (Johnson, 2015). Above 70% of the universities at the United State of America are providing e-learning programs (Johnson, 2015). Fully e-learning students are self-controlled and much disciplined because they have to set their learning goals, identify a proper learning strategy and put it into place (Johnson, 2015). It is against this background that this study set out to find if the introduction of m-learning at UKZN can improve economics students' pass rate.

1.8 SIGNIFICANCE OF THE STUDY

South Africa is a developing country and it is still in the process of finding many solutions that will make it a better country. This study will contribute to improving the education system for South Africa, as it is known that the pass rate from the secondary schools to the institutions of higher learning is not of highest standard compared to developed countries (Dwolatzky, 2014). It will further help the government and the private sector to decide on investing in mobile technology for m-learning. Government and private investors would save a lot of money because online laboratory programmes will be adopted in areas with inadequate infrastructure.

1.9 JUSTIFICATIONS OF THE STUDY

Technology is designed to help people. More people have developed an interest in technology and all the amazing applications that are available. The use of these mobile technologies as the learning tool will diffuse educational information very quickly and it will reach areas that would have taken many years for education to reach. The students spend too much time on mobile technologies and social networks (Nkosi, 2012). If mobile technology is not used in education, students might lose interest in the traditional way of teaching in the future.

1.10 RESEARCH METHODOLOGY

1.10.1 THE OVERVIEW

The sampling strategy that will be adopted in this study is the probability sampling. From the four subsets of the probability sampling, namely, simple random sampling, stratified random sampling, systematic random sampling and cluster random sampling. A simple random sampling is going to be used for this study because it is easy to implement. It requires minimum information about the population ahead. A simple random sampling reduces the risk of biases within the chosen sample. The students are a homogeneous population, therefore a simple random sampling will work well and will provide estimates that are unbiased and have high precision.

This research looks at the introduction of technology which the University of KwaZulu-Natal is currently adopting, hence the research will be done at UKZN (Westville-Main Campus). Only economics students from UKZN-Westville campus will be participating in this study. The school of economics has a number of students ranging from 1000-2119 at undergraduate levels (number of students varies per module of interest). From the study population of approximately 2119, only 300 students will be used as the sample of the study. Using the sampling strategy, the sample size of 300 students will be made of 150 first year's economics students and 150 second year's economics students. The first year students is the group that is allowed to have mobile technology and the second year students are deprived of technology.

The quantitative research approach is preferred, as it will enable the researcher to reach a precise conclusion that is supported by numerical evidence or facts. A structured questionnaire will be use to collect data from the participants. The data will be generated from the questionnaires. Questionnaires will have a number of questions relating to the use of mobile technology for m-learning to improve economics students' pass rate at the University of KwaZulu-Natal. The questions included in the questionnaire will seek to answer the following research questions:

1. **What role does mobile technology play in secondary and tertiary institutions?**

2. **What degree of exposure does UKZN economics students have on mobile technology?**

3. **To what extent do economics students use Learning Management Systems in UKZN?**

4. **What is the attitude of economics students towards the use of mobile technology for educational purposes?**

The researcher wants to identify the relationship between mobile technology and the pass rate, only quantitative research approach enables the study of variables' relationship. Google forms will be used to conduct this survey. The students will get the link which they need to click in order to fill in the questionnaire via emails. Once the respondent is done filling in the questionnaire, he or she will click submit. They do not have to email back the questionnaires. The data will be stored in google excel and updated as the students continue to fill in more forms. The google forms will be able to give little statistical analysis (descriptive statistics). The data will then be transferred to stata 14 where a full data analysis will be completed.

1.11 CHAPTER OUTLINE

Chapter one: presents the background and introduction of the topic that is being studied. The rationale, background of the study, objectives, problem statement, methodology are all outlined under their respective sub-headings.

Chapter two: consists of the theoretical underpinnings of the study. The landscape of m-technology, the features that m-technology provides to accelerate studying and aiding in diffusing education and providing accessible quality education to all corners of South Africa are discussed in this chapter. The chapter also examines the available technology at UKZN, how it can be fully utilized when m-technology is fully adopted and how m-technology can equip students for work and the future.

Chapter three: explains the methodology utilised and the manner in which it was put into practice in order to conduct the entire study. In the most detailed and precise way possible, all the steps taken to achieve the research objectives and answer the research questions are discussed.

Chapter four: presents the findings that arose from the data collection process as well as the analysis. The main aim of this chapter was to make meaning of the primary data collected and to further substantiate it with the secondary data discussed in chapter two.

Chapter five: presents a discussion of all conclusions, areas for future research and recommendations made with regards to the findings arising from the data collected. These conclusions and recommendations were based on the research objectives and questions of this study.

1.12 CHAPTER SUMMARY

This chapter maps out the scope that was taken by this study in analysing the impact of mobile technology in the educational environment by introducing the topic and all the relevant research questions as well as the perspective from which it was tackled. The next chapter, chapter two, discusses academic literature that was reviewed for the purposes of this research.

CHAPTER 2

THE ROLE OF MOBILE TECHNOLOGY IN THE EDUCATIONAL ENVIRONMENT

2.1 INTRODUCTION

In this section all the relevant literature in the fields of study related to the topic under review were thoroughly examined. The gaps that were not filled in the previous studies were identified and discussed further in the chapter. The literature collected and included in the study as part of its theoretical underpinning was used to conceptualise the key terms contained in the title.

2.2 LEARNING AND THE ADOPTION OF TECHNOLOGY AS THE STUDY TOOL

This study will base some of its foundation on Papert's and Piaget's constructivism. Piaget looks at what are children' interests, what are they capable of achieving at their different stages of growth. Piaget's theory looks deeper on child's life and explains their ways of thinking and doing the thing as they grow and it analyses different circumstances in which a child changes their worldviews or hold into their worldviews (Ackermann. 2016). On the other hand, Papert's constructionism explains the art of learning. In this study Papert's theory will be adopted. Papert's research focused on how learners learning to learn by looking at how they engage themselves into conversations with other people, their own or artefacts and how conversations improve self-direct learning and the construction of new knowledge. In order to construct new knowledge, the use of media, tools and context in human development is essential (Ackermann. 2016).

Technology has now primarily reshaped our lifestyle, way in which we work and communicate with others. It further influences the education system, thus it became the most used and the essential tool to construct new knowledge (Lan Li, 2015). Individuals are driven by the sense of self-efficacy to perform their daily life activities. Self-efficacy is defined by Efe (2015), he stated that it is the formation of behaviour self-perception, belief and judgement of an individual's

capacity in planning the necessary activity to achieve something under different situations. For this context, self-efficacy refers to the use of technology. Perceived computer self-efficacy as an individual's accepted perception of his ability to use the computer to do tasks that are required to be done by a computer (Efe, 2015).

The advancement of technology has encouraged the use of technology by all range of ages and in everyday life activities. This may be due to its portability and affordability (Baran, 2014). Large funds of investment have been allocated to technology to integrate mobile technology with the learning system and many researchers have focused their interest in the evolving landscape. But there are some hinders like lack of theoretical and pedagogical outlining sustainable interlink with formal education context and unavailability of teachers support and training (Baran, 2014).

The accessibility of mobile devices like personal computers, tablets and smartphones has made mobile devices common to the youth. The development of Applications (Apps) and mobile service made the technological devices popular (Kateryna, 2015). All these mobile devices are user-friendly and most people use them to access news, financial information, entertainment, learning etc. In the past, technological limits made technology not to be used for educational purposes. Challenges like limited internet access, expensiveness, insufficient memory space, are now resolved to enable maximum use of technology for mobile learning. Therefore, m-learning became the platform to provide many educational activities. It is used for different purposes and for different needs, it may be used to deliver content or focus on training for jobs. It can also be in the form of learning application, performance support, to access learning materials by secondary institutions' students and higher educations' students. Health professionals are using podcasts as a form of mobile learning, which is lately an important technological tool (Kalludi, 2015).

2.3 INTERNET AND ITS USABLE FEATURES FOR EDUCATIONAL PUPOSES

2.3.1 INTERNET IN THE EDUCATIONAL ENVIRONMENT

The arrival of the internet and the use of a progressive technology is the primary push for the evolution of online education and it alters the entire learning process. Most research has been done on students, but now researchers and lecturers are beginning to explore the potentials of mobile learning technology as an extra hand for education (Baran, 2014). Despite the availability of advanced technological devices and internet, it remains a challenge as to which tools and methods that should be utilised in the learning programmes (Maysami, 2015). Internet-based tools are playing a vital role in the learning programmes not only in the online classes but it is also used in the traditional classes. Therefore, it is imperative to get the right method to practise at the right place. It remains a faculty members' duty to get a new technique which is not going to be used for traditional class's purposes, which would be things like teaching pedagogy, interaction technology among members of the class. It is expected that each faculty chooses technological tool that best suits their students, that means faculties would be using different technological tools depending on the needs of their students (Maysami, 2015).

Web 2.0 is the new version of internet based devices on World Wide Web. This includes web-based free encyclopaedias, social networking services, forums, podcasts, sharing media and other online association (Efe, 2015). This new version of technology enables a user to alter how they use, create, share and proliferate documents in an easier way than it was in the past (Efe, 2015). The main feature of the Web 2.0 medium is that it is able to create applications that are required by the user and it doesn't need any design knowledge from the users. Other key features of Web 2.0 are its tools for cooperation and social interaction. The Web 2.0 allow users to manage data and information and to engage into interactive services. The use of the Web 2.0 is spreading every day all over the world. This is because Web 2.0 provides rich and user-friendly sources of information which are required by the user (Efe, 2015). Web 2.0 applications are wiki, podcasts, video sharing platform, social networks and instant messages. These applications play a huge role in the educational environment.

Lecturers and students can leave class but still be able to share knowledge, through the Web 2.0. Information in Web 2.0 is open to everyone. Web 2.0 technologies including podcasting, wiki, blogs and Facebook are mostly used by the lecturers (Efe, 2015), hence internet plays a vital role in education and social lives. Mobile technology is rapidly used as a vital component of the educational platform in helping to learn. It offers an online platform for students to interact with each other, grows course utility and enhances writing skills (Kayri & Cakır, 2010). Institutions of higher learning have their education intensively supported by Web 2.0 including UKZN. The Web 2.0 also equips students with skills that are necessary for their future jobs.

2.3.2 INTERNET FEATURES USED FOR EDUCATIONAL PURPOSES

2.3.2.1 SOCIAL NETWORK SITES

Social Network Sites are web based and enable an individual to create a controllable profile in the system to connect will the list of users, share things, comment and like posts. The examples of Social Network Sites (SNS) are Facebook, Myspace, and Twitter etc. These tools enable a user student to gain academic content (Arshad, 2014). Thus they are regarded as a ground for sharing, distribute formative resources and community building. The SNS facilitate communication, sharing, learning and creating knowledge. The special features that these tools have made it a leading source for interaction and collaboration with tertiary institutions students.

If students use media constructively, it can have a positive impact on them. The spread of social network, different software and applications encouraged the educational institutions to use and keep up with these new technologies to assist their students to complete their educational needs. The SNS assists a lot in information seeking and is a centre for universal knowledge seeking and it direct students by means of online community. The professional users of social sites within the universities claimed that the SNS is the potential medium in tertiary institutions because it is a successful learning platform for students to interact. The SNS has been identified as the most efficient means that contributes to learning efficacy by its capability to interact and sharing information within students (Arshad, 2014).

The social networks enhance interaction within tertiary students by engaging them in discussing the current issues and involving them in academic knowledge. It also involves students and lecturers across the world. SNS promotes education within students, even though some of the higher institutions haven't realised this as yet. The most common social networks such as Twitter, Facebook, Flicker etc, are used in academia in the present days, the study on its scholarly usage is still not been done in depth.

Facebook is one of the popular social networks for university students, in Turkey, 33% of the university students are using Facebook (Efe, 2015). These students benefit from social network by enriched learning and instruction experiences (Efe, 2015). A study by (Efe, 2015), further reveals that social networks enhance communication skills, participations, social commitment, strengthens peer support and allows learning base and cooperation. Social networks are easy to use and are user-friendly.

2.3.2.2 BLOGS

The blog is a web page that has a dated content, they can be created by any individuals. They are able to contain pictures, links and sounds. They can be created easily. A new heading highlights new topics and can be shared with other internet users. Other users are able to make comments and interaction between the author and the reader at the end of the content (Arshad, 2014). A blog can be used in different ways for education purposes, they can be used for learning software development, obtain the writings from other students and even share ideas in the classroom. It can be also used by students to say their opinions. Lecturers can suggest a subject for the students and the students can say what they think, then the teacher can evaluate them.

2.3.2.3 INSTANT MESSAGES

An instant message is an application that allows a person to communicate with the other person or a group of people in real-time, cooperation may be in a text, audio and video message. The instant message includes internet calls, chats (hang out) and video conference, this tool offers a real-time cooperation (Efe, 2015). E-mails are examples of non-real-time communication. It is a free internet

application. The major element of an instant message is that it ensures that the correspondent is available, enables multi-tasking, messages are recorded for future references and they are less costly. Instant messages can be used for educational purposes like sharing ideas regarding different topics and enable users to meet new people (Teten & Allen, 2005). The University of KwaZulu-Natal uses this method of communication as a main medium of instruction. This study will examine how frequently the economics students interact with Learning Management System.

2.3.2.4 VIDEO SHARING

Video sharing is a site that allows users to share videos with other users. Popular sites for video sharing are google video and YouTube. These sites offer service to publish videos for different uses, mostly for educational purposes. This internet feature enables lecturers and teachers to provide audio-visual learning facilities. Students can use this feature at their own time to go through what has been covered in the class (Efe, 2015). Normally there are more than one video clips explaining one thing. The students can enjoy the benefits of choosing the one they feel or think explains better to them. Another important feature for video sharing is that a student can ask a question and expect an answer from different users who have seen the video.

2.3.2.5 PODCAST

Podcasting is simply the broadcasting of sound through the Web, this is a very useful tool for students how are using the audio material. This feature is more used in education. Podcasts are not interactive and simultaneous, but the learners can still relate to the learning environment through using the information that is delivered (Efe, 2015). This feature is also used a lot in qualitative research, where a researcher would record interviewees with regards to certain information.

2.4 M-TECHNOLOGY IN THE EDUCATIONAL ENVIRONMENT

The continuous advancement of technology is positively affecting life from all the different angles. The area that most researchers are interested in is the educational field which is affected by the continuous technological change (Kim, 2013). The society that is technological sound gives rise to new opportunities for learning. In not so may years ago the learning environment evolved into e-learning and m-learning environment (Kim, 2013), students are utilising all the different kinds

of technology to learn. Common examples of learning technological devices are Personal Digital Assistant (PDA), Ultra Mobile PC (UMPC), PC etc. Each device is developed for its different purpose, many applications and software are created to make these devices more usable. The differences are the purpose for which these devices are created for, they come in different sizes with regards to mobility and portability.

The wide range of research conducted in mobile learning makes it very hard to come up with a definition or describe generally added benefits (Baran, 2014). Different fields of study for instance Engineering, Information systems and Healthy science define mobile learning in a way that suits their specific field. The definition of mobile learning highlights mobility, access, immediacy, stativity, ubiquity, convenience and contextualises (Baran, 2014). Mobile learning further possesses the qualities of a physical mobility, conceptual and social spaces (Baran, 2014). Nowadays most of the technological devices are made such that they are in a portable form. Technological devices are reforming the user's lives into a different ways, in this study the users will be students. Most of the mobile technology has been limited to social communication, thus fewer tertiary institutions regarded mobile learning as a core pedagogical activity (EL-Hussein, 2010). The University of KwaZulu-Natal is one of the few universities that adopted m-technology. This study will examine if the adoption of m-technology is going to influence the pass rate. Although these technologies are used to support learning such as lectures and assignments, it is not a core way of knowledge delivery in most institutions of higher learning (EL-Hussein, 2010).

The value of mobile learning and e-learning is that it expands classroom discussions to be in other places through the network connection. The newly developed technology like cameras, imbedded sensors, location awareness, motion detection, social network, web searching and augmented reality, shows the need to upgrade learning and enable it to take place at different remote places, conceptual and social spaces, outdoor and indoor (Baran, 2014). Mobile learning allows both lectures and students to have unlimited access to information, expediency, convenience, immediacy are valuable to lectures and improve students' learning. Such feature offers a chance for individualized, collaborative, situated, and informal learning exclusive of classroom context limits (Baran, 2014). These devices created attraction through their portability and mobility, innovation like geospatial technologies, searching abilities, video capture, images, and context

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awareness rapidly increased their versatility by offering situated learning experiences and enabling exploration among authentic settings, especially supporting inquiry-based learning (Ertzberger, 2013).

Quinn and Stein (2013) and Kummerow *et. al.,* 2012 have called for attention to the important impact of e-learning on building the future education for both traditional and online schools. Maysami (2015) claims that there is direct instruction from traditional classes which is directed to the whole class, the speed of learning is monitored by a lecturer and they follow the textbook curriculum. But the availability of e-tools that are applicable for both face-to-face and online formats, students take a lead in the learning programmes and play a more preemptive part. Maysami (2015) disputes the definition of e-learning, stating that students should be the centre of their own learning, so technological systems must be designed to assist their learning progress.

Technology shifts education making it digital and reachable to everyone. E-learning allows adults, all nations and different race groups to gain learning openings through it multiple space capability and elastic times (Maysami, 2015). Online courses satisfy the students provided that other attributes like lecture slides, online assessment, bulletin boards and other tools are available for them. Some students may prefer traditional learning and search things online for extra help (Quinn and Stein 2013). To make online education tools to be more usable, online course is structured well and interact to create a user-friendly environment (Tucker, 2012). The University of KwaZulu-Natal has recently adopted the use of mobile technology. This study wants to examine if the UKZN will reap the benefits of using m-technology. The benefits includes improved pass rate, increased number of students enrolment and efficiency.

2.5 MOBILE LEARNING IN SECONDARY AND TERTIARY INSTITUTIONS

 The great advancement in the Massive Open Online Courses (MOOC), companies are working together with well-known universities to introduce their online courses. MIT and Harvard University formed edX, which is able to incorporate virtual laboratories. With this technological tool, students are able to conduct simulated experiments (Maysami, 2015). The MOOC software offers students with paths to follow, and it is usable for both traditional and online classes.

Traditional classes that use online technology can improve their pass rate when the quality of both modes of content delivery is integrated (Maysami, 2015). Singh (2003), encouraged the choosing of the best and correct method in order to achieve best results.

Tucker (2012) suggested that videos alone are not enough for the successfulness of the class, but instructors are needed. Therefore, instructors must be well trained to integrate technology effectively in order to attract different students' learning styles and make sure that students remain the core of learning. The University of KwaZulu-Natal is integrating both methods of learning to achieve the maximum pass rate and efficiency. Students that prefer not to attend the classes will be able to use m-technology to catch up. These technological tools help students to understand content, develop their skills and create their knowledge. It is much easier when instructions are well outlined (Maysami, 2015). The success of the traditional class using an online component depends on the content of the course material, communication between leaners and instructors, and communication among learners alone. In this way, the direction in learning will be constructed.

2.5.1 WIDGET AS AN M-TECHNOLOGY FEATURE THAT SUPPORTS E-LEARNING

Instead of using singular multi-devices educational application, widgets can be used as a feasible solution. Kim (2013) defines widgets as an educational application that can be installed on a PC/laptop, mobile phone and in websites. Widgets are complete-fledged client side APP that is authored by using web standard and packaged for distribution. Widgets are downloaded from the internet and installed into a client's devices where they are executed as an independent application but they also can be inserted into web pages. Popular widgets are newscasters, weather forecasters, games, stock tickers. There are also other complicated widgets which can collect data from different sources to be compared and be shown to a user (Kim, 2013). The advantage about widgets is that they can be installed in any desired device and the information is updated automatically. If one's device is lost the information can be retrieved from the internet when a replacement device is procured.

These make widgets a useful feature for educational learning tool which pulls learning contents from various sources and delivers it to a user for learning purposes (Kim, 2013). Information processing model and widgets are very useful in organisations for repetition of information and storing it in a temporary memory. This assists students in conveying information to the students' permanent memory. The combination of widgets with information processing model can assist students to learn in the e-learning and m-learning platforms. In the investigation on how handhelds devices assist the traditional learning activities in the e-learning and m-learning environment, the lecturer would enrol core contents of the modules into the widgets server. Upon the m-learning platform, students would learn through a widget on their mobile technologies. After the traditional class, students would consult their mobile devices for learning widgets. That where they will be able to engage with the learning contents. This will effectively assist them to memorise core content with regard to the lesson (Kim, 2013).

The learning widget offers a student with a platform which helps them to transmit information from the short term memory into long term memory. These learning widgets simplify the learning progression and yields to effective learning. The lecture can update the contents to make it more suitable for the students. The way this is done is shown in the following figure 2.1.

Figure 2.1 The process of the information-processing model with learning widget.
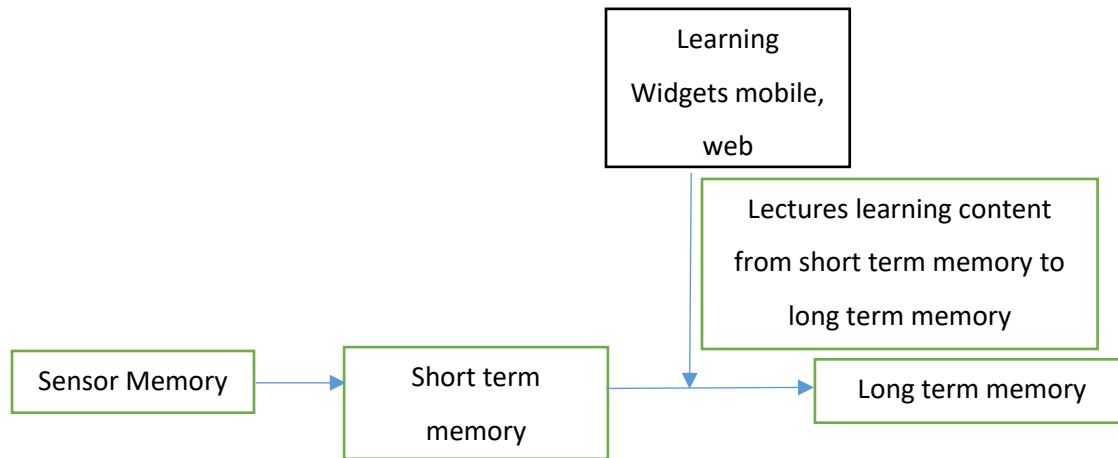
Source: Kim 2013:193

Since the mobile technology is part of the students' lives, mobile devices can be used in the formal learning model and can encourage students to explore other sources of information that are available on the learning widget system (Kim, 2013).

Figure2.2. Images of the widget's content
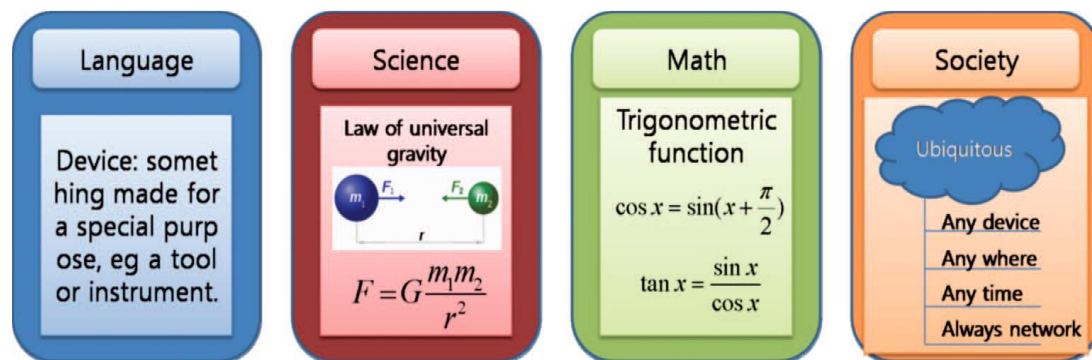
Source: Kim 2013:194

Figure 2 displays four learning widgets, society and language learning widgets contents is made of texts and mind maps. The mathematic and the science contents are made of text, images and formulae. The content uploaded in a widget is made up of the core content of the modules and has

a simple structure to assist students internalise lesson content and further help them to memorise it.

2.6 THE DEGREE OF UKZN ECONOMICS STUDENTS' EXPOSURE TO EDUCATIONAL MOBILE TECHNOLOGY

Mobile technologies have changed the way the society interact with one another, and the way in which information is transfer and made available to everyone. South African educational history depicted a system that offered the imbalanced quality of education and unequal distribution of educational resources (Foko, 2009). The government has put effort into offering the unavailable educational resources to public schools, including computers. Despite the huge government improvement, a majority of the low-income societies are still getting bad grades. This deprives them a chance to be admitted into tertiary institutions. The few that manages to be admitted into tertiary institutions are still not doing well as students from high-income societies (Foko, 2006). The students from low-income societies do not hold necessary skills that are required in the tertiary institutions and many do not have basic skills to compete successfully (Foko and Amory, 2005). The required skills are logical, reading, visual and writing skills.

Public schools from low-income societies only provide students with access to computers during specified times because the students still have other modules to focus on (Foko, 2006). The only mobile technology that students from low-income society are fully exposed to is mobile phones. Foko (2009) says that mobile phones are accessible to both rich and the poor students, therefore, it is a strong tool that can be used for educational purposes. Mobile phones are designed such that they are able to perform a lot of desktop computer functions while they are portable and easy to use (Foko, 2009). Even though the students from low-income societies can have a full access to mobile phones but their degree of exposure to mobile technologies is very limited compared to those students from high-income societies. Not all mobile phones are designed in a way that they could be used for educational purposes.

Economics students at the University of KwaZulu-Natal are required to do a computer module at their first year level of study (UKZN, 2016). Bachelor of commerce is a very broad field of study

at the University of KwaZulu-Natal. Students may specialise in one of the many programmes available under the commerce field. The programmes under commerce field include Bachelor of Commerce-Law, Bachelor of Commerce in Accounting, Bachelor of Commerce (Extended Curriculum) and Bachelor of commerce in Economics, Finance, Human Resource, Supply Chain and Marketing (UKZN, 2016). The commerce students are required to do at least two computer modules at their first year level of study. Those students that decide to major in ISNT are expected to do ISTN modules in second year and their third year level of study. The four computer modules that are offered at the first year level are ISTN 100, ISTN 101, ISTN 102 and ISTN 103.

ISTN 100 (end user computing concepts), exposes students to computer hardware (input, processing, output and storage), theory and application of systems software (operating system) and applications software (word processing, spreadsheets, presentation graphics, database, internet and email). It also covers information networks, data communications and Data Base Management Systems (DBMS). ISTN 101 for business, this module teaches students organisational systems (business processes, management levels, and business decisions), systems theory and concepts, including systems components and relationships (UKZN, 2016). It further covers information systems in organisations (decision-support, developing and managing systems, societal and ethical issues relating to ISTN use, business applications of spreadsheets, databases, types of information systems in the business, systems development life-cycle, information system security and E-business).

ISTN 102 covers information systems management, systems analysis and design, human-computer interaction, Webpage design, hypertext markup language (HTML), Web page creation and programming fundamentals. ISTN 103 aims to teach students information systems management, systems analysis and design, human-computing interaction, Webpage design, Web page creation, business applications for packaged software and systems auditing. It is compulsory for economics students to take at least two of the computer modules at their first year level of study, one module per semester (UKZN, 2016).

This important to determine economics students' interact with technology. If the student had a bad computer experience in ISTN first year, it is unlikely that they like m-technology. Those that had

a good computer experience in ISTN first year might find it easy to adopt m-technology. This can even influence their attitude towards technology. Those that struggled in ISTN might have a negative attitude towards technology but those that did well might like m-technology.

2.7 LEARNING MANAGEMENT SYSTEMS (LMS)

Learning Management System (LMS) is the common internet based technology that many institutions have adopted for assisting their distance learning and teaching learning processes. Examples of Learning Management Systems is Moodle, WebCT, Desire2learn etc. Learning Management System is a Webpage with instrumental tools to assist colleges to structure academic content and interact with students in learning activities (Fathema, 2015). The massive usage of internet based technology in the learning environment for learning activities to provide various learning tools, Learning Management Systems offers efficient interaction within the students and lecturers and improves the learning programme. Research by Jaschik and Lederman (2014) reveals that universities are underutilising LMSs. To successfully implement technology in the learning process, lecturers need to be able to use it and encourage students to use it too (Fathema, 2015).

The research by Hustad and Arntzen (2013) shows that most of the college staffs only utilise LMSs to assist in their class lessons. Other feature of Learning Management Systems like Chat, Online discussions are used by those staff members that have no direct communication with the students. The survey which was compiled by Jaschik and Lderman (2014) suggested that most of the academic staff underutilise LMSs, 78% of the academic staff use LMSs for posting course outlines, 58% use LMSs to post results and 52% use LMSs for communication with the students. 20% of the academic admin are using LMSs for uploading lecturer contents. Only one-half of the 99% of higher institutions that have Learning Management Systems running, utilising LMSs every day. The rest is not taking advantage of the learning Management Systems (Dahlstrom, *et. al.*, 2014).

The tools and functions that the learning Management Systems offer are online group chat and discussions, course management tools and lecture materials, assignments, homework, power points, grading, course evaluations and video clips (Fathema, 2015). The LMSs have advanced greatly regarding education, therefore there are suggestions in connection with its quality and the

way in which tasks are executed in the system (Freire *et.al.,* 2012). The above percentages show that the Learning Management System is not used to it full capacity. It is clear that there are some challenges that its users are still facing. Some of the challenges might be usability, the word usability varies based on the field of study (Freire *et.al.,* 2012). In this case, the term usability refers to the capacity that a system is purposed to provide to the user to completing the user's duties effective, efficiently and satisfactory (Freire *et.al.,* 2012). It is stated that to evaluate the LMSs' usability: "the users' perspective", counts not anymore "the systems' perspective", is the main point to look at (Freire *et al*., 2012).

Studies conducted in the past regarding LMSs reveal that features of LMSs are unequally utilised, some functions are utilised more often than others (Jaschik and Lederman, 2014). The rapidly used features (blackboard learning management system) of the Learning Management Systems are document uploading, results release and assignment (Fathema and Sutton, 2013). The college staff explains that LMS challenges lead to the minimum utilisation of the system (Fathema, 2015). The research conducted by Holden and Rada (2011), have found that k-12 teachers' technology self-efficacy have some effect on the teachers utilisation of technology. The highlighted problem regarding the usage of technology for e-learning in an educational environment is restricted or poor internet access, academic and administrative staff is not well trained and institutional policy on instructional design for e-learning.

To motivate college staff, students and academic staff to use e-learning, adequate technological infrastructure must be provided and the system must be intellectual demanding. Hinders to technological use are individual issues like lack of skills, lack of training, lack of knowledge, time and role models, less faith in technology, accessibility and unwillingness to use technology for educational purposes. There are also additional difficulties within the organisation (organisational barriers), examples are problems regarding hardware, software, instrumental design, and insufficient technological support. Some of the institutions haven't realised the value of online learning (Fathema, 2015).

The University of KwaZulu-Natal uses Moodle (Learn@UKZN) as their official e-Learning Management System. Moodle (learn@UKZN) is used as a platform where communication with

the students happens. Moodle (learn@UKZN) is used to upload lecture notes, library resources, study tips and other educational resources on the site (UKZN, 2016). A survey that was conducted at the UKZN-Westville Campus reveals that students regard Moodle (learn@UKZN) as a very helpful learning platform and they would like to recommend it to other institutions of higher learning (UKNZ, 2016). The challenges the students highlighted is that Moodle (learn@UKZN) requires data or WI-FI to operate, which is very restricted for students that live outside the university campuses.

The registered students can submit their assignments, access library resources, have access to links that can help them prepare for examinations and study tips. Moodle (learn@UKZN) can be accessed anywhere if you have mobile technology and internet connection (UKZN, 2016). Moodle (learn@UKZN) performs administration of online tutorials and quizzes. Professor Fatima Suleman, said Moodle (learn@UKZN) is the only tool that enabled her to reach students when she was outsides the country. Beside the normal functions that Moodle (learn@UKZN) can perform, it can be used to store academic resources and roll over them into subsequent years. Lectures can mark online through Moodle (learn@UKZN), this makes marking easier.

2.8 STUDENTS' ATTITUDE TOWARDS THE USE OF MOBILE TECHNOLOGY FOR EDUCATIONAL PURPOSES

Most researchers have shown that the technological acceptance by students and distance learning can be only determined by the easy to use component and its usefulness. Other studies further explained that perceived enjoyment and usefulness of mobile technology can have an impact on how students see technology and their willingness to engage with internet-based technology for their studies (Fathema, 2015). Pituch and Lee (2006) state that system features are essential for tertiary students to estimate the usefulness and easiness of internet based technology and this can convince the students to use e-learning systems. Saadé, Nebebe and Tan (2007), predicted that the usefulness of the system has a huge impact on students' attitude for Multimedia Learning Environments (MMLEs) and their attitude controls their behaviour to utilise Multimedia Learning Environments. In their research, Weaver, *et. al*., (2008), state that when using LMS, system quality is important for the use of the students and the college staff. Park (2009) believes that the important

factors influencing students' attitudes towards e-learning are e-learning self-efficacy and subjective norms.

2.8.1 E-LEARNING PROGRAMMES AND STUDENTS

It is very common for universities to offer the full online course (Kahu *et al,.* 2013). Open Universities Australia have been operating for more than 20 years, they are regarded as the pioneers of e-learning (Johnson, 2015). They have benefited a two times more of their enrolments in the previous four years, whereby more than a 55 000 students enrolled for 170 courses (Maslen 2012). Above 70% of the universities at the United State of America are providing e-learning programs (Lederman 2013). In 23 countries, with more than 250 000 students, UK Open University is number one in the records of the iTunes U service, where digital library materials are provided to the entire university students and academic staff (Johnson, 2015). It is expected that universities that offer online programs to have more registers students than those that are strictly contact institutions because their market scope is much bigger. This may be due to the fact that e-learning is not geographically fixed and is suitable therefore all people who want to further their studies see this as an opportunity (Prins *et. al*., 2012). This study wants to examine if the implementation of mobile technology is going to increase the pass rate at UKZN.

2.8.2 E-LEARNING VS TRADITIONAL LEARNING STUDENTS

The differentiation between the non-traditional university and traditional students is not crystal clear (Bell, 2012). This is because traditional students have shifted to e-learning, while still registers as full-time university students. So both traditional and non-traditional systems overlap (Allen & Seaman 2013), fading the differentiation between the on campus and online students. Some institutions of higher learning that are known that they are contact institutions have seen the demand to cater those students who are unable to be on campus all the time, thus they created a room for them. The advancement of technology and the amount of influence it has to our lives change the way students register in on campus and to fully online courses (Johnson, 2015).

The difference between students who belong to the traditional classes and the classes whereby learning process is integrated with technology is demography, like gender and age (Quinn & Stein

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2013). Most students that are fully utilising online resources for their studies are older than those students who only rely on their lecturers, more female students use internet based mobile technology for learning than male students. Others suggested that an influence on the choice to use e-learning or not is culture and linguistic. It is traditionally believed that the students that are fully using e-learning are part-time and they are working (Johnson, 2015). Many students prefer to work and study at the same time, this may be due to the higher university costs (Kahu and colleagues, 2013). Approximately 90% of the students who choose to fully rely on e-learning are found that are registered part-time (Johnson, 2015). In a sample of 355 full e-learning students, most of them are from rural areas, low-income females, they are white and 38% of them are financially assisted (Prins *et. al*., 2012).

Gender and age remain the primary feature to differentiate between the traditional student and a full e-learning student (Kummerow *et. al.,* 2012). It is mentioned above that the full e-learning students are normally older than traditional students and it is expected that they are weighty users of digital technology. Zickuhr and Smith (2012) argued with that, they claim that younger students use more technology compared to the older adults. Quinn and Stein (2013) highlight the difficulty in comparing the use of technology in the two models because on-campus students on average are younger compared to full e-learning students. It is revealed that fully online students do like an opportunity of a face-to-face learning but due to certain personal situations they ended up being forced to choose online learning (Johnson, 2015).E-learning students are extremely frequently using mobile technology for their studies hence they are exposed to different features of LMSs (Johnson, 2015). According to Poellhuber *et. al.,* (2013) study in Canada, age and gender referenced to the utilisation of social software for learning.

Regarding geography features and utilisation of mobile technology, both e-learning students and on-campus students seem to have unlike methods of learning (Quinn and Stein, 2013). Fully e-learning students are self-controlled and much disciplined because they have to set their learning goals, identify a proper learning strategy and put it into place. Students that are using e-learning are likely to be disturbed from their studies and they can be demotivated easily. Therefore, setting a goal for them is a big thing because it helps them pass their studies. On campus students get motivation on a daily basis from the lecturers and even from other students. Fully e-learning

students present a very high metacognitive self-control compared to on campus students and this prepares them for their future employment (Johnson, 2015).

E-learning applies a deeper method to learning unlike on campus students who adopt a superficial method of learning (Quinn and Stein, 2013). Kahu and collegues (2013) agree with Quinn and Stein 2013, they further revealed that older e-learning students employ a detailed learning method compared to younger students. The chances for success in e-learning environment are equivalent to student metacognitive awareness of learning output, intrinsic and extrinsic motivation and evaluation of learning method (Kirmizi, 2013).

2.8.3 STUDENTS' INTERACTION WITH DIGITAL TECHNOLOGY

Today's tertiary students are actively using digital technology in their learning process. Digital technology is an umbrella term which covers programmes, device and Data Base Management Systems (DBMS), personal computers, internet, mobile devices, video, e-mails and Web 2.0 (Eliana Gallardo Echenique, 2015). There is a series of names given to the generation that shows attraction to the digital technology, those names are "digital natives" (Prensky, 2001), "learners of the digital era" (Rapetti & Cantoni, 2010), "the next generation" and "millennials" (Howe & Strauss, 1991). The researchers dispute that net generation commerce their tertiary education with a much experience of the digital technology which was not available for the past generation (Eliana Gallardo Echenique, 2015). Nowadays students start university with awareness of internet based tools like podcasts, wikis, Twitter, blogs, Facebook etc (Bicen & Cavus, 2011).

Young people are separated into two groups, one that was born in the year 1980 to 1994 and the one before 1980. Both of these groups exhibits different characteristics, the group that is born between 1980 and 1994 shows confidence in the use of technology and they possess their unique learning approach and different approach to things (Romero *et. al.,* 2013). Many researchers delegated their interest in studying this group worldwide. Some researchers found that students of the same age use technology differently, and the use of technology do not require them to know programming languages.

The use of technology by students before university it does not imply that they used it for learning purposes (Eliana Gallardo Echenique, 2015). Other researchers, who played a part in researching the use of technology by the groups of young people, say that there is no enough evidence to suggest that net generation uses technology in a different way than the past generation. Some dispute that net generation qualities also appears in other generations, thus it is very difficult to say they are not like other generations (Eliana Gallardo Echenique, 2015) and most of these studies are conducted at universities, so they might yield different results if they are conducted in a different context.

2.9 CHAPTER SUMMARY

This chapter reviewed literature that is relevant for this study. The literature that was reviewed relates to the role that internet plays to reshape people's lives, internet features that are usable for educational purposes, value of mobile technology in the educational environment, role of mobile technology in secondary and tertiary institutions, mobile technology features that support e-learning, students' exposure to educational mobile technology, role played by LMS, students' attitude towards mobile technology, difference between online students and on-campus students and the students interaction with mobile technology. This literature review is the theoretical foundation of this study. Chapter three will build upon these observations and discuss the research methodology, which tries to investigate the use of mobile technology to improve students' academic performance in UKZN-CLM-School of Economics.

CHAPTER 3

RESEARCH DESIGN

3.1 INTRODUCTION

This chapter uncovers the methodology used and explains how the academic performance determinants were put together into the production function. It shows how the production function was derived and the steps taken to achieve the research objectives and addresses the research questions. It further discusses some of the variables used in the study which are directly linked to the students' performance.

3.2 THEORETICAL FRAMEWORK

There are so many schools of thoughts teaching different quantitative and qualitative methodologies. The School of social science explains methodology into two broad methods, which are quantitative and qualitative (Black, 2005). This research adopted the quantitative method. The definition of the quantitative method is extracted from Black (2005), 'quantitative research is defined by collecting numerical data that are analysed using mathematically based methods in particular statistics'. Quantitative research involves numerical data acquisition, which is analysed using mathematical models. The data is required to give an explanation regarding any phenomenon at hand. Bokana (2011) stresses that quantitative methodology is mostly preferred in economics empirical research. Challenges concerning students' academic performance within the College of Law and Management can be addressed as follows: (1) description - what is so, (2) explanation - why it is so and (3) correction - actions that can be taken.

3.2.1 MODELLING CONSIDERATION

This study exerts effort to test factors including m-technology that contributes to the university students' pass rate. Students who are admitted at tertiary institutions have passed and accumulated the required points by the university in order to be admitted. The transition between high school and a university is measured by matric performance in terms of grading obtained at high school and the university performance is measured in terms of test and examination marks.

The University of KwaZulu-Natal is subjected to theories of production function like any other educational enterprise. In an educational enterprise, inputs are technologies, policies, resources, finances etc. and these inputs are used to educate students. Output would be the improved retention, higher graduation rate, more research output etc.

This study adopts a linear logistic educational production function approach, where many factor determinants of education are incorporated in order to predict students' pass rate. Educational inputs are independent variables and educational output will be a dependent variable. The application of economics methods will assist in determining the efficiency of educational input to improve educational output (Horn *et al.,* 2011).

The existing body of research argues about the different variables used to determine students' academic performance. A number of studies used performance of each module (subject) taken, an average mark achieved in a year, a number of credits obtained in a year and a ratio of passed examinations over attempted examinations (Bokana, 2011).

Most studies have identified a need to assist first-year students because of the larger transition between high schools and universities (Tinto, 2003). Higher Educational Institutions paid attention into challenges that first-year students are faced with at universities (Yathavan, 2008). First-year students' test or examination marks can best estimate students' persistence, provided that other factors are accounted for (Pascarella and Terenzine, 2005). Bokana (2011) says that students' marks are a good predictor of students' success and they are used to select the students that must continue with their studies. Students' marks are massively treated as the dependent variable to determine students' success, mostly appears in studies that used educational production function (Cappellari *et al.,* 2010 and Horn *et al.,* 2011).

The University of KwaZulu-Natal grades students' academic performance from 0 – 100 percent, marks above a 50% are regarded as a pass. A student that obtains a mark ranging from 40%–49% is granted with a supplementary examination. Students that are granted with a supplementary

examination, their main examination marks are disregarded. Supplementary examination mark would be considered for that specific module that a student is granted a supplementary examination on. Pass marks enable the students to progress to the next level or major in those particular modules. A test and final examination mark is a continuous variable, taking any value ranging from 0-100, depending on a performance of a student. Bokana (2011) says in order for a test mark or final mark to be treated as a dependent variable, it must be a discrete variable. A test or final examination mark can be considered as a continuous variable and in other case considered as a discrete variable, where final examination mark or test mark is changed into probability of getting a pass or fail.

3.1.2 CONCEPTUAL MATHEMATICAL MODEL

To elaborate the conceptual mathematical models used to predict students' performance, economic principles and methods are applied. This study adds to the massive body of research regarding educational production function by the theory of firms' model. Students' academic performance is influenced by qualities of staff members (administrators, lectures, Academic Development Officers and others), qualities of the university (in this case it's UKZN) and qualities of a student.

<u>Educational Production Function</u>

$$Pij = f (Aij, Iij, Sij, Uij) \dots\dots\dots\dots\dots (1)$$

Pij – Educational output, in terms of ith student' marks, obtained in j^{th} module

Factors influencing educational output:

A_{ij} – is the qualities of the staff members (Administrator, Lectures and ADOs) of ith student in j^{th} module

I_{ij} – is the qualities of the academic institution (UKZN) used to elaborate i^{th} student' achievement for j^{th} module.

S_{ij} – i^{th} student' qualities that explain his achievement in j^{th} module.

U_{ij} - error term

The error term in the above production function acknowledges that there are many other factors that influence educational output, so it incorporates them.

Equation (1), states that, qualities of academic staff, qualities of academic institution and qualities of a student jointly relates to students' academic performance, *ceteris paribus*.

3.1.3 LINEAR REGRESSION MODEL

Specifications for educational production functions are subjected to changes. Previous studies say that, a bond between educational output and educational inputs do not correspond in the exact form of functional relationship (Horn *et al.,* 2011). To account for the incoherencies in the educational production function, this study adopts a linear educational model.

$$P_{ij} = \beta_1 + \beta_2 A_{ij} + \beta_3 I_{ij} + \beta_4 S_{ij} + U_{ij} \ldots\ldots\ldots\ldots\ldots (2)$$

P_{ij} – Educational output (final examination or test marks), in terms of ith student' marks, obtained in j^{th} module

Factors influencing educational output:

A_{ij} – is the qualities of the staff members (Administrator, Lectures and ADOs) of ith student in j^{th} module

I_{ij} – is the qualities of the academic institution (UKZN) used to elaborate i^{th} student' achievement for j^{th} module.

S_{ij} – i^{th} student' qualities that explain his achievement in j^{th} module.

U_{ij} -Error term

β_1 – Constant

β_2, β_3 and β_4 – are unknown variables that need to be estimated.

Equation (2), states that, qualities of academic staff, qualities of academic institution and qualities of a student are linearly and jointly related to students' academic performance, *ceteris paribus*.

If any of the three determinants malfunction in any single institution, the results will be underperformance of the students. Students' underperformance leads to low graduation rate, higher dropout rate and lower output rate (Bokana, 2011).

Through the usage of linear regression model, students' academic performance can be estimated in any High Educational Institution in South Africa by applying different estimation methods. This study will examine the factors influencing economics students' academic performance, particularly mobile technology in College of Law and Management Studies at the University of KwaZulu-Natal. Therefore, equation (2), will be adjusted to suit estimations within the UKZN – CLM – School of economics.

3.1.4 REGRESSION MODEL OF ECONOMICS STUDENTS' PERFORMANCE AT UKZN (WESTVILLE CAMPUS)

A study by Van Den Berg and Hofman (2005), puts an emphasis that there are many factors influencing students' performance in every single Higher Educational Institution. This study focuses on a single institution (UKZN). In equation (2), A-academic staff qualities and I-institutional qualities will be held constant. This will enable the researcher to magnify students' qualities that influences their academic performance for a particular module (S_{ij}). The assumption adopted in this study is supported by two rationales. (1). Qualities of academic staff and qualities of institution changes greatly if students' academic performance is compared across different HEIs. (2). In a single HEI, one lecture could teach same class and that class be subjected to the same administrator. Information regarding I_{ij} and A_{ij} is usually not collected and kept at UKZN. Students' data is only kept for one year, therefore it is important to keep I_{ij} and A_{ij} constant.

Equation (2) is now left with the qualities of students. All the other factors are now constants. Qualities of students (S_{ij}) are further broken down into students' demography represented by S_d, students' abilities represented by S_b etc., *ceteris paribus.* Equation (3) incorporates the above mentioned change and it is tailored specifically for UKZN-CLMS-School of Economics.

$$P_{ij} = \beta_1 + \beta_2 S_{dij} + \beta_3 S_{bij} + U_{ij}\ldots\ldots\ldots\ldots\ldots (3)$$

Pij – Educational output (final examination or test marks), in terms of ith student' marks, obtained in j[th] module

Factors influencing educational output:

S_d – Students' demography qualities like age, gender, race, location etc.

S_b - Students' abilities. Hours of study, class attendance, tutorial attendance, studying using mobile technological.

U_{ij} – Error term

β_1 – Constant

β_2 & β_3 – unknown variables, need to be estimated.

3.1.5 REGRESSION ANALYSIS

Regression analysis is the prediction of the mean values for the dependent variable using the explanatory variables. The study aims to test if the use of mobile technology in the educational environment for study purposes is able to improve students' academic performance. Linear regression is applied to test at what degree the usage of mobile technology for academic purposes can best predict a good economics students' academic performance.

3.2 METHODOLOGY

This study attempts to test if the uses of mobile technology can improve economics students' pass rate. The technique adopted in this study is a quantitative research technique. This type of method is the systematic empirical investigation of observable phenomena via statistical, mathematical or computation techniques. Quantitative research can be performed after some hypothesis has been made, because this kind of approach is deductive. Before the research is conducted the researcher will make some hypothesis statements about the population then conduct the research to see if the hypothesis is true or false.

3.2.1 RESEARCH DESIGN

The proposed research approach for this study is quantitative research using a cross-sectional study. A quantitative research is an investigation into social or human problems based on testing a theory composed of variables, measured with numbers and analysed with statistical procedures to determine whether the predictive generalisation of the theory is true (Bokana, 2011). The cross-sectional study obtains data once at a specific time and in a specific place (McBride, 2016). It is further used to investigate associations between factors and outcomes within a defined population.

3.2.2 AIM AND OBJECTIVES OF THE STUDY

This study aims to find out if the use of mobile technology would improve the economics students' academic performance at the University of KwaZulu-Natal. To achieve that the researcher needs to find out if the students that are given mobile technology could perform well than those students that are not given mobile technology. In the process, other important factors that come in as the important determinates for academic performance will be incorporated. Those factors include demography and attitude towards mobile technology. The researcher also wants to establish the degree at which technology impact the students' academic performance.

3.2.3 DATA COLLECTION

This study uses a quantitative technique to collect data. Primary data will be used in this study, however existing statistical data will be used as a frame of reference. To get the data required for this study, a questionnaire was designed. A questionnaire had 7 sections, first section contained information regarding the researcher, supervisor, definitions, message to the participants and a consent form. Second section asked information concerning participants' demography, third section focuses on participants' academic characteristics. Section four to the last section asked questions based on the objectives of this study. The four point Likert scale is used. A number of 2119 UKZN students are currently registered for economics module 101 and module 102 (UKZN, 2016). All these students are reachable through emails and Moodle Learning Site. Questionnaires were designed using google forms. There was no issue of hard copy questionnaires. Questionnaires, informed consent form and a message explaining more about the survey will be sent to students via institution emails and a message will be posted on Moodle Learning Site. This

was done to encourage the students to fill in the survey form. The email will contain a URL that students must click and it will direct them straight to the form. After they have filled in the form, they must click a text box saying submit. The data will automatically be updated to the online spread sheet which is linked with google form. To improve the respondents' rate, tutors and lectures will be advised to encourage students to fill in the survey forms.

3.2.4 DATA QUALITY CONTROL

This study uses a quantitative research method; data was monitored to ensure validity and reliability. Validity is very important to make sure that data addresses what it supposed to address. To ensure correct measure of the objectives, all questionnaires were closed questions. Reliability test was conducted to ensure that same results are yield at any time under similar conditions (Creswell and Clark, 2007:350).

3.2.5 SAMPLING STRATEGY

The entire data required for this research is collected at the University of KwaZulu-Natal (Westville- Main Campus). The research focuses on economics students, so they are the only required participants for this study. The school of economics has 2119 students that are currently registered for both economics 101 module and economics 201 (UKZN, 2016). The sampling strategy that is adopted in this study is the probability sampling. Section 1.10.1 explains more on this.

In the form there is field that requires first three digits of the students' number and the other field requires academic year of the participants. This information is used to separate data into 2 groups, first year and second years based on their academic year. The first three digits of their students' number will be used to identify if the student is a repeater or not. The data will also account for transferred students. Those students would have students' numbers starting with 216xxx but a student would be in their second year of study (academic year). Since the researcher wanted to test the influence of mobile technology determinant in the students' academic performance, students whose students' numbers starts with 216xxx and in their first year of study are assumed to have mobile technology.

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The University of KwaZulu-Natal clearly outlined that all the first year students are required to have personal computers as the primary requirement for the university in order to be admitted (UKZN, 2016). The rest of the students are treated as the group that is deprived of mobile technology.

The number of the currently registered students is very large, hence the probability sampling technique was applied. This means every student in both groups stand equal chance of being chosen. A total number of 300 students will be chosen as the study sample size, 150 students from those who have mobile technology and another 150 students from those who were deprived of technology.

3.2.6 DATA ANALYSIS

Stata 14 software package is used to analyse data. All the data is recorded on google spread sheet (google excel) will be transferred in to stata 14 for a detailed analysis. Errors that might have occurred in the transcribing process are checked and corrected. Stata 14 is used to filter data as it is explained above. Demography analysis is performed in stata 14 and a descriptive statistic using demography variable. Academic information, section 3 of the survey form contains information used to perform regressions. That particular information is directly taken as the determinants of students' academic performance.

All the data from section 4 to section 7 of the survey form is collected using a Likert scale method. Each of the four objectives, were directly represented in the form by the main questions. Under every main question there were four questions that put emphasis to the main question. For each of the four questions a table of summary is made to clearly represent how the respondents' answered. This draws a theme summarizing how respondents responded to each objective.

3.2.7 MEASUREMENTS

This quantitative study uses a Likert scale as the measurement tool. A likert scale is a non-comparative scaling technique and are unidimensional. It is a 4 points Likert scale, one-sided

starting from strongly disagrees to strongly agree. The questionnaire forms have 7 sections, the first section contains information regarding the researcher, supervisor, definitions, message to the participants and a consent form. The second section asks information concerning participants' demography, the third section focuses on participants' academic characteristics. Section four to the last section asks questions based on the objectives of this study. The questionnaire form asks a total number of 26 questions, 16 questions are based on the objectives of the study and the remaining 10 questions ask about the participant's demography and academic information.

3.2.8 RELIABILITY AND VALIDITY

The researcher developed the objectives of the study based on existing gaps in the literature review and from the introduction of technology that the University of KwaZulu-Natal adopted. The questionnaires were developed such that they help the researcher to address the issue and provide answers to the problems. Data quality is ensured through validity and reliability. Validity makes sure that the data addresses exactly what it supposed to address (McBride, 2016). Closed questions were asked to ensure that the responses address exactly the main objectives. Reliability ensures that the same statistical results are obtained at any time under similar conditions (Creswell and Clark, 2007:350). Data is stable if the measure is adopted frequently on the same sample and the results are similar. The questionnaires asked questions that build on a similar theme but phrased differently. In this way participants were consistent with their answers.

3.2.9 ETHICAL CONSIDERATIONS

For this study, permission is received from the Head of Economics School before any questionnaire is distributed to the students. Students are not obliged to participate in this study. It is outlined in the questionnaire form that participation is completely voluntary and anonymous. Those students that are willing to participate in the survey will have to complete a consent form which comes with the questionnaire form. The researcher will make sure that all the participants remain unknown and any information they provided is kept safe and will not be given to a third part for whatever reason. The information is stored in the password protected online drive which is only accessible by the research. According to the University of KwaZulu-Natal protocol, the information will be kept for the period of five years. After the five of five years, the information will be deleted from the drive.

3.2.10 REGRESSION AND LOGISTIC MODELS

Inferential statistics, mathematics methods and economics are used to assess the determinants of students' academic performance in the Collage of Law and Management (Bokana, 2011). This study addresses two things, (1) correlations between mobile technology and students' academic performance within the school of economics. (2) Application of the educational production function to try model the link between educational inputs and educational output. Students' academic performance (P_{ij}), will be treated into two different ways. (1) It is treated as a continuous dependent variable, where P_{ij} takes any value between 0 and 100 percent, using ordinary least square (OLS). (2) P_{ij}, will be treated as a discrete variable, where it takes one of the two values, 1 denoting pass and 0 denoting failure, using Logistic regression.

3.2.11 ORDINARY LEAST SQUARES

In OLS, mean values of P_{ij} (dependent variable) are estimated based on the values for explanatory variables (Bokana, 2011). In OLS, students' marks (examination or test marks) are treated as continuous variable (can take any value between 0 and 100). Explanatory variables will be chosen from the main three determinates as explained above. Linear production function is shown below, where P_{ij} can be students' final examination mark or test mark.

$P_{ij} = \beta_1 + \beta_2$hours of study $+ \beta_3$class attendance $+ \beta_4$tutorial attendance $+ \beta_5$m-technology $+ \beta_6$race $+ \beta_7$gender $+ \beta_8$location $+ u_{ij}$………………. (4)

P_{ij} – Educational output (final examination or test marks), in terms of ith student' marks, obtained in j^{th} module

Factors influencing educational output:

Students' hours of study, the student will have to choose from the options available on the form according to the amount of time they spend in studying.

Class attendance, tutorial attendance and mobile technology, students are given three options in the form, they have to choose one.

Location, students have to choose between the two available options.

U_{ij} – Error term

β_1 – is the constant

β_2,………….,β_8 – unknown variables, needed to be estimated.

In order to estimate the success of the economics students in UKZN-CLMS-School of Economics, logistic regression model is used.

<u>**Cumulative Distribution Function**</u>

$$P_{ij} = (p/q) = p \text{ (event/}Y_1, \ldots Y_Z) = \frac{\exp[\alpha 0 + \beta 1(Y1) + \cdots + \beta z(Yz)]}{1 + \exp[\alpha 0 + \beta 1(Y1) + \cdots + \beta z(Yz)]} \ldots\ldots\ldots\ldots.(5)$$

Both sides of the above equation are non-linearly related to each other. Introducing logarithm, in both sides of the equation makes it a linear function in Y_i, as shown below:

$$\text{Logit } (P_{ij}) = \ln (p/q) = \ln p \text{ (event/}Y_1, \ldots Y_z) = \ln \frac{\exp[\alpha 0 + \beta 1(Y1) + \cdots + \beta z(Yz)]}{1 + \exp[\alpha 0 + \beta 1(Y1) + \cdots + \beta z(Yz)]}$$

$$= Y_i \, \beta + U_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Where:

p – (Discrete dependent variable), probability that a student pass.

q - Probability that a student fails (equivalent to 1-p).

Event shows dichotomous variable, which takes 1 for pass and 0 for fail.

$Y_1, \ldots Y_z$ – independent indicators variables.

p/q – odd ratio of the probability of observing pass divided probability of observing a failure. (the odd ration in favour of passing a test or final examination in first year or second year economics modules to the probability that the student will not pass the final examination or test).

Exp (or e) = 2.71828 shows base of the natural logarithm.

U_i - error term (disturbance).

$\beta_1,\ldots\ldots,\beta_z$ – Regression confidents (i=1…..z : shows the number of independent variables)

Bokana (2011), raised the argument that interpreting logistic coefficients for dichotomous dependent variables remain an issue in the school of sociology. This is due to the inconsistences depicted by the way in which a logistic coefficient is used.

Beta logistic regression coefficients (β_1), shows how much the natural logarithm of the predicted odds ratio ($\ln(p/q)$ = logit (P_{ij})) changes due to 1 unit change in a specific variable, holding everything constant at a certain value.

3.3 VARIABLES

3.3.1 RACE

South Africa is a multiracial country, like all other universities, University of KwaZulu-Natal is a four racial group university. Each race is coded, 1 is for Africans, 2 – Indians, 3 – coloureds and 4 – white people. Many studies, including a study by Bokana (2011), have shown that in Higher Educational Institution that is multiracial, non-white students are performing poorly compared to whites. A few studies said race is an insignificant variable in predicting academic performance.

South African background caused a racial differences and individual subjectivities. South African's past political system instituted barriers to non-whites and affected the quality of their education. In all the South African universities the majority of the students are black African students and Indians are the next. University of KwaZulu-Natal is dominated by white academic staff, which goes out to teach majority black African students. Very few academic staff plays the role of being a role model to black African students, since the academic staff is dominated by whites (Bokana, 2011). In stata 14, black African students are coded 1, zero otherwise (whites,

Indians and coloureds). In this study the race coefficient (for black African) is expected to have negative relationship with students' academic performance.

3.3.2 GENDER

Adding gender as a determinant for students' academic performance is question by many studies (McNabb, 2002 and Edwards, 2000). Many fields of study, i.e economics, law and accountancy are still dominated by males. The past belief that females are not permitted to do certain jobs is perpetuating misrepresentation of females. Other researchers revealed that male students are still performs better than female students in business studies and economics (Bokana, 2011). They further explain that male students are performing better in economics multiply choice questions (MCQ) and short essay, but when looking only at short essays, females are performing relatively better.

Williams *et al*. (1992) says that there is no enough evidence to support to consider gender as the students' academic performance determinant. Even though there's positive relationship between male students and their academic performance but there is no evidence that shows that female students are at a disadvantage (Edwards, 2000). In this research, male students are coded 1 and zero otherwise, thus β_7 is expected to have a positive relationship with academic performance.

3.3.3 LOCATION

Most of the students that are admitted at the University of KwaZulu-Natal are local students (Mike, 2014). Students from low income rural areas are normally underperforming compared to students from high income societies (Vijay, 2012). Rural area is coded 1, zero otherwise (urban area =0), so the relationship between the location and students' academic performance is expected to be a negative relationship.

3.3.4 MOBILE TECHNOLOGY

The value of mobile learning and e-learning is that it expands classroom discussions to be in other places through network connection. These devices created attraction through their portability and

mobility. Open Australia University is regarded as the pioneer of e-learning. It experienced a doubled amount of student enrolment after fully introducing e-learning (Johnson, 2015).

3.4 CHAPTER SUMMARY

This chapter presented the details of the theoretical framework, methodology and the variable used in this study. The literature reviews and the body of research under this related topic was used to develop the methodology of this study, deriving the relevant regressions for this study and constructing the variables. This chapter has the details on the population, sampling procedure, data collection, data analysis and regression analysis. Chapter four presents a detailed data analysis and discussion.

CHAPTER 4

PRESENTATION AND ANALYSIS OF RESEARCH FINDINDS

4.1 INTRODUCTION

The previous chapter dealt with the approach to the research methodology and design. This chapter proceeds to present the findings, analysis and interpretation of the data collection by means of a questionnaire on the use of mobile technology for m-learning in improving economics students' pass rate at the University of KwaZulu-Natal. The data analysis was done using stata 14 and excel packages. The presentation of the results is in tables and figures which is interpreted for statistical meaning.

4.2 QUANTITATIVE ANALYSIS AND REGRESSIONS

4.2.1 REGRESSIONS

Two regression models were conducted to examine the effect of mobile technology towards students' academic performance. The first regression model includes all the variables and the second regression model excludes mobile technology variable. The difference between these two regression models is the effect of mobile technology towards the students' academic performance.

First Regression Model

$\acute{Y} = P_{ij} = SAP$ (Students' Academic Performance)

$$SAP = \beta_1 + afr\beta_2 + ind\beta_3 + col\beta_4 + males\beta_5 + rural\beta_6 + m\text{-}tec\beta_7 + ca\beta_8 + ta\beta_9 + hours\beta_{10} + \mu$$

Race   Gender   Location

M-technology

Class Attendance

Tutorial Attendance

Hours of study

Dummy Variables

Race

White students are chosen as the reference category since their academic performance is expected to be the highest.

Gender

Female students are chosen as the reference category, as it is expected that they relatively perform lower than male students.

Location

Urban location is chosen as the reference category since KZN province is dominated by rural areas.

Figure 4.1 Regression Model 1

SUMMARY OUTPUT

Regression Statistics

Multiple R	1
R Square	1
Adj R-Square	1
Standard Erro	3.87E-14
Observations	300

ANOVA

	df	SS	MS	F	gnificance F
Regression	9	18034.91667	2003.9	1.338E+30	0
Residual	290	4.34289E-25	1E-27		
Total	299	18034.91667			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	1.386E-13	2.83093E-14	4.8944	1.639E-06	8.28E-14	1.94E-13	8.2838E-14	1.943E-13
Afr.	-3.3E-14	9.39249E-15	-3.5086	0.0005219	-5.1E-14	-1.4E-14	-5.1441E-14	-1.447E-14
Ind.	-3.18E-14	1.04379E-14	-3.0445	0.0025448	-5.2E-14	-1.1E-14	-5.2322E-14	-1.123E-14
col.	-3.29E-14	1.06074E-14	-3.1006	0.0021211	-5.4E-14	-1.2E-14	-5.3767E-14	-1.201E-14
Males	-3.03E-15	5.2223E-15	-0.5803	0.5621848	-1.3E-14	7.25E-15	-1.3309E-14	7.248E-15
Rural	5.333E-15	4.70742E-15	1.133	0.2581602	-3.9E-15	1.46E-14	-3.9316E-15	1.46E-14
M-Tec	5	4.39032E-15	1E+15	0	5	5	5	5
C.A	5	5.02814E-15	1E+15	0	5	5	5	5
T.A	5	6.07528E-15	8E+14	0	5	5	5	5
Hour.S	5	1.79967E-15	3E+15	0	5	5	5	5

Second Regression Model

$$SAP = \beta_1 + afr\beta_2 + ind\beta_3 + col\beta_4 + males\beta_5 + rural\beta_6 + ca\beta_7 + ta\beta_8 + hours\beta_9 + \mu$$

Regression model (2) includes every variable but not mobile technology variable. This regression model examines the students 'academic performance in the absence of mobile technology.

Figure 4.2 Regression Model 2

	Figure 4.2 Regression Model 2							
SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.9446166							
R Square	0.8923005							
Adj R-Squared	0.8893397							
Standard Error	2.5835533							
Observations	300							
ANOVA								
	df	*SS*	*MS*	*F*	*ignificance F*			
Regression	8	16092.56506	2011.6	301.37028	6E-136			
Residual	291	1942.351604	6.6747					
Total	299	18034.91667						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	14.484894	1.688493494	8.5786	5.82E-16	11.1617	17.8081	11.1616861	17.808101
Afr.	-1.337498	0.622136391	-2.1498	0.0323914	-2.56196	-0.11304	-2.5619552	-0.11304
Ind.	-2.243963	0.684325115	-3.2791	0.0011679	-3.59082	-0.89711	-3.5908168	-0.897108
col.	0.0780076	0.70815497	0.1102	0.9123615	-1.31575	1.47176	-1.3157473	1.4717625
Males	0.0104039	0.348648616	0.0298	0.9762145	-0.67579	0.6966	-0.6757887	0.6965965
Rural	0.6273144	0.312116211	2.0099	0.0453673	0.01302	1.24161	0.01302303	1.2416058
C.A	5.2651404	0.335326488	15.702	1.146E-40	4.60517	5.92511	4.60516772	5.9251131
T.A	4.4733857	0.404418844	11.061	5.655E-24	3.67743	5.26934	3.67742893	5.2693425
Hour.S	5.0542605	0.120107064	42.081	9.44E-126	4.81787	5.29065	4.81787185	5.2906492

4.2.2 ASSESSING THE RELIABILITY OF THE COEFFICIENTS

4.2.2.1 THE TEST-STATISTIC METHOD

This type of test involves determining a range of *t*-values for which one must reject the null hypothesis. This is known as the rejection region. A set of regression results is then used to calculate a test statistic and to determine whether or not the test statistic falls into the rejection region. The test statistic is given by:

$$t = \frac{bj - Bj}{\sigma bi} \quad \text{.. 4.1}$$

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This test approach will be used to test if technology is a significant variable in determining students' academic performance.

H_0: $\beta_{m\text{-tec}} = 0$ against

H_1: $B_{m\text{-tec}} \neq 0$

Critical value (t_c) Degree of freedom is equal to the number of observations subtract the number of variables including the constant. Therefore, the degree of freedom is 290 (see appendix table 4.1). The critical value (t_c) is <u>1.962</u>

$$t = \frac{5-0}{4.39032 * 10^\wedge{-15}}$$

$$= \underline{1.1 * 10^\wedge 15}$$

Since the test statistic (<u>1.1*10^15)</u> is larger than the critical value (<u>1.962)</u> at the 5% significant level and therefore falls into the rejection region, we must reject the null hypothesis that the slope parameter is zero at the 5% significance level.

4.2.2.2 THE PROBABILITY VALUE METHOD

This is the lowest probability (or level of significance) at which H_0 can be rejected. H_0 is rejected at all levels of significance above the probability value but fail to reject it at all levels below the probability value. Figure (1), shows that hours of study (Hour.s), tutorial attendance (T.A), class attendance (C.A) and mobile technology (m-tec) have a zero p-value. This means that Hour.s, T.A, C.A and m-tec are statistically significant at all conventional levels, thus we reject the null hypothesis that $H_0 = 0$. Figure (1) further shows that, for African students we reject the null hypothesis at all levels above 0.05%, for Indian students we reject the null hypothesis at levels above 0.25%, for coloured students we reject the null hypothesis at levels above 0.21%, males are insignificant at levels above 56.22% and rural is insignificant at levels above 25.82%.

4.3 THE EFFECT OF MOBILE TECHNOLOGY IN EDUCATIONAL OUTPUT

The above two hypothesis tests prove that mobile technology is a significant variable to determine students' academic performance. The coefficient of m-tec is positive, which means that mobile technology is positively affecting the students' academic performance by increasing their academic performance.

The standard error of the regression is the standard deviation of the Y values around the regression line. It is used as the measure of the goodness of fit of the regression line. The smaller the value of the standard error is the better the fit as the actual Y values are closer to the values estimated from the model. The smaller the standard error of x, the more reliable x is as an estimator of X. This means that the less x changes from sample to sample. In both figure 4.1 and 4.2 the standard errors are relatively small.

$SAP = \beta_1 + afr\beta + ind\beta + col\beta + males\beta + rural\beta + m\text{-}tec\beta + ca\beta + ta\beta + hours\beta + ų$……..……...4.2

$SAP = \beta_1 + afr\beta + ind\beta + col\beta + males\beta + rural\beta + ca\beta + ta\beta + hours\beta + ų$…………………….4.3

Equation 4.2 – 4.3

$SAP = m\text{-}tec\beta$

Therefore, the coefficient on m-tec is 5. On average, as the use of mobile technology increase by 1%, the students' academic performance inclined by 5% everything else kept constant.

4.4 LOGISTIC REGRESSION

In the above regression, the independent variable was continuous. It took any value between 0 to 100 percent, using ordinary least square. Logistic regression model was used to determine the success of the economics students in UKZN-CLMS-School of Economics. The dependent variable is now treated as binary. It can only take two values, 1 means pass and 0 means fail. Nonlinear probability model varies the marginal effect of independent variables (*X*) on dependent variables (*Y*) as the values of the independent variables are increasing. This feature makes nonlinear probability models a better model of actual behavior than linear probability models.

Figure 4.3 Logistic regression

```
. logit sap hours ta ca mtec

Iteration 0:   log likelihood = -21.202693
Iteration 1:   log likelihood = -20.422369
Iteration 2:   log likelihood = -13.981529
Iteration 3:   log likelihood = -13.443357
Iteration 4:   log likelihood =  -13.39846
Iteration 5:   log likelihood = -13.398213
Iteration 6:   log likelihood = -13.398213
```

```
Logistic regression                             Number of obs   =        297
                                                LR chi2(4)      =      15.61
                                                Prob > chi2     =     0.0036
Log likelihood = -13.398213                     Pseudo R2       =     0.3681
```

sap	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
hours	1.388309	.6192358	2.24	0.025	.1746291	2.601989
ta	.1272028	.6812633	0.19	0.852	-1.208049	1.462454
ca	1.433653	.7607688	1.88	0.060	-.0574262	2.924733
mtec	3.623948	2.066068	1.75	0.079	-.4254703	7.673367
_cons	-10.58276	6.126565	-1.73	0.084	-22.5906	1.42509

The coefficient for *m-tec* is positive, therefore the larger the number of students using mobile technology in their academic activities, the higher the probability that the students' academic performance improves, cet. par.

For every extra hour that students spend on their academic activities, the higher the probability that the students' academic performance (*sap*) is improved, cet. par.

When more students attend their tutorials (*ta*), the higher the probability that students' academic performance improves, cet. par.

When more students attend their classes (*ca*), the higher the probability that students' academic performance improves, cet. par.

4.4.1 THE SIZES OF THE COEFFICIENTS

Tutorial attendance, $100(\exp0.1272 - 1) = 13.56\%$

The odds that students' academic performance (*sap*) is a pass increases by 13.56% for every extra tutorial attendance (*ta*), cet. par.

Hours of study, 100(exp1.3883 -1) = 300.80%

The odds that students' academic performance (*sap*) is a pass increases by 300.80% for every extra hours of study (*hours*), cet. par.

Class attendance, 100(exp1.4337 -1) = 319.42%

The odds that students' academic performance (*sap*) is a pass increases by 319.42% for every extra class attendance (*ca*), cet. par.

4.5 ANALYSIS

4.5.1 USAGE OF MOBILE TECHNOLOGY BY GENDER

Table 4.4 Mobile technology and gender

| | M-Tec | | | |
Gender	1	2	3	Total
female	3	76	137	216
male	5	22	57	84
Total	8	98	194	300

The sample size of 300 students was chosen, 216 participants were female and only 84 were males. Female students that said they use mobile technology for their studies at all times are 137 and only 57 male students are using mobile technology at all times for their studies. Students that said they use mobile technology for their studies but not at all times are 76 female students and 22 male students. Those who never use technology for their studies are 3 female students and 5 male students. Most students use mobile technology for their studies, but female students are more active in the usage of mobile technology for education. This is revealed by the above figure and the fact that the survey form was electronically sent out to all the students irrespective of their gender.

Table 4.5 Class attendance

Gender	C.A 2	3	Total
female	64	152	216
male	27	57	84
Total	91	209	300

The University of KwaZulu-Natal is a contact learning institution. Students are required to attend class, mostly the undergraduate level. In the above figure, only 30.33% of students attend their class but not at all times. The school of economics at first-year and second-year level achieves a class attendance of 69.67%. More female students attend classes than male students. An amount of 152 of female students attend classes at all time and only 57 male students attend all the times. Students that said they attend classes but not at all times are, 64 female students and 27 male students. It is also noted that there are more female students than male students in the sample. This makes it difficult to see if the rate of class attendance is different.

Table 4.6 Tutorial attendance

Gender	T.A 2	3	Total
female	35	181	216
male	19	65	84
Total	54	246	300

The school of economics offers tutorials as extra help for the students (UKZN, 2016). Tutorials are offered in both English and isiZulu languages. In the above figure, an amount of 181 of female students always attend their tutorials and only 65 male students attend at all the times. The numbers of students that attend tutorials but not at all the times are 35 female students and 19 male students.

Table 4.7 Hour of study by gender

Gender	Hour.S						Total
	2	3	4	5	6	7	
female	21	6	95	44	29	21	216
male	6	6	39	20	9	4	84
Total	27	12	134	64	38	25	300

From the above figure, it can be seen that more students spend four hours studying. Only 6 students from both genders spend 3 hours for studying. In the total of 84 male students, only 4 students spend 7 hours for studying and 6 students spend 2 hours for studying. In the total of 216 female students, there is a balance of 21 students that spend 7 hours for studying and 21 students that spend 2 hours for studying.

Table 4.8 Students' academic performance and gender

S.A.P	Gender		Total
	female	male	
40	1	2	3
45	9	1	10
50	11	5	16
55	48	21	69
60	47	18	65
65	43	15	58
70	35	10	45
75	17	10	27
80	5	2	7
Total	216	84	300

The figure above shows that there are more female students that obtained 80% than male students. There are more female students that failed their assessment (test or examination) than male students. More students obtained a pass rate of 55%. Most students obtained a mark of 50% and above. The male students' pass rate is 96.23% and the female students' pass rate 95.337%. The total pass rate is 95.67%, this shows a very good performance. The sample is dominated by female students, but the pass rate of the male students' is higher compared to that of the female students.

Figure 4.9 Covariance between sap and m-tec

	sap	mtec
sap	68.6187	
mtec	.373244	.2899

In the figure above, the figure for 'covariance' between sap and sap is actually the variance of the pass rate (students' academic performance), while the figure for the 'covariance' between m-tec and m-tec is its variance. The figure we are interested in is 0.373244, which is the covariance between sap and m-tec. It's positive, indicating a positive relationship between the variables.

Figure 4.10 Correlations between sap and m-tec

	sap	mtec
sap	1.0000	
mtec	0.0837	1.0000

```
. display (0.0837)^2
.00700569
```

The number we are interested in is the squared correlation coefficient. This number measures the proportion of the variability in m-tec (mobile technology) that is explained by (or matched up with) the variation in sap (students' academic performance).

This number means that 0.7% of the variation in the level of sap (students' academic performance) can be accounted for by the variation in the levels of m-tec (mobile technology). Since this number is less than 1, there must be other factors affecting students' academic performance. Some other factors are outlined in the above but there are more other factors.

4.5.2 THE ROLE OF M-TECHNOLOGY IN SECONDARY AND TERTIARY INSTITUTIONS

Figure 4.11 Role of mobile technology in education
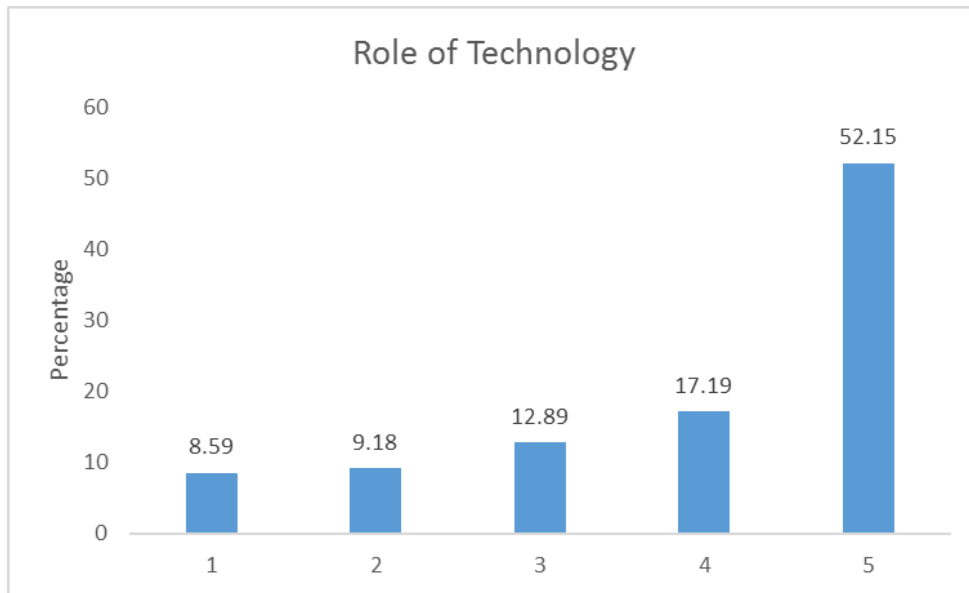
In Figure 4.11 more than 50% of the students that participated in the survey strongly agrees that mobile technology makes studying interesting, easier, improved their marks and encouraged them to study. The data shown above is skewed to the right. Which means that 69.34% of the students believe that mobile technology has a positive impact on their studies. Only 12.89% remain neutral about the role of mobile technology in education. The remaining 17.77% of the students believe that mobile technology has no impact on their studies.

4.5.3 STUDENTS' AWARENESS OF M-TECHNOLOGY

Figure 4.12 Students' awareness of m-technology
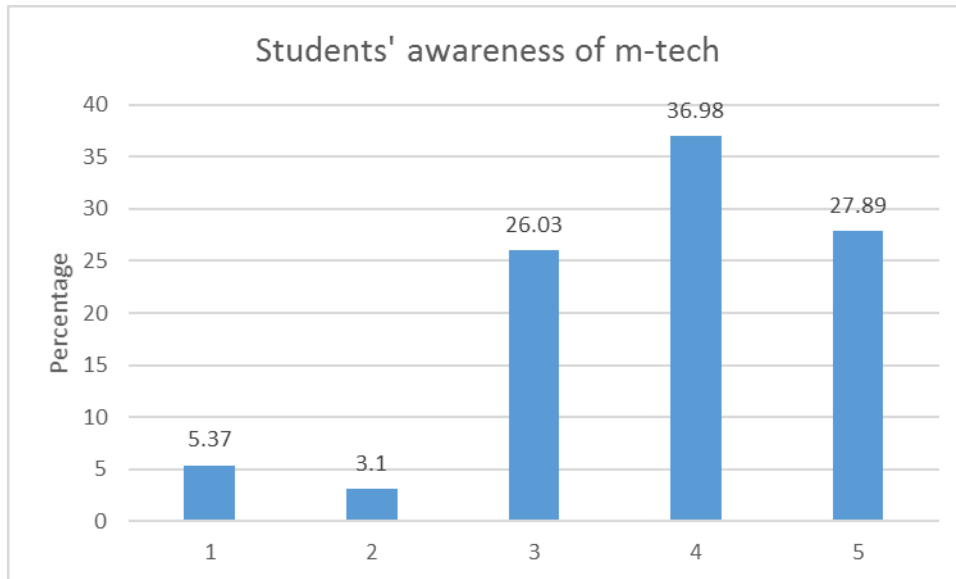
Figure 4.12 shows that 64.87% of the students lie on the agree end. This means that a bulk of the students can use mobile technology without having any problems, they can handle minor technological issues, they find it easy to operate mobile technology and they have a clear and understandable interaction with mobile technology. However, 26.03% of the students decided to remain neutral, this may mean that they are unsure that they can operate mobile technology. A very small percentage (8.47%) lies on the disagree end of the above figure. Despite the bulk of the students that remain neutral, most of the economics students are aware of mobile technology and they can handle it without seeking for assistance.

4.5.4 USAGE OF LEARNING MANAGEMENT SYSTEM

Figure 4.13 Usage of Learning Management System
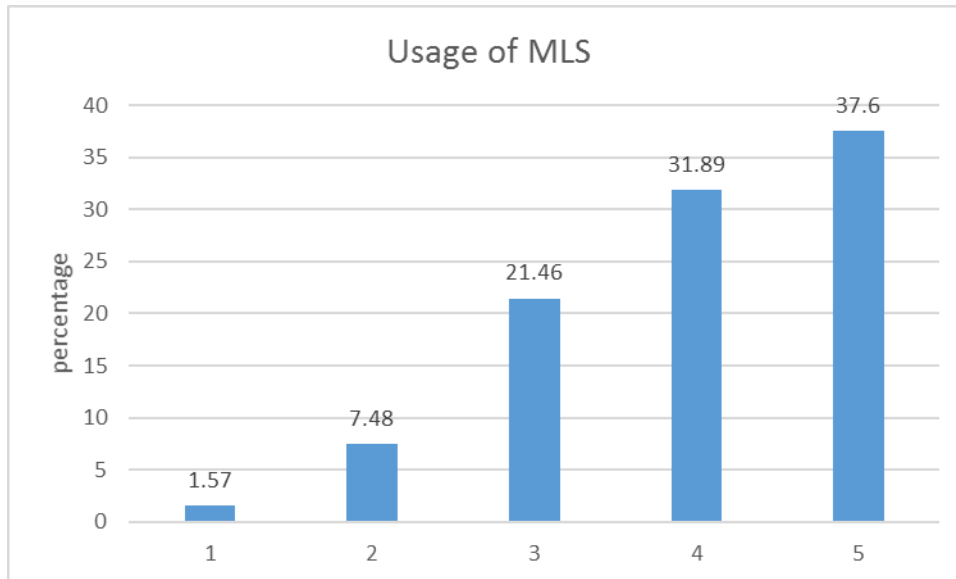
The above Figure 4.13 presents data that is skewed to the right. Only 9.05% that disagreed that they check their emails every day, know how to use moodle (learn@UKZN) learning site, check their learning site every day and participate in discussion forums via moodle (Learn@UKZN). A bulk of the students (69.49%) use LMS effectively and only 21.46% is neutral about their usage of the LMS. This may mean that the 21.46% students are not aware of the learning site or they are being ignorant. However, most of the economics students are aware of the source of information (Learn@UKZN) that is available for them. In the 69.49%, a 37.60% strongly agreed that they use moodle, participate in discussions, and check their email and moodle every day.

4.5.5 ECONOMICS STUDENTS' ATTITUDE TOWARDS M-TECHNOLOGY

Figure 4.14 Students' attitude towards mobile technology
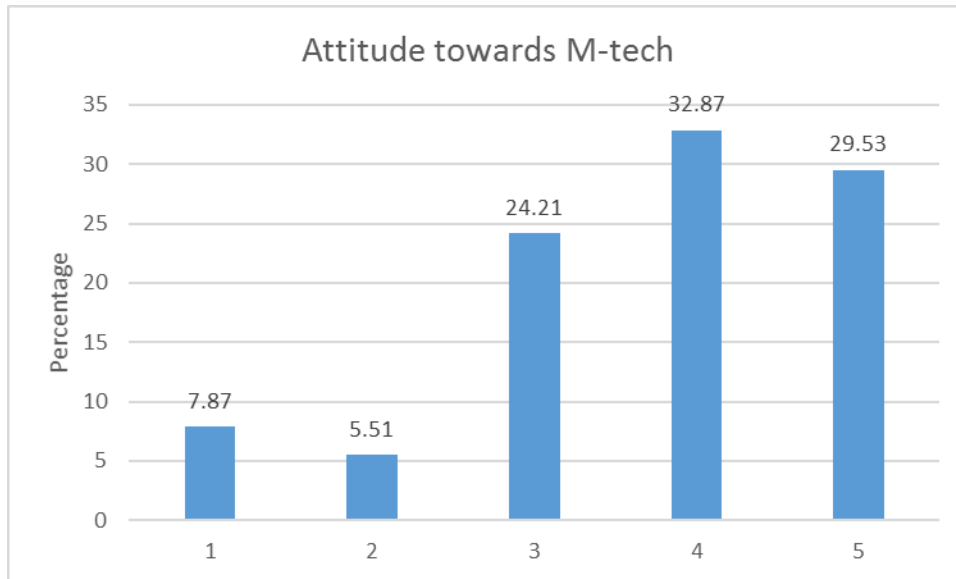
The above Figure 4.14 shows that 62.40% of economics students wants to use mobile technology for their studies, their families already use mobile technology, they believe mobile technology is fascinating and studying using mobile technology is good. The 24.21% of the students are not sure of their attitude towards mobile technology. This may be that the students are not aware of what mobile technology is. Only 13.38% of the students preferred not to use mobile technology for their studies. Within the 13.38%, 7.87% of them strongly disagreed with the usage of mobile technology.

4.6 CHAPTER SUMMARY

This chapter has presented a detailed data analysis in three broad ways. It has covered linear regressions including variable testing, logistic regression and a simple data analysis using standard bar graphs and some Stata 14 analysis tool. Chapter five presents conclusion and recommendations based on the results that were obtained in chapter four and what the other researchers found in their studies.

CHAPTER 5

DISCUSSIN, CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

The rationale behind this study was to evaluate the impact of mobile technology in the educational environment at UKZN. The purpose of chapter five is to integrate the results obtained in data analysis highlighted in chapter four with the literature review in order to draw inferences. In addition, recommendations from the research will be highlighted.

5.2 RESEARCH QUESTIONS

This study uncovered the below research questions:

1. **What role does mobile technology play in secondary and tertiary institutions?**

2. **What degree of exposure does UKZN economics students have on mobile technology?**

3. **To what extent do economics students use Learning Management Systems in UKZN?**

4. **What is the attitude of economics students towards the use of mobile technology for educational purposes?**

These questions were analysed using different measures which are applied in econometric, this includes OLS regression analysis (discrete dependent variable) and Logistic regression (dichotomous dependent variable). Microsoft excel and Stata 14 were used to perform all the analysis shown in chapter 4. The regressions and excel analysis are important to identify the effect of mobile technology on the students' academic performance.

5.3 PRESENTATION OF THE HYPOTHESIS

H_0: Use of mobile technology for m-learning will not increase pass rate at UKZN.

H_1: Use of mobile technology for m-learning will increase pass rate at UKZN.

The above hypothesis was made before the test was conducted. The hypothesis testing was performed using two methods, namely t-statistic and probability value method. The detailed calculations on this were conducted in chapter four section 4.2.2. For the first method, the test statistic was larger than the critical value at all significant levels. This means that we reject H_0, application of mobile technology at UKZN will increase pass rate. The second method, probability test agrees with t-statistic. The p-value for mobile technology is zero at all conventional levels.

5.4 DISCUSSION AND INFERENCE

University of KwaZulu-Natal encouraged the use of mobile technology for the education purposes. This policy was made last year and implanted this year. It has not been in place for too long but the results are positive. From 100% students that participated in the survey, 64.87% of those students indicated that they use mobile technology all the time when they are studying. Another factor that contributed to the easy adoption of mobile technology for educational purposes at UKZN is accessibility of mobile devices and the development of applications which is very common to the youth (Kateryna, 2015).

Despite the fact that UKZN recently implemented mobile technology, 64.87% of the students that participated in the survey further stated that they can use mobile technology without having problems. This included the handling of minor technological issues and operation efficiency of the mobile technology. Mobile technology offers many opportunities for learning because they offer multiple academic activities for the students (Kim, 2013). In UKZN-School of Economics first years and second years, 62.40% of the students claimed that their families use mobile technology and they wanted to use mobile technology too. This group of students believed that mobile technology is interesting and is a good tool for their educational purposes.

The survey analysis showed that 69.49% of the students use Learning Management Systems. This percentage of students are efficiently interacting with their lectures and other students through Learning Management Systems. These students find their learning process easier compared to the other students that neglected the Learning Management Systems. The students that used Learning Management System for their studies took advantage of the tools that are offered to them to understand content, develop their skills and their knowledge.

The bulk of the students that accepted mobile technology and were effectively utilizing it, claimed that it helped them a lot to achieve better pass marks. In the analysis chapter, the pass rate was 95.67%. This is a good performance. It must be considered that the pass rate can be high but the quality may be very poor. The students that were actively using mobile technology for their studies obtained high quality marks compared to those that shied away from mobile technology. This agreed with Fathema (2015) on his research where he claimed that students that engage themselves with internet based mobile technology for m-learning noticed a positive impact on their studies. The acceptance of mobile technology by many students also reflected their attitude towards it. Many students showed a positive attitude towards the use of mobile technology and believed that using mobile technology appropriately can result in improved academic performance.

5.4.1 OBJECTIVES OUTCOMES

A bulk of the students believe that technology make their studies interesting and easy to understand the content. The outcome shows that students are interested in studying with mobile technology and most of the students are aware of m-technology. They are able to personally fix minor technological issues. Their great interest in mobile technology resulted in a number of students part taking in the usage of LMS and they really want to fully adopt mobile technology as part of their traditional way of teaching and learning.

5.4.2 LIMITATIONS OF THE STUDY

The challenge in this study was the fewer respondents that initial participated in the survey. This was an anticipated challenge, thus the researcher had to go visit the students during their lectures and during tutorials to encourage them to participate in the survey. The Academic Leader for

economic, administrators and tutors played a huge role in encouraging students to take part in this survey. Another problem which was unaccounted for was that the survey questions were sent using google forms; students who did not have an account with google were required to open one to facilitate their participation in the study.

5.4.3 RELIABILITY AND VALIDITY OF THE FINDINGS

The researcher developed the objectives of the study based on existing gaps in the literature review and from the introduction of technology that the University of KwaZulu-Natal adopted. The questionnaires were developed such that they help the researcher to address the issue and the respondents' answers must lead to the conclusion. Data quality is ensured through validity and reliability. Validity makes sure that the data addresses exactly what it supposed to address (McBride, 2016). Closed questions were asked to ensure that the responses address exactly the main objectives. Reliability ensures that the same statistical results are obtained at any time under similar conditions (Creswell and Clark, 2007:350). Data is stable if the measure is adopted frequently on the same sample and the results are similar. The questionnaires asked questions that build on a similar theme but phrased differently. In this way, participants were consistent with their answers.

5.5 RECOMMENDATIONS

This study reveals that technology can be used in the educational environment and can benefit the users. Technology is able to reach all the corners of the country because it is rapidly developing and more people are reliant to it. Technology is quickly responding to the needs of the market. Issues regarding education are outlined in chapter one. Those issues included the limited access to educational resources and the higher failure rate. As technology is able to reach many places, mobile technologies can be used to spread out education at a lesser cost. The analysis shows that most of the students are willing to use technology for their studies and studying with it would make their studied very easy because mobile technology comes up with many applications that are used to supplement studying.

Mobile technologies are able to use widgets, this application can be installed in to the devise and the information in the device can be updated automatically. This application can store all the information in the network. If your device is lost your information can be retrieved from the internet when you have a replacement device. These make widgets a useful feature for educational learning tool which pulls learning contents from various sources and delivers it to a user for learning purposes (Kim, 2013). Information processing model and widgets are very useful in organisations for repetition of information and storing it in a temporary memory. The learning widget offers a student with a platform which helps them to transmit information from the short term memory into long term memory. These learning widgets simplify the learning progression and yields to effective learning.

The answers that were obtained from the research questions for this study suggest that mobile technologies can be used for education purposes. If the government and the private sector invest in mobile technology, they can both achieve their shared dream very quickly and at a low cost. It has been the countries big dream to provide education to all the corners of the countries mostly in rural areas where there are few educational resources. The adoption of mobile technology can spread education and improve the quality of education at the same time. This will allow the same standard of education for every student within the country because all students will have an access to the lesson outline, the content that needed to be covered, the study materials and the extra online sources of information this includes online libraries and other database.

5.6 SUGGESTIONS FOR FUTURE RESEARCH

This study was only focused on the college of a university. This restricts the derivation of conclusions beyond this entity. The study attempts to evaluate students' success, this is a building block on which junctures of interventions and further steps can be taken to enhance efficiency, quality of teaching, effectiveness, research setting of a college and learning. Future research can possibly generalise across more than one university.

This study's objectives were to use only a cross-sectional data, not longitudinal. Where a good set of longitudinal data is available, a preferable approach would have been to use longitudinal data.

The study would have created a pooled regression analysis to accommodate for a longitudinal evaluation of what explains different levels of students' performance in the same modules over time. Applying the same methodology, this study would have included a longitudinal examination across the universities of South Africa. For example, what explains the different performance in the same module between universities that have same assessments. This study opened the door and encouraged better research using sufficiently robust longitudinal data.

5.7 CHAPTER SUMMARY

This chapter converges the overview of this study, the results that offered the answers to the research questions, discussion and inference, recommendation and suggestions for future research. The chapter connected this study's results to the educational issues not just for the University of KwaZulu-Natal but for South Africa.

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APPENDICES

APPENDIX A

t Table

cum. prob	$t_{.50}$	$t_{.75}$	$t_{.80}$	$t_{.85}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$	$t_{.999}$	$t_{.9995}$
one-tail	0.50	0.25	0.20	0.15	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
two-tails	1.00	0.50	0.40	0.30	0.20	0.10	0.05	0.02	0.01	0.002	0.001
df											
1	0.000	1.000	1.376	1.963	3.078	6.314	12.71	31.82	63.66	318.31	636.62
2	0.000	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	22.327	31.599
3	0.000	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	10.215	12.924
4	0.000	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	0.000	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	0.000	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	0.000	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	0.000	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	0.000	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	0.000	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	0.000	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	0.000	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	0.000	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	0.000	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	0.000	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	0.000	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	0.000	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	0.000	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	0.000	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	0.000	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	0.000	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	0.000	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	0.000	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.485	3.768
24	0.000	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	0.000	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	0.000	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	0.000	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	0.000	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	0.000	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	0.000	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	0.000	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	0.000	0.679	0.848	1.045	1.296	1.671	2.000	2.390	2.660	3.232	3.460
80	0.000	0.678	0.846	1.043	1.292	1.664	1.990	2.374	2.639	3.195	3.416
100	0.000	0.677	0.845	1.042	1.290	1.660	1.984	2.364	2.626	3.174	3.390
1000	0.000	0.675	0.842	1.037	1.282	1.646	1.962	2.330	2.581	3.098	3.300
Z	0.000	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.090	3.291
	0%	50%	60%	70%	80%	90%	95%	98%	99%	99.8%	99.9%

Confidence Level

APPENDIX B

The use of mobile technology for m-learning in improving economics students' pass rate at the University of KwaZulu-Natal

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College of Law and Management Studies
Graduate School of Business and Leadership

Participation in this survey is absolutely voluntary and anonymous. If you are willing to participate in this survey please accept the declaration of consent below.

· Please be forthright in your answers.
· Note there is no right or wrong answer.

Definitions
·   M-technology: is the technology that is portable, for example: PC(computers), tablets or smart phones.
·   M-learning: is the ability to obtain or provide educational content on personal pocket devices like PC (Computer), tablets and smart phones.
·   learning management system (LMS): is a software application for the administration, documentation, tracking, reporting and delivery of electronic educational technology (also called e-learning) courses or training programs.

Consent Form *

☐ I agree to participate in this survey

Demography

Please click on the appropriate box

Your Age *

☐ 18 - 25

☐ 26 - 30

☐ 31- 35

☐ 36 - and above

Gender *

☐ Male

☐ Female

Ethnic Group *

1 - Africans 2 - Indians 3 - Coloureds 4 - Whites

	1	2	3	4	
Africans	○	○	○	○	Whites

Location *

☐ Urban

☐ Rural

Acadamic Information

Click the appropriate box

First Three digits of your student number *

☐ 213xxx

☐ 214xxx

☐ 215xxx

☐ 216xxx

☐ other

Academic Year *

☐ First year

☐ Second year

APPENDIX B : CONTINUED

Hours of study per day *

☐ 1

☐ 2

☐ 3

☐ 4

☐ 5

☐ 6

☐ 7

Class attendance *

1 - Never 2 - Sometimes 3 - Always

	1	2	3	
Never	○	○	○	Always

Tutorial Attendance *

1 - Never 2 - Sometimes 3 - Always

	1	2	3	
Never	○	○	○	Always

I use mobile-techonogy for studying *

1 - Never 2 - Sometimes 3 - Always

	1	2	3	
Never	○	○	○	Always

The role of m-technology in secondary and tertiary institutions

Please click one answer for each and every question

M- technology makes studying more interesting *

1 -Strongly Disagree 2 - Disagree 3 - Neutral 4 - Agree 5 - Strongly Agree

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

M-technology makes studying easier for me *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Using m-technology improved my marks *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

M-technology encourages me to studying *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Students' awareness of m-technology

Please click one answer for each and every question

I can use m- technology without having any problems *

1 -Strongly Disagree 2 - Disagree 3 - Neutral 4 - Agree 5 - Strongly Agree

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I can handle minor technological issues (Software related) without asking for help. *

Learning to operate m-technology is very easy *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

My interaction with m-technology is clear and understandable *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Usage of Learning Management System

Please click one answer for each and every question

I check my emails every day *

1 - Strongly Disagree 2 - Disagree 3 - Neutral 4 - agree 5 - strongly agree

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I know how to use moodle (learn@UKZN) learning site *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I check my moodle (learn@UKZN) learning site every day *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I participate in discussion forums via moodle (learn@UKZN) learning site *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Economics students' attitude towards m-technology

Please click one answer for each and every question

I want to use m-technology *

1 - Strongly Disagree 2 - Disagree 3 - Neutral 4 - agree 5 - strongly agree

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

My family uses m-technolgy *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

M-technology is fascinating *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Studying using m-technology is good *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

APPENDIX C

UNIVERSITY OF ™
KWAZULU-NATAL

INYUVESI
YAKWAZULU-NATALI

02 August 2016

Mr Sidwell Sabelo Nkosi (211503356)
Graduate School of Business & Leadership
Westville Campus

Dear Mr Nkosi,

Protocol reference number: HSS/0924/016M
Project title: The use of mobile technology for m-learning in improving Economics students' pass rate at the University of
KwaZulu-Natal

Full Approval – Expedited Application

In response to your application received on 22 June 2016, the Humanities & Social Sciences Research Ethics Committee has
considered the abovementioned application and the protocol have been granted **FULL APPROVAL.**

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 Rosemary Sibanda
Cc Academic Leader Research: Dr Muhammad Hoque
Cc School Administrator: Ms Zarina Bullyraj / Ms Eileen Mohamed

APPENDIX D

THE USE OF MOBILE TECHNOLOGY FOR M-LEARNING IN IMPROVING ECONOMICS STUDENTS' PASS RATE AT THE UNIVERSITY OF KWAZULU-NATAL

ORIGINALITY REPORT

%1	%0	%0	%1
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to University of KwaZulu-Natal Student Paper	%1

EXCLUDE QUOTES	ON	EXCLUDE MATCHES	< 1%
EXCLUDE BIBLIOGRAPHY	ON		