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Mobile Technology as a Learning Tool in the Academic Environment

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Abstract: Education in South Africa is not equally accessible, and the quality of education is not the same across all educational institutions. Students from low-income societies are scoring lower marks in contrast to students from higher income societies. The influence on this is the unavailability of efficient educational resources and infrastructure. This study uses a focus group of 300 students from the University of KwaZulu-Natal (UKZN) School of Economics. It attempts to examine and explain the effect of the use of mobile technology in academic activities within the school of economics at UKZN. The study divides the sample size into two groups, half is given mobile technology and the remaining group is deprived of mobile technology. The data is recorded in two educational production functions, namely Ordinary Least Squares and Logistic Regression Model. The cumulative distribution function examines the probability, in form of Logit, that a student passes economic if using mobile technology for academic activities or studying. Study findings indicate that it is imperative that institutions invest in mobile technology as their learning tool to improve throughput rate and it allows efficiency in all academic activities. Mobile technology enables students to be disciplined, effective and work ready.

Key Phrases: *M-technology; production function and students' academic performance*

1. Introduction

South Africa has 25.54% of unemployment. A larger percentage is those who did not complete secondary education. Research shows that the youth that obtained both secondary and tertiary education stands better chances of getting employment. Education has become a priority for government and companies. Education enables youth to get employment and those that are employed to remain employed. The government facilitates the accessibility of education by providing free education for all and investing in an improved level of education (Dwolatzky, 2014). Research reveals that previously disadvantaged schools are still performing lower than expected (Nkosi, 2012). Most of these schools are situated in low-income societies where there are inadequate resources and infrastructure. The University of KwaZulu-Natal is the biggest university in the KwaZulu-Natal province. The KwaZulu-Natal province is rated third biggest rural areas in the country. The University of KwaZulu-Natal receives a bulk of its students from local schools.

This university takes about 50 079 students per year, subject to availability and space (Mike, 2014). University of KwaZulu-Natal is a decentralised university across the city of Durban, Pinetown and Pietermaritzburg with multiple campuses. These campuses are Westville, Edgewood, Pietermaritzburg, Nelson R Mandela School of Medicine and Howard College. Each of these campuses has its own separate library. Every year, the university started by conducting library orientations to help students understand how to use library and online library tools (UKZN, 2016). Students mostly use the library as their social gathering place and for reading lecture slides. Some second- and third-years students experienced hassle to locate books around the library. The students use the library to search for books and journals when they have assignments. It remains a hassle for them to acquire all the required information using library systems. This negatively affects their academic performance and has the potential to disadvantage them in the working place (Baran, 2014).

2. Literature Review

Issues in the Educational Environment: South Africa believes that tertiary education is a solution to a number of economic, social and political problems this may include inflation poverty and unemployment. The spiking dropout rate and failure rate is a threat to the economic progress of the country. The government of South Africa together with the private sector are investing in education but the outcome is not significant (Bokana, 2011). South Africa doesn't have the strong financial capacity to help each and every student to access tertiary education; hence there are students that are deprived of tertiary education due to their

inability to pay the fees. The University of KwaZulu-Natal has been engaged in serious research around students' academic progress. There might be opportunities for hidden talent from those students that are deprived of tertiary education.

Numerous studies that have been conducted around students' performance depict a common outcome. The outcome is measured through the number of students who graduated within the minimum prescribed period for a degree. A study conducted by Mike 2014, an exhibit that from 2004-2012, 42% of students graduated within the space of the minimum degree period. Students that were academically excluded make up to 19.45%, the amount of 6.98% of students dropped out with a good academic record, the rest is still studying, 31.39%. 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 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 a 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 have made mobile devices common to the youth. The development of Applications (Apps) and mobile service made 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).

Academic Performance in the School of Economics: The throughput rate is an issue that many schools within the University of KwaZulu-Natal facing (Essack, 2014). It is not feasible that this study is performed for each and every school because the University of KwaZulu-Natal is big and consists of a number of schools. The main attention of this study will be narrowed to the School of Economics at the University of KwaZulu-Natal Westville Campus. The high failure rate and dropout rate in the School of Economics have come to the attention of the gatekeepers who are responsible for a variety of degree programmes and qualifications in the school. There are many factors that attribute to this issue it could be low-quality secondary education, the bigger transition between universities and secondary education. Some researchers proclaimed that economics is a difficult module (Bokana, 2011). In this study Economics 102 and Economics 201 will be

analysed. From 2013, 2014 and 2015, the pass rate was 69.20%, 67.48% and 80.36% correspondingly. The performance for Economics 102 module exhibits an upward trend with a spike in 2015. The performance for Economics 201 module from 2013, 2014 and 2015 is 65.68%, 65.26% and 78.53% respectively. Economics 102 modules and Economics 201 module both have upward trends but Economics 201 module is relatively below Economics 102 module. This may result in the class overcrowding by 1.83% for economics 201 modules in 2016.

When the class is overcrowded, it's not easy for students to pass because of limited space in the class and some students are discouraged from attending. This may shrink the pass rate compared to last years. The higher the failure rate for Economics 102 module and Economics 201 modules is the higher the chances of the university taking fewer new entrant students who want to study economics. This is an issue of concern, not only for UKZN but for all tertiary institutions. Improving the quality and equity of students' academic performance remains, therefore, remains the top priority for the South African Higher Education (Vithal, 2015).

Mobile Technology as a Solution: The modern people's social and economic lifestyle is dependent to the invention of smart and portable technology, this is personal computers, smartphones, tablets and internet (EL-Hhussein, 2010). The common use for these smart technological devices is getting access to the internet to keep up with the news, emails, financial updates, social media and communication (Danylova, O., Manako, A., Synytsya, K. & Voychenko, O. 2004). Most people are attracted to using these devices because they are portable and for their wireless functionality. M-Technology is used as a tool that provides education in different organisations. It is also used for content delivery for specific training in a job, performance support or extra access to learning material for secondary and higher education institutions for students (EL-Hussein, 2010). The continuous advancement of technology is positively influencing life from all spheres. Most researchers are interested in the impact of changing technology in education (Kim, 2013). The society that is technological sound gives rise to new opportunities for learning.

Not many 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 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 highlighted in the purpose for which these devices are created for they come in different sizes with regards to mobility and portability. The beauty of mobile technology is that it can extend classroom lessons to distance network places. The newly developed technology like cameras, embedded 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 technology enables lectures and students to gain unconstrained access to information, expediency, convenience, immediacy. The features provided by this technology add value to the quality of lecturing and enhance the students; learning.

Such features offer a chance for individualisation, collaborative, situated, and informal learning exclusive of classroom context limits (Baran, 2014). Quinn and Stein (2013) have directed the focus to the vital roled played by e-learning to upgrading future education for online schools and traditional schools. Maysami (2015) says 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. The availability of e-tools that are applicable for both face-to-face and online formats enables students to take a lead in the learning programmes and play a more pro-active part. The fast pace advancement of technology has transformed education, making it digital and accessible by almost everyone and everywhere. E-learning allows and attracts everyone, all ages, all nations, all races to obtain learning through its multiple space capability and elastic times (Maysami, 2015). Online courses are enough for students provided that there are extra assistant tools like lecture slides, bulletin boards, online assessments.

Other students are very reluctant to migrate to e-learning. They still prefer traditional learning and only search for extra help online, but not relying online (Quinn & Stein 2013). To make online educational tools more usable, online courses are structured well and interactive to create a user-friendly environment

(Tucker, 2012). 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 States of America are providing e-learning programs (Johnson, 2015). Full 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). The University of KwaZulu-Natal recently adopted 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 together with certain challenges, which if disregarded defeat the purpose 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). 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.

3. 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.

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.

Aim 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 impacts the students' academic performance.

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 spreadsheet 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.

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 the same results are yield at any time under similar conditions (Creswell and Clark, 2007:350).

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. In the form there is field that requires first three digits of the students' number and the other field requires an 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 start with 216xxx and in their first year of study are assumed to have mobile technology. 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 a 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 stands an 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.

Data Analysis: Stata 14 software package is used to analyse data. All the data is recorded on the google spreadsheet (google excel) will be transferred into stata 14 for a detailed analysis. Errors that might have occurred in the transcribing process are checked and corrected. 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.

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 grades 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 to 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., 2012 and Horn et al., 2011).

The University of KwaZulu-Natal grades students' academic performance from 0 – 100 percent, marks above 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 the 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. Below is Educational Production Function

$P_{ij} = f(A_{ij}, I_{ij}, S_{ij}, U_{ij})$ …… (1)

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

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. 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.

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

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.

Qualities of academic staff and qualities of institution change greatly if students' academic performance is compared across different HEIs. 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.

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

P_{ij} – 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.

4. Results and Discussion

Regressions: Two regression models were conducted to examine the effect of mobile technology on 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 on the students' academic performance.

First Regression Model

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

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

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. 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 on the students' academic performance.

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

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

Dependent variables: Race, gender, location, m-technology, class attendance, tutorial attendance and hours of study.

Table 1: Regression Model 1

Independent Variables	Coefficients	Std. Error	t-value	p-value	95% Confidence Interval Lower Bound	Upper Bound
Intercept	$1.386X10^{-13}$	$2.83X10^{-14}$	4.894	<0.001	$8.28\ X10^{-14}$	$1.94\ X10^{-13}$
Afr	$-3.3X10^{-14}$	$9.39\ X10^{-15}$	-3.509	<0.001	$-5.1\ X10^{-14}$	$-1.4\ X10^{-14}$
Ind.	$-3.18X10^{-14}$	$1.04\ X10^{-14}$	-3.045	0.003	$-5.2\ X10^{-14}$	$-1.1\ X10^{-14}$
Col.	$-3.29X10^{-14}$	$1.06\ X10^{-14}$	-3.101	0.002	$-5.4\ X10^{-14}$	$-1.2\ X10^{-14}$
Males	$-3.03X10^{-15}$	$5.22\ X10^{-15}$	-0.580	0.562	$-1.3\ X10^{-14}$	$7.25\ X10^{-15}$
Rural	$5.333X10^{-15}$	$4.71\ X10^{-15}$	1.133	0.258	$-3.9\ X10^{-15}$	$1.46\ X10^{-14}$
M-Tec	5	$4.39\ X10^{-15}$	$1\ X10^{15}$	<0.001	5	5
C.A	5	$5.03\ X10^{-15}$	$1\ X10^{15}$	<0.001	5	5
T.A	5	$6.08\ X10^{-15}$	$8\ X10^{15}$	<0.001	5	5
Hour. S	5	$1.80\ X10^{-15}$	$3\ X10^{15}$	<0.001	5	5

Table 1, shows that hour 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%. Multiple R and R^2 values are 1 with Standard Error $3.87\ X10^{-14}$.

Table 2: Regression Model 2

Independent Variables	Coefficients	Std. Error	t-value	p-value	95% Confidence Interval Lower Bound	Upper Bound
Intercept	14.485	1.688	8.579	<0.001	11.162	17.808
Afr	-1.337	0.622	-2.149	0.032	-2.562	-0.113
Ind.	-2.243	0.684	-3.279	0.001	-3.591	-0.897
Col.	0.078	0.708	0.110	0.912	-1.316	1.472
Males	0.010	0.349	0.029	0.976	-0.676	0.697
Rural	0.627	0.312	2.010	0.045	0.013	1.242
C.A	5.265	0.335	15.702	<0.001	4.605	5.925
T.A	4.473	0.404	11.061	<0.001	3.677	5.269
Hour. S	5.054	0.120	42.081	<0.001	4.818	5.291

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

Table 2 shows regression model 2 which includes every variable but not mobile technology variable. This regression model examines the students 'academic performance in the absence of mobile technology. Multiple R-value is 0.945 and R^2 value is 0.892 with Standard Error 2.584. 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 the goodness of fit for 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 x̄, the more reliable x̄ is as an estimator of X̄. This means that the less x̄ changes from sample to sample. In both tables 1&2 the standard errors are relatively small.

$SAP = \beta_1 + afr\beta + ind\beta + col\beta + males\beta + rural\beta + m\text{-}tec\beta + ca\beta + ta\beta + hours\beta + ц$……..1

$SAP = \beta_1 + afr\beta + ind\beta + col\beta + males\beta + rural\beta + ca\beta + ta\beta + hours\beta + ц$……..2

Equation 1&2 gives following generalized equation....

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

Therefore, the coefficient of m-tec is 5. On average, as the use of mobile technology increase by 1%, the students' academic performance incline by 5% everything else kept constant. Logistic regression model is used to determine the success of the economics students in UKZN-CLMS-School of Economics. The dependent variable is now treated as binary. It only takes 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 behaviour than linear probability models.

Table 3: Logistic Regression

SAP	Coefficient	Std. Error	Z-value	p-value	95% Confidence Interval Lower Bound	Upper Bound
Hours	1.3.88	0.619	2.24	0.025	0.175	2.601
Ta	0.127	0.681	0.19	0.852	-1.208	1.463
Ca	1.433	0.761	1.88	0.060	-0.057	2.925
Mtec	3.624	2.066	1.75	0.079	-0.443	7.673
Constant	-10.583	6.127	-1.73	0.084	-22.591	1.425

Log likelihood for this regression model is -13.398. 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.

5. Conclusion

Discussion and Inference: University of KwaZulu-Natal encouraged the use of mobile technology for 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: These percentages 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.

Objectives Outcomes: A bulk of the students believe**s** that technology makes 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.

Limitations of the Study: The challenge in this study was the fewer respondents that initially 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.

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.

Recommendations: This study reveals that technology can be used in the educational environment and can benefit 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 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 studies. Mobile technologies are able to use widgets, this application can be installed into the device 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 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 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.

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