IMPROVING THE ACCESSIBILITY OF DIGITAL CONTENT VIA MOBILE TECHNOLOGY: A CASE STUDY OF MOUNT KENYA UNIVERSITY

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DECLARATION AND APPROVAL

Declaration by the student

I hereby declare that this thesis was my original work and had not been presented for a degree in any other University for any other award. I certify that the information communicated in this thesis was complete and true.

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DEDICATION

I am grateful to the Almighty God for the gift of life and wisdom. This work was dedicated to Olive Immaculate for their encouragement.

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ABSTRACT

Globally, Higher Education Institutions (HEI) have embraced the use of mobile technology in the delivery of instructional resources which has promised multiple benefits in digital or blended learning, HEIs are facing the challenge of high internet tariffs. The current study sought to improve the accessibility of digital content via mobile technology within limited Internet connectivity contexts. The case study was Mount Kenya University in Kenya. In the university, training had been done for both students and educators on how to access digital content but still, both students and educators have been experiencing challenges in getting cost-effective, highquality education, and the accessibility of reading materials. The accessibility of digital content was a problem because of internet connectivity and bulky content. This research contributes to improving the accessibility of digital content via mobile technology by coming up with a mobile-based model. Objectives were to establish the factors that influence mobile technology, Challenges, and their effects on the learners, develop a mobile-based model, and then validate the model. The study was guided by the Technology Acceptance Model (TAM). TAM demonstrates the prediction of the usability and acceptance of new technology. The study used a quantitative research approach within which a descriptive survey research design was adopted. The target population was 15123 individuals comprising of 15,000 students and 123 were educators/ ICT staff who accessed digital content in the academic year 2018/2019. In sampling methods, this research used a case study of Mount Kenya University; students, staff, and educators as population. In this study, Slovin's formula was used to get the sample population of 390 out of the target population of 15,123 members. Simple random sampling was the procedure used. The findings showed that there is a statistically significant relationship between internet connectivity, type of mobile technology, user literacy, data caching, and eLearning policy had a significant effect on the accessibility of digital content. The variables were statistically significant. The adjusted R squared was 0.862 indicating that 86.2 percent of the total variation of accessibility of digital content can be explained by Internet connectivity, e-learning policy, type of mobile technology, data caching, and user literacy. The study then went ahead to develop a mobile-based e-learning model. The mobile-based model used a WIFI router device which is not internet supported as an alternative to a wired internet connection where students and educators access digital content from the mobile sub-server which was not connected to the internet through their mobile technology The findings showed that the use of mobile-based e-learning (m-learning) in universities will greatly improve access to digital content and hence e-learning. The study recommends the use of m-learning as it will provide alternative means of optimizing Internet connectivity. This research makes a contribution to m-learning to universities, policymakers involved in testing, designing, and implementation, and scholars.

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LIST OF ABBREVIATIONS AND ACRONYMS

ANOVA	Analysis of Variance
BS	Base Station
CCNs	Content-Centric Networks
COVID-19	Coronavirus disease 2019
D2L	Desire 2 Learn System
DDA	Direct Digital Access
DIBEL	Distance Institution-Based and Electronic Learning
ICT	Information Communication and Technology
IDAP	Interactive Digital Access Program
LMS	Learning Management Systems
MKU	Mount Kenya University
Modules	Reading materials
NACOSTI	National Commission for Science Technology and Innovation
ODEL	Online Digital Electronic Learning
OER	Open Educational Resources

QoS	Quality of Service
TAM	Technology Acceptance Model
TRA	Technology Reasoned Action
UA	University of Arizona
UH	University of Hawaii
UNESCO	United Nations Educational, Scientific and Cultural Organisation
URLs	Uniform Resource Locators If
VIF	Variance inflation factor

CHAPTER ONE

INTRODUCTION

1.1. Background to the study

The use of mobile technology in everyday life had reached a tremendous level in our homes, workplaces, and communities. Mobile technology was also used in many universities to access digital content by the students and educators. According to Marketsandmarkets, (2017), global access to digital content enables lecturers and trainers to offer real-time communication in training and give out instructions to students by the use of mobile technology. This learning was not limited to the classroom or lecture rooms. Due to the COVID-19 pandemic which was a health crisis, many schools in different countries had been closed to reduce contracting the disease and also save lives. The classroom learning process was distributed in a way that teaching was done online and also assessments were done online.

Mobile learning had gained popularity around the world because of distributed mobile technology and was mostly implemented by universities (both public and private) or schoolbased initiatives (Tsinakos, 2013). Websites developed by most libraries enable students to access reading materials and research materials from their mobile devices (Tsinakos, 2013). These were factors that make students and educators access digital content online; Adoption of mobile technology, connectivity, and use of technology to access digital content.

1.1.1. Adoption of mobile technology in education

Watson (2015), advised universities to support plans to extend access to education by students through e-learning and the adoption of the blended learning schools model. The author stated that there was better evidence of achievement felt by universities after access to digital content

and also how digital learning had been promoting learning in universities. According to Watson (2015), digital content will be necessary for creating a system that contributes to the learning of digital content through technology. Access to digital content through technology that enables new strategies and formats such as online and blended learning and competency-based learning have the potential to contribute to good quality of education. Mobile technology can also help educators to concentrate on developing a better learning atmosphere that assists students in reading/learning more.

Public schools use 1 computer per 5 students (1:5) and also those schools spend almost $3 billion per year on digital learning materials. Most teachers have been slow in transforming the way they teach despite the arrival of new technology (Herold, 2016). They remain limited to indicate the way technology and Digital content were improving learning students' outcomes. (Students in the world were increasingly using their computers in the institutions (Herold, 2016).

1.1.2. Connectivity increases learning

Mobile technology and devices with cellular connectivity increase learning style by engaging both students and teachers (West, 2015). The varieties of educational advantages mobile technologies provide for students' study, adding the personalization of study, real-time valuation, the addition of innovative activities, and the empowerment of those who don't have access to the institutions (West, 2015). The author mentions that students were quite flexible whenever they were using technology for their learning. With this, it makes students aware of new learning methods such as online courses, virtual reality, and video games for instructional purposes. In Europe, teachers used mobile technology primarily for class preparation only.

Students were not using ICT for learning but it was used outside of the school which affected their confidence in their digital competence.

Komen (2017), in sub-Saharan Africa, many pupils move out of schools even the privileged enough to continue with education which makes them live with literacy and numeracy knowledge. There was a lack of trained and inspired teachers. In past years, many African countries came up with solid progress in enhancing their education levels but some problems come with the methods of delivering education. Mobile technology was growing very fast in Africa. Botswana, Gabon, and Namibia were some of the countries where mobile subscriptions were more than inhabitants. With this progress of mobile connections, it offers an opportunity in education. Through the use of mobile technology in Africa, a project such as Yoza Cell phone Stories had been used to download stories and novels.

According to Komen (2017), in universities such as Makerere University in Uganda and also Open University in Nigeria, learners have shown that mobile devices were better placed in giving learners a well-controlled learning process and access to digital material. The same research indicated that there were perceived worries among educators on the effects of using their mobile devices for teaching purposes.

1.1.3. Use of technology to access digital content in Kenya

Chen, Seilhamer, Bennett, and Bauer, (2015), did research at the University of Central Florida which indicated that mobile device ownership among students was higher because 80% of the undergraduates owned mobile (smart) phones in the last years, while 47% have access to tablets. There were several educational benefits comes the use of mobile technologies to access digital content through LMS such as learning, a rise in innovative practices, and the empowerment of those who were disadvantaged. It also helps in the real-time assessment of digital content.

Mobile technology allows students to collaborate, communicate, connect, and create using rich digital resources. Learning will be comfortable with such devices which prepare students for shifts in the global economy and help them adapt to quickly evolving new technologies. In the current situation in the world on COVID-19 pandemic on health crisis, ICT was resourced by institutions to deliver institution programs online using mobile technology and applications such as conference meeting applications and learning management systems. This process of teaching online was not a good experience because students from the same institution were equipped differently, for example, a student from urban areas and they were rich can afford to access online teaching while poor from the rural area cannot afford to access online teaching due to poor internet or they can not afford to buy bundles.

The use of mobile technology in education was one of the key structures for innovating learning in Kenya universities. In Garissa County in Kenya, students were willing to learn but teachers were few while educational elements such as textbooks were not enough. There was a wide range of mobile technology for education (Mukherjee, 2016). Connectivity, social interactivity, availability, Portability, context sensitivity, and individuality were properties that have made mobile technology to be appealing for academic use. Access to digital learning content through mobile technology was more convenient for learners and educators (Mukherjee, 2016).

To improve education in developing countries, they need to bring unconnected students to the internet and reduce taxes on mobile technology to enable them to access digital content freely (West, 2015). These e-learning platforms give services such as reading materials, assignments, and discussions to students. More research was needed to address the question of how students can use another source of the internet to improve in digital learning (DA, Behringer, Haberstroh, Ehlers, Sostmann, Peters, 2016). Other e-learning materials were inaccessible because either digital content was bulky, the problem with internet connectivity, or a long process of accessing. Kenya and

other African developing countries experience problems accessing the internet which assists in accessing digital content (Nyst, 2017).

Wanja (2014), indicate that lecturers possessed mobile phones as in the case of Mount Kenya University, they do not use them for Digital content access due to the negative attitudes they hold on mobile devices. The use of mobile technology at Mount Kenya University was improving at a very high rate especially now that it had been introduced to DIBEL students. Lecturers were currently using mobile devices to access digital content, assignments, and do a discussion with students. University uses Sakai as LMS to access digital content while students use mobile technology to access digital content.

In this study, Mount Kenya University was chosen as a case study because was one of the fastest-growing University in Kenya in terms of students who access digital content via mobile technology. There was an improvement of programs being offered by the University through an online platform that a student use to access digital content via mobile technology. University had invested more in improving the infrastructure such as services and networks and the internet which were mostly used by students in accessing digital content via mobile technology. Digital content access by the students was designed in different styles such as; video, audio, and documents.

Mount Kenya University had invested much in improving the technology and implementing the system used by students/educators in accessing digital content. The university had gone further to do training for students and educators on how to access or post-digital content in the system. There was also a technical team that supports the system used in accessing digital content. But after doing all these activities/investments, students and educators were still complaining. For example, posting the digital content and notification on who had or had not accessed the digital

content. When it comes to digital content such as assignments, educators indicate that marking students' assignments was a problem because assignments were not

digitized (there was no highlighter). It was also hard to tell whether students do access digital content on time or not. Both students and lecturers complain about poor internet connection speed which affects those who were in far counties such as Garissa, Mandera, and Isiolo. With this low internet connectivity, learning doesn't support offline access. I.e. students can't submit their assignment or read digital materials without the internet which also applies to the lecturers. Some digital content accessed by students was not accessible using any mobile technology for instance students who can't afford smartphones, laptop, or desktops in the house or working place had a hard time accessing and reading digital content, doing a discussion with other students, submitting assignments. Some students intend to access LMS just when they want to submit assignments and download content.

In Strathmore University students use the Moodle platform to access digital content via mobile technology and also used as a lecture facilitator. The University uses a blend of direct lecturing and online learning techniques in accessing digital content as one of the technology acceptability to both educators and students. Online learning was utilized well by the use of video conferencing for a professor which again was partnered with other schools of business such as IESE School of business.

1.2. Statement of the problem

The HEIs were forced to turn away from classroom learning globally do to the COVID-19 pandemic. This forced the HEIs to deliver digital content/learning through online but also it was a big challenge to most of the HEIs to deliver digital content to the students online due to lack of knowledge for internet connectivity quality at that moment (Cullinan, Flannery, Harold,

Lyons and Palcic, 2021). (Cullinan, Flannery, Harold, Lyons and Palcic, 2021), also indicated that in Irish one out of six students had a poor coverage of broadband which was found to cause negativity in socioeconomic.

After this COVID-19 pandemic, many HEI introduced m-learning where internet connectivity affected the ease to use of mobile technology. Students and educators were unable to access digital content properly where as perceived usefulness of mobile technology was well introduced.

Kenya agreed with Google loon Service 4G to improve internet connectivity in the country. The agreement came along due to the situation of coronavirus disruption. The approval was to help Kenya citizens to communicate as well as improve remote access to services offered from their homes. This agreement indicates that in Kenya there was poor internet connectivity which needs to be busted to improve the accessibility of digital content via mobile technology (Pre20).

Mount Kenya University had invested much in improving the technology and implementing the system used by students/educators in accessing digital content. University had gone further to do training to the students and educators on how to access or post the digital content in the system. There was also a technical team that was supporting the system used in accessing digital content using mobile technology. But after doing all these activities/investments, students and educators were still complaining. Some of the educators indicated that the user interface used not easy and efficient to operate via mobile technology due to low internet connectivity. For example, posting the digital contents and notifications on who had or had not accessed the digital contents. When it comes to digital content such assignments, educators indicated that continuous marking of students' assignments was a problem because of internet connection issues also it was hard to articulate whether students did access digital content on time. This issue of internet connection was the main challenge to both the students and lecturers which

affected most of those who were in various counties such as Garissa, Mandera, Isiolo. It was also challenging for the students and educators to perform online learning through a discussion forum or chat rooms or accessing videos and audios because of the internet connection so they opted to download reading materials while educators uploading reading materials.

To get to the bottom of these challenges, the researcher discovered that Mount Kenya University had a locally hosted e-learning system and other students/educators system at the main campus. This means that all students and educators accessed digital content on the main server. Access to digital content from the main server was a challenge to students and educators due to internet connection which could because of different incidents. The incidents could include network interruption due to distance coverage from the time of user request to the main server, cost of the bandwidth which most of the time was expensive depending on the internet provider, and poor broadband services. This situation made students and educators from different areas in counties have the challenge to access digital content continuously via mobile technology.

A model was developed to improve the accessibility of digital content via mobile technology in universities in Kenya. To do this, the study empirically studied the accessibility issues and challenges as the basis of the improvement to be done.

1.3. The purpose of the study

The purpose of the research study was to investigate how universities can improve the accessibility of digital content via mobile technology.

1.4. Objectives of the study

This study will be guided by the following objectives;

1. To establish factors related to mobile technology that influence access to digital content by the students and educators at Mount Kenya University.

2. To identify the challenges affect the students and educators who access digital content at Mount Kenya University via mobile technology.

3. To develop a mobile-based model to mitigate the challenges facing students and educators in accessing digital content via mobile technology.

4. To validate the model which will be developed in objective 3.

1.5. Research questions

The research questions were delivered from the above objectives which include;

1. What were the factors that influence mobile technology in accessing digital content at Mount Kenya University?
2. Which challenges and to what extent do they affect accessing digital content via mobile technology?
3. How will the mobile-based model be developed?
4. How will a model that improve the accessibility of digital content via mobile technology be validated?

1.6. Significance of the study

Based on the findings, universities would be able to determine what kind of digital content as well as a mobile-based model that was best suited for mobile technology-based learning.

Scholars and policymakers may also benefit from this research because it helps in improving the quality of content and time taken by educators and students in access reading materials and submission of content. Mobile technology theoretically makes student-centered learning

possible by enabling students to customize the transfer of and access of the information to build on their skills and knowledge and to meet their own educational goals (Sharples, 2004). Mobile technology would also help to change the level of education and the accessibility of education both to learners and educators in Kenya and globally because they may be able to access digital content freely despite the distance from universities.

Distance Institution-Based and Electronic Learning (DIBEL) was a mode of study that involves both electronic learning and face-to-face learning. Learning may be performed from anywhere such as in homes, outside of the classroom, and office. Distance learning students do also access digital content via mobile technology. By studying popular systems that were used to support e-learning, the finding of the study may also assist educators to make the best-informed uses of LMS that support the use of mobile technology.

The study had exposed challenges facing students in universities in accessing digital content and putting measures that may be used for effective content delivery.

1.7. Justification of the study

Internet connectivity and bulky digital content were some of the few things universities need to resolve to make learning via mobile technology more effective.

Students were capable of accessing digital content freely and gain quality education through the availability of mobile technology, availability of internet connectivity, building digital infrastructure, designing digital content to a format that can be accessed by the student via mobile technology comfortably, embedding assessments, and providing qualified growth for an educator (West, 2013). The educator needs to locate and study how to use tools for marking assignments or either educator will be forced to scan or print for marking then digitize it for the student feedback which tends to be expensive to educators. Caching online digital content for

offline areas will be useful and beneficial to those places where internet connectivity was periodic and unreliable. Offline access will enable the distribution of digital content to students in disadvantaged areas in terms of internet connectivity and students will be able to access online digital content.

This research intended to improve the accessibility of digital content via mobile technology by developing a mobile-based model. It would assist in maintaining and improving the quality of education in universities and Students in universities would be able to engage in discussions with their specific educators without any problems.

1.8. Scope of the study

The research would focus on improving the accessibility of digital content via the mobile technology used by both students and educators at Mount Kenya University. A mobile-based model was developed in this study and later it was validated using a statistical tool, an expert questionnaire, and a prototype. Developing a mobile-based model, demonstrated how universities would reduce the challenges faced by students and educators on digital content the accessibility via mobile technology. The development of digital content optimized for mobile technology, designing e-learning servers, or introducing new mobile technology was not involved in this research.

1.9. Limitations and delimitations of the study

1.9.1. Limitations

Mount Kenya University had ODEL students on all campuses and this might cause problems in collecting data but to solve this problem, main campus students who perform tutorial classes during holidays were used in collecting data. In this study, different groups of individuals were involved in the delivery of e-learning in the university such as students, educators, and support staff in this research for better data collection.

1.9.2. Delimitations

MKU was one of the largest private universities in Kenya by student population and campuses. This research focused on the issue of internet connectivity and bulky digital content which affect students during online learning via mobile technology. This research used interviews and questionnaires to collect data on digital content accessed by students, challenges faced by students when accessing digital content via mobile technology. This research used a total population of 15123 participants.

1.10. Assumptions of the study

It was assumed that both students/educators had access to digital content using mobile technology within and out of study times and they were willing to improve mobile technology. It was also assumed that both students and educators had been well trained on how to access digital content using mobile technology, access to internet connectivity was available to each and everybody performs study through Virtual Learning Environment (VLE). It was assumed that students and educators can afford mobile technology and enough bandwidth to access digital content freely and fast. It was assumed that educators were able to mark students'

assignments and give back assignment remarks for students to revise. Through assessments, it was assumed that educators use students' assessment to prepare for quality lessons

1.11. The expected outcome of the research

This research would come up with a model that would assist in improving the accessibility of digital content without exposing other clients' (students/educators) activities and also assist the university in reducing complain among students/educators about the accessibility of digital content in their studies.

1.12. The operational definition of terms

Digital content – Digital content means the reading materials available to students and educators in the digital form. In this study, the digital content was used because they were valued on how students and educators need to access them more often without challenges.

Mobile technology – mobile technology is used by individuals who move with it whenever they go. It is a portable device that consists of network connection technology and computing technology. In this study, digital content was accessed using mobile technology from wherever there are without assembling to a classroom.

Accessibility – accessibility the process of accessing items such as digital content from a defined area or technology. In this study, the accessibility was used to indicate the situation of accessing digital content via mobile technology and the accessibility of digital content was to be improved for better learning and good quality of education.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

According to research done by Naismith, Lonsdale, Vavoula, Sharples (2004), mobile technologies were used by students in the UK and some educators. Recent developments show that mobile technologies were also applicable in offering potential features that were rich in multimedia experiences and the allocation of specific resources. In the UK, reasonable interest from educators and students to exposed mobile technologies had been realized in a way that enabled a new education framework and also engaging different methods of education.

Mobile technology was referred to as a technology that was personal and portable, like a cell phone, tablet, and laptop. Mobile technology would be applicable in accessing digital learning content comfortably depending on the type of digital content accessed in University. Although there were challenges that learners and educators face during online learning of different content using university systems which were discussed below.

2.1.1. Types of Digital content

Digital learning content was any content that exists in the form of digital data and which can also be referred to as digital media. Digital content can be in the form of video, text, audio, or images. Digital content consists of reading materials, assignments, quizzes, discussions, and other content that was recorded.

To reduce the cost of course materials for students, University of Hawaii System Pearson limited through the UH System's Interactive Digital Access Program (IDAP), faculty across 10 colleges and universities will have the option to provide students with streamlined access to

Pearson's digital learning materials from campus bookstores by the first day of class (Pearson, 2017). The IDAP initiative was launched based on that lack of access to course materials negatively impacts student academic performance in the classroom. The IDAP initiative, in partnership with Pearson and other leading educational content providers, was designed to improve outcomes for our students by providing them equitably, easy access to essential course materials they need to succeed (Pearson, 2017).

M-learning in East Africa had become highly adopted as a model of learning. Many universities such as Kenyatta University, Makerere University, The University of Nairobi, and Kampala International University have polished their curriculums to accommodate digitalized content. These Universities have also applied and adopted the ICT policy (Ischebeck, 2017). Mount Kenya University, Nairobi University, and Kenyatta University were some of the universities that have adopted m-learning and have custom-made programs to be accessible over the internet (Ischebeck, 2017).

According to Brown (2003), education had become more available and accessible because of the introduction of mobile technologies in the institutions as compared to the existing elearning. Brown (2003) had proposed a model to represent flexible learning as shown in figure 1.

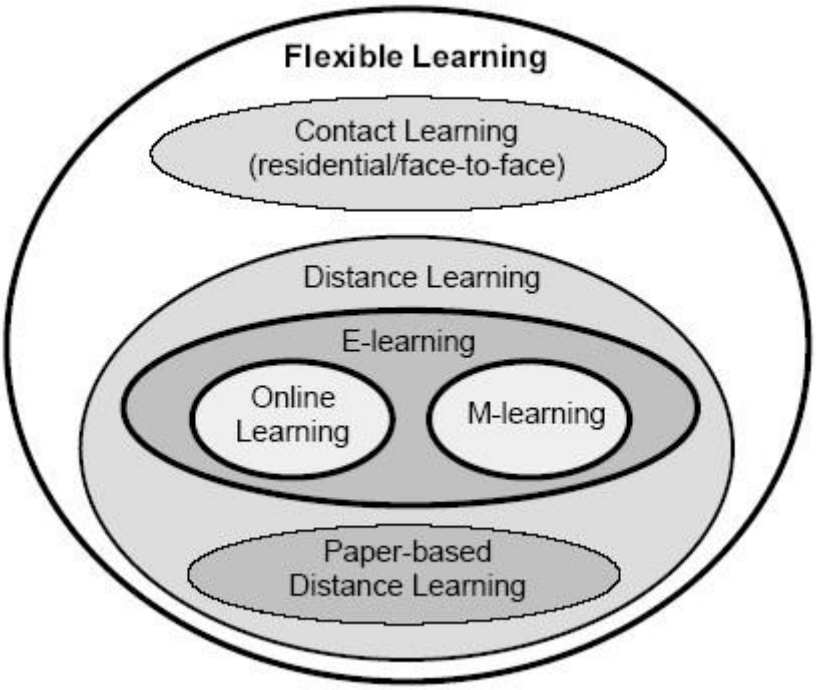


Figure 1: The subsets of flexible learning (Brown (2003))

The model categorizes flexible learning into 5 themes which indicate that m-learning was a subset of e-learning and e-learning was a subset of distance learning.

Figure 1 indicates that M-learning students cannot do studies without accessing content via mobile technology.

Wanja (2014), some lecturers were in fear of using their mobile devices and systems in lecturing students because they tend to think that access to Digital learning content will affect their privacy. In most of the universities in Kenya, people were yet to accept technology as part of the learning model (Wanja, 2014).

Technology was well placed in Kenya than in other countries because Kenya was full of creative people who were interested in building its future and performing a specific experiment at a time (Imende, 2013).

Economic growth was important for human development and technology and education were a big driver of that growth (Imende, 2013).

2.1.2. Challenges faced by learners who access digital content

Computers have been used in America's homes and classrooms for many decades. Few would be surprised to learn that students in economically disadvantaged communities have far less access to content. However, digital divisions also exist among ethnicity and income levels even after access was equalized at home and school (Anderson, 2014). The study done plotted that more than 500 middle school students in Lower Michigan and found that there were race and gender differences in the nature and use of information technology. She also found that parental socio-demographic differences predict the nature and intensity of information technology usage and that the nature and intensity of information technology usage impact academic performance (Anderson, 2014).

Most of the students who accessed online learning barely access forums but they normally accessed LMS to download digital content such as assignment questions and submission of the assignment, and reading materials. Students also indicated that most of the lecturers did not access the learning platform which normally demolished them from access forums. Students also expressed disappointment in the slow and difficult process of accessing digital content because of poor internet connectivity and also it was expensive to access internet connectivity (Makokha and Mutisya, 2016).

2.1.3. Mobile technology

According to Stone (2015), competencies of mobile technology can certify that learners who were dropping behind, get a chance to learn important concepts, and students who ahead do not get bored with the material they have already mastered.

There were several different kinds of technology that can be categorized as mobile.

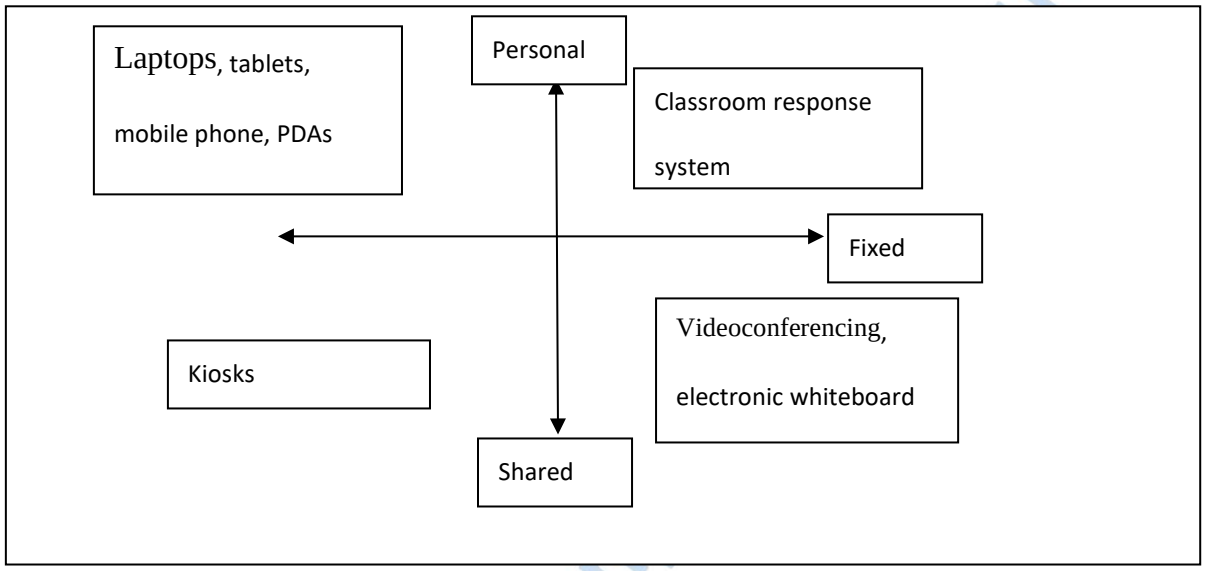


Figure 2: classification of technology (Kendrick (2015))

At Mount Kenya University most of the learning was only done by use of the whiteboard and video conferencing or projector except few who were learning under a virtual mode of study.

According to Chen, Seilhamer, Bennett, and Bauer (2015), at the University of Central Florida, learners use mobile devices such as modern phones, tablets, and e-book readers in their study. The research was done showed that introducing m-technology in education was not well-known than the devices themselves where the same scenario was reflected at Mount Kenya University.

At Mount Kenya University, one may find that students have occupied sufficiently of images using phone cameras although hardly do use that means of devices to educational experiences. Like other revolutions, mobile technology was regularly seen as an interruption in previous learning environments, the research was done found that several educators and students shared this fear. Nevertheless, in previous assignments, such as textbook materials and class group discussions, educators can easily control the information and pace of learning. Researchers who directed mobile research at Boise State University found that schools required the necessary support and resources to successfully join mobile learning technology into the classroom learning experience. Similar research was reported in other mobile research at the University of Florida.

According to Chen, Seilhamer, Bennett, and Bauer (2015), youths aged between 18 and 29 have access to a smartphone which estimates 83% of adults. Mobile device ownership among university learners was at the highest level. According to a 2014 EDUCAUSE REPORT, undergraduates who have smartphones estimates to 86 percent, and half of this percent own tablets. Mobile devices offer comprehensive features and information that can assist in accessing an assignment immediately and also getting feedback on students' educational goals. Mobile devices make students and educators live more appropriately by providing access to valuable information. Mobile devices and services provide wonderful flexibility for those who desire to take the improvement of library services. With a humble 3G connection, a user lying on a shore can access e-books and program content via his or her home-grown library like Mount Kenya University Library. MKU library contains digital content that was accessible through the e-book system, catalogs, and journals by use of mobile devices. By upgrading mobile, MKU library takes massive steps toward becoming an overweight-the-clock service.

The internet connectivity issues, the server being loaded, bandwidth usage being huge, and perceived services of access assignment became delayed, it was noticed that content caching will improve and reducing these problems (Kam, Kompella, Nguyen, Wieselthier, Ephremides 2017). The plentiful caching storages were allocated at the edges of the wireless which also involves base stations (BSs) and also user terminals (UTs). Figure 3. It was developed to reduce network congestion and also give out an actual technique to minimize delays in accessing digital content via mobile technology. With this, the mobile user was required to request a file from the base station or user terminals direct without a backbone connection (Wang, Peng, Zhang and Letaief, Fellow and IEEE, 2016).

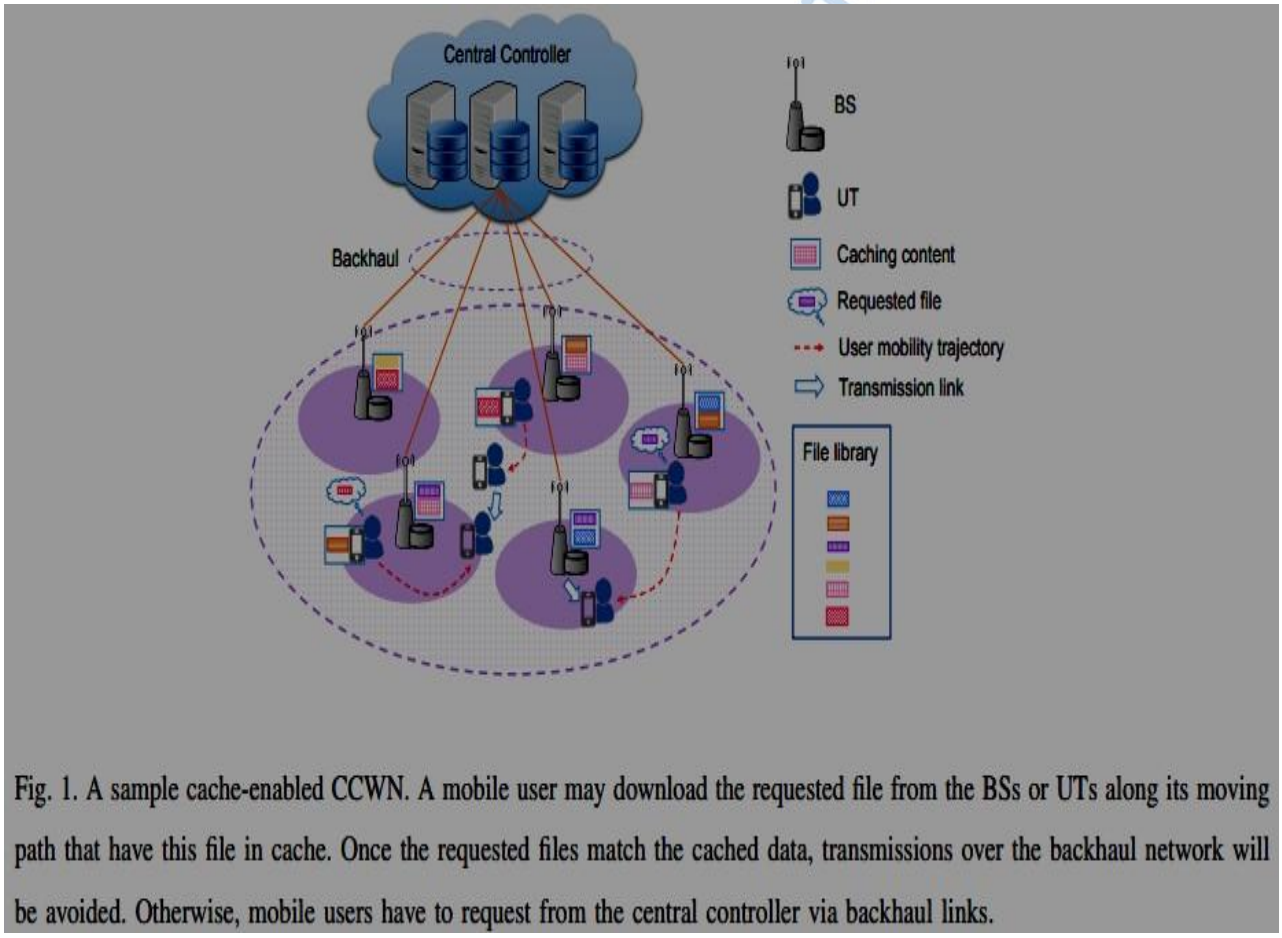


Fig. 1. A sample cache-enabled CCWN. A mobile user may download the requested file from the BSs or UTs along its moving path that have this file in cache. Once the requested files match the cached data, transmissions over the backhaul network will be avoided. Otherwise, mobile users have to request from the central controller via backhaul links.

Figure 3: cache enabled CCWN model (Caching for Content-Centric Wireless Networks) (Wang, Peng, Zhang and Letaief, Fellow and IEEE, 2016)

The digital content was inputted and turned out by the system whenever the caching system was performing. In case the digital content had been stored in a different caching location, it will be low cost to retrieve it in the caching network. The act of caching system depends on the digital content request procedure and its feature, caching performance, and caching architecture (Xu, Zhao, and Liang, 2017).

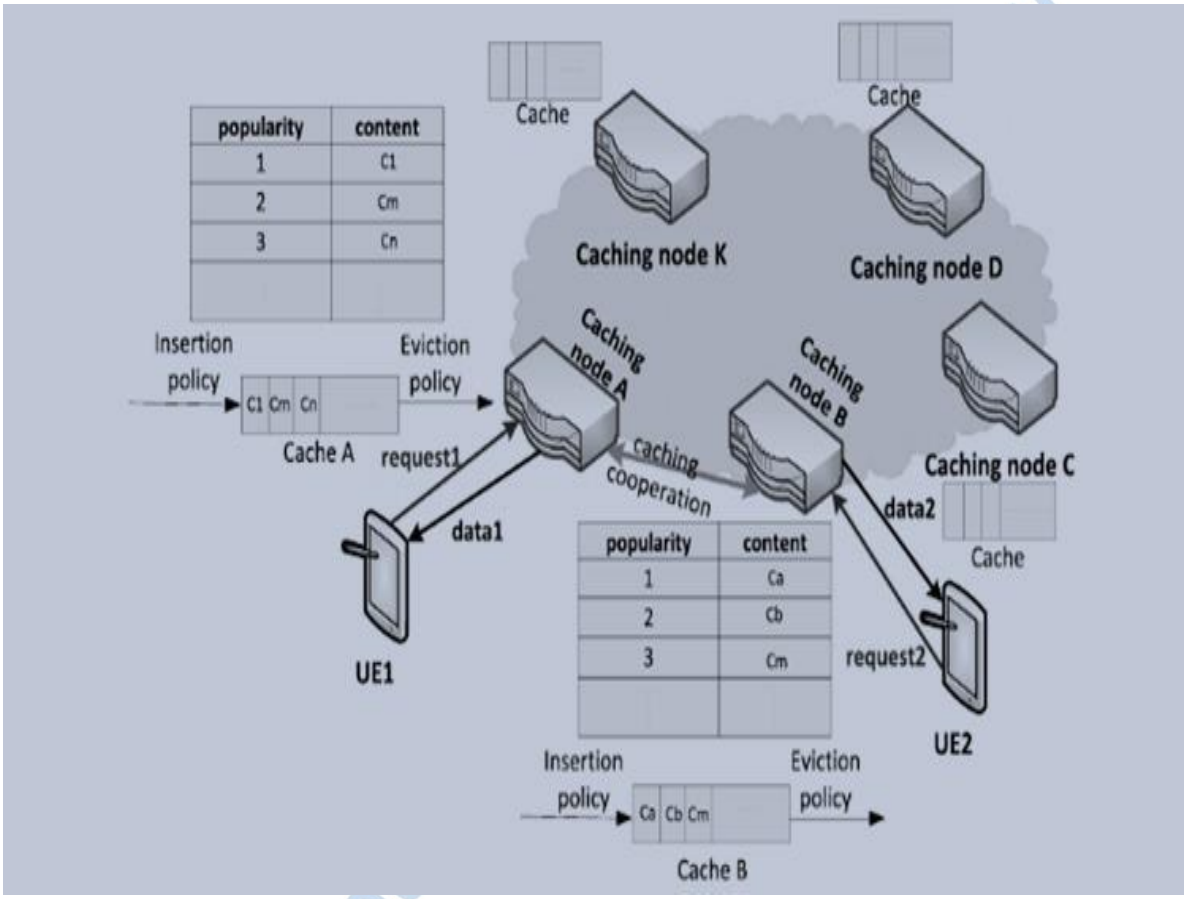


Figure 4: A typical Caching system (Xu, Zhao, and Liang, 2017).

2.1.4. E-learning policy

E-learning policy was used by universities to guide in organizing the way online learning which consists of accessing digital content via mobile technology was adopted systematically for the

award. Most of the African universities do not have a proper e-learning policy that governs the utilization and adoption of access to digital content via mobile technology. There was no online learning policy planted to guide the implementation of access to digital content via mobile technology in Kenya (Makokha and Mutisya, 2016). Policy adoption in European countries shows that national online learning policies had been developed or being developed. 89% of institutions had institutional or faculty level policy (figure 3) (Gaebel, Kupriyanova, 2014)

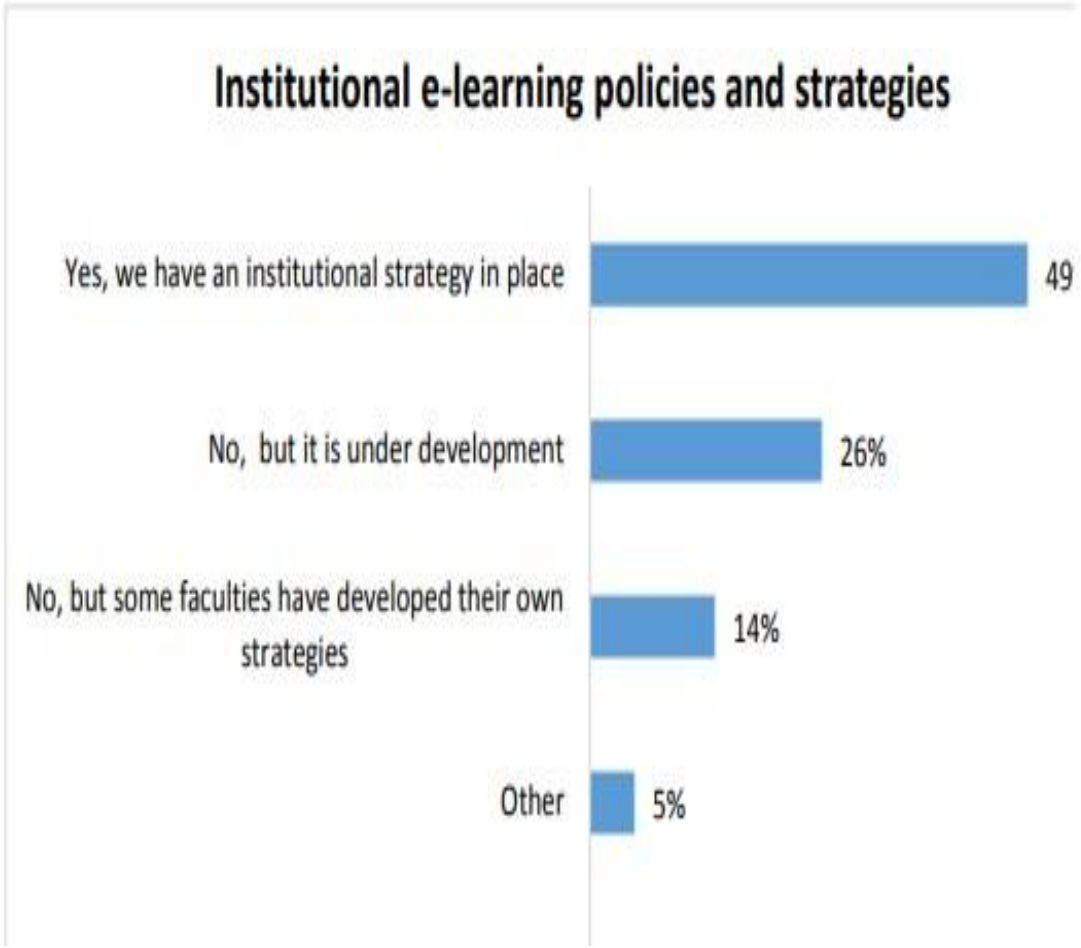


Figure 5: Institutional e-learning policies and strategies (Gaebel, Kupriyanova, 2014)

In London's Global University, an e-learning policy was created to provide flexible, effective, and efficient learning to the students. The policy involves (LGU, 2017):

a. Reviewing of all courses accessed through Moodle. The review was to be repeated every 3 years. For the Moodle that was not meeting the required stranglehold was to be reviewed the following year. Monitoring and reporting of the activity concern performance were to be done by the head of departments. The data from modules were to be provided by Academic leads to Heads of department

b. Reviewing Moodle courses support. The online checklist was to be used in providing a simple way of access data by the academic leads for report generation.

Some of the online and distance learning policy at the University of Nottingham was as follows (UONottingham, 2016):

a. Delivery: schools were supposed to ensure that students can access digital content and a proper study and assessment schedule.

b. Learner support: students were to have learner support contact and updated data both locally and remotely on their courses. Also, a document that indicated the commitments of school and university at the range in supporting the course and also indicated the responsibilities of the students.

c. Assignments of students: students to access data on how achievements were to be judged and weighing of course unit. The assessor was required to confirm the originality of the assignment submitted by students

East Africa universities have implemented ICT policies in introducing online learning to the students which ensures that the availability of affordable, accessible, efficient, reliable ICT services was given to them (Ischebeck, 2017).

2.2. An empirical review of the literature

The effectiveness and efficiency of teaching and learning experiences in the classroom via mobile technology.

2.2.1. Types of Digital content

There was a lot of demand for modifying digital content to be accessible via mobile technology such as a smartphone or any other phone. Reading materials need to be flexible for students and educators to study and also adaptable. Digital content may be presented in different types such as courses, learning/discussions, and media type. For the digital content to have a quality education, it must include flexibility, interfaces used to access, mobile technology used, interactivity between devices, LMS, and accessibility (Keengwe, 2017).

2.2.2. Mobile technology

According to Keengwe (2017), mobile technology was just a distraction to the tutors and there was a portion of learner's lives irrespective of whether educators include its structures in providing education as well. In this case, the availability and massive popularity of mobile devices would be an opportunity for educators to hold and maintain the interests of their students by integrating mobile devices into teaching space learning. The mere reality of technology in a classroom was continuously going to demand to students, so it was best to make the most of it and harness that demand into classroom learning. This way, educators can avoid conflict with learners over the prohibition of their favorite device, while getting students involved in the lesson by accepting the use of the technology that would otherwise be a distraction.

Mobile technology also assists in accessing digital content, uploading resources when an educator was either inside or outside the lecture room. By use of mobile learning, education goals were reached effectively and also assist in individual teaching and learning comfortably (Keengwe, 2017).

Interestingly, Keengwe's field study stressed more on mobile technology in access Digital learning content in the classroom only between students and educators. Their study does not indicate what kind of digital content was accessed using mobile technology, the experience of accessing digital content in areas where there was low internet connectivity. Digital content challenges were realized on their mobile devices adaption in way of coordination and collaboration.

2.3. Theoretical framework/review of the literature

This study employed a theoretical framework with the purpose of understanding accessibility to digital content. The framework was useful in foresee, explain, comprehend occurrences, to challenge and cover existing knowledge among the restrictions of critical clearing assumption (Dickson, Emad, Adu, 2018).

Various technology adoption models relate to the accessibility of digital content using mobile technology for students who were not residents or have to face contact at the university. For example, Diffusion of Innovation theory (DOI) was created by (Rogers, Diffusion of Innovations, 1962), was utilized to develop the M-learning Adoption Scale (MLAS) which had four sections: innovation-decision process, innovativeness level, attributes of m-learning, and types of m-learning decision (Ismail, Ismail, Mustafa, 2014). The Task Technology Fit model (TTF) was created by (Goodhue, Dale, Thompson, Ronald, 1995), was utilized to show that elearning satisfaction and effectiveness to students and educators depend on task complexity,

learning climate, and self-efficacy (Linwu, Jianfeng, 2015). The Technology Acceptance Model (TAM) was created by (Davis, 1989), was believed to be an extension of the theory of reasoned action (TRA). Most of the researchers use TAM to investigate on acceptance of new technology mostly because it does not use a lot of resources and its strength. TAM was also used to study m-learning adoption to students from different universities (Shakeel and Zeeshan, 2015).

Internet connectivity or coupled with the long process of accessing content was the main problem that affects Kenya and other African developing countries especially when learners access digital content using mobile technology (Nyst, 2017). None of the Technology adoption models, covered issues concerning internet connectivity for the e-learning and m-learning students and educators.

In this research, the Technology Acceptance Model (TAM) was used in this research as a technology adoption model to relate the use of mobile technology in improving the accessibility of digital content by checking internet connectivity and its alternative when internet signals were weak or no signals. This research seeks to assist universities to improve the accessibility of digital content through mobile technology by developing a mobile-based model that might be applicable in mitigating the accessibility challenges. Universities need also to examine the process used to access the digital content by students and lecturers to improve the accessibility speed in terms of the digital content loading process via mobile technology.

2.3.1. Technology Acceptance Models

The Technology Acceptance Model (TAM) was defined as an information systems theory that shows how new technology gets accepted by users (Davis, 1989). TAM was the most used model by the researchers in predicting the usability and acceptance of new technology and

information systems by specific users (Surendran, 2012). This model consists of two main constructs which include; Perceived Usefulness and perceived Ease of Use as shown in Figure 6. These constructs were theorized to be basics determinants of the system usage and they were formulated through their hypothesized influence toward the system use (Davis, 1989).

First, construct, Perceived usefulness intends to show how users intend to use or not to use new technology on the point they believe the technology can assist them to achieve expected goals. While the second construct, Perceived Ease to Use intends to analyze the usability of the technology to improve the performance and benefits of technology. i.e. despite users believing that new technology can assist in achieving expected goals, the new technology can again be too tough to use, and that the expected goals were overshadowed by the effort of technology (Davis, 1989). Davis (1989) also indicated that the use of the TAM model both perceived usefulness and perceived ease of use had to affect the behavioral intention of the users in using the information system. TAM was initialized from the Theory of Reasoned Action (TRA) (Fishbein, Ajzen, 1975). TRA suggested that beliefs affect the attitude, which impacts the intention to be behavior. Davis (1989) adopted this belief of the attitude in behavior intention relationship into TAM.

TAM was used in the Technology, Gaming, and Social Networking research by (Neil, Walter, 2016) indicating that older users who perceive modern games as too hard to play with or even indicate that modern games were a waste of time which would make them unlikely to accept or adopt the game's technology. Other older users perceive modern games as a way of providing mental stimulation and also an easy way to educate themselves better using the game’s technology. TAM was also used to foresee and explain the driver's intention to use a Variable

Message Sign (VMS) information system on their roads (El, Shengchuan, Tran, 2019). According to El, Shengchuan, Tran, (2019), the TAM studied the effects of approach towards path diversion, awareness with the road network, and information quality.

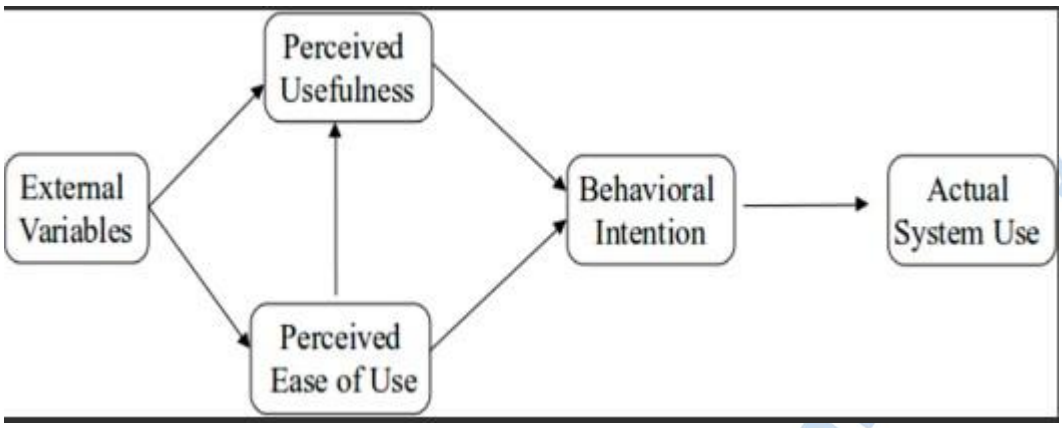


Figure 6: Technology acceptance model (Davis, 1989)

Ngo and Gwangyong (2014) did a literature review on m-learning adoption importance where they indicated that external cultural factors, anxiety, and innovativeness were issues that needed to be examined. They also extended TAM by adding service quality, perceived social interaction, system commitment, and mobility value into a behavioral intention to use for educational purposes via mobile technology. According to Ngo and Gwangyong (2014), mobile learning was supported mostly by different values that affect both perceived usefulness and perceived ease of use. Mobility value, quality of services, perceived social interaction value, and student readiness affected perceived usefulness while students' readiness and system commitment affected perceived ease of use. According to Ngo and Gwangyong (2014), training learners and educators during post and pre-implementation on how to use mobile technology in m-learning properly and effectively was an important thing because it influenced learners' and educators' beliefs about a system and usage behavior (system commitment). System commitment influences awareness of the ease of use and system usefulness. Quality of service

(QOS) was defined as response and quality of content, personalization, reliability, security, and privacy. QoS affected the acceptance of m-learning through perceived usefulness and also perceived ease of use. Ngo and Gwangyong's (2014) conclusion about TAM in m-learning suggested that students' readiness, system commitment, and quality of service be determinants of m-learning acceptance.

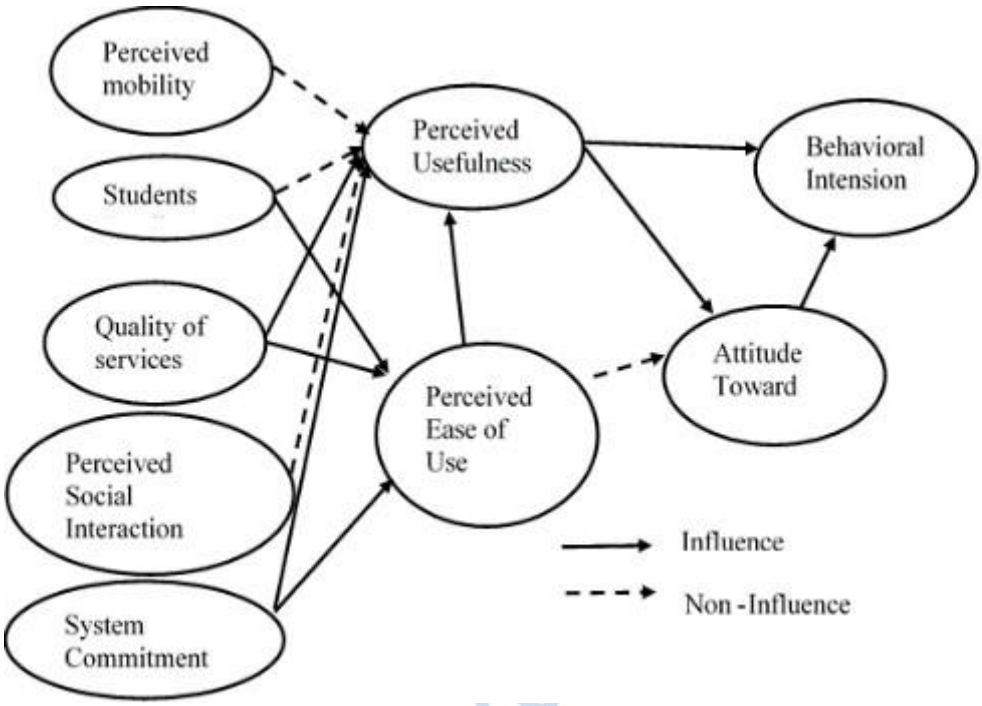


Figure 7: Technology Acceptance Model (modified by Ngo and Gwangyong, 2014)

To improve the accessibility of digital content, TAM was well applied in predicting and explaining the benefit of proper mobile technology to be used to the extent of mobility in Figure 7.

In this case, TAM in Figure 7 had been added constructs on the usability, mobility of mobile technology, and proper accessibility of digital content which on the type of mobile technology used by learners and educators. Other constructs that were constructed using perceived usefulness include; internet connectivity, e-learning policy, data caching, and user literacy. This

study applied TAM because of applicability and it explained more on the constructs needed in this research.

According to (Afzaal, Noah, Abd, Rudy, and Armanadurni, 2015), mobile device usage had been proven to be a useful interactive tool in e-learning because it increases the communication between learners and educators or learners and learners. (Duvince and Cheryl, 2017) analyzed the recent studies that developed further research TAM with the constructs of perceived ease of use and perceived usefulness. Researchers came up with more constructs which include perceived playfulness, quality of internet connection, and subjective norms. This was intended to advance the capability of the model to foresee students' implementation and usage performance of social media.

According to Fiona, William, Rohit, (2004), diffusion of innovation was used to predict the use of the internet by physicians.

In the context of accessibility of digital content via mobile technology, diffusion of innovation theory had been used in this research to demonstrate how internet connectivity acceptance among mobile technology users had attracted more learners and educators as well as the adoption of m-learning at Mount Kenya University. Internet connectivity was early adopted by the students and educators in accessing and downloading reading materials, assignments, and submission of assignments. Most of the learners and educators from Mount Kenya University had weak access to an internet connection or no access to an internet connection which was against the university's wish and also can affect m-learning adoption. Internet connectivity had been the main key to improving the accessibility of digital content. The presence of innovation variables will predict the adoption of data caching to reduce internet connectivity issues among learners and educators. learners and educators use mobile technology, an integrated system to

access digital content where internet connection was used as a tool for downloading and submitting the content also through this process learners and educators will cache data into their mobile devices. At this stage, learners and educators will have continuous learning and access to content using mobile technology and the university e-learning system.

Many researchers had done a study on e-learning, multimedia, and m-learning concerning acceptance. These studies looked at the usefulness of e-learning, m-learning, and multimedia systems to students and educators. The studies also checked on these systems whether there was easy to use (Mei, Balakrishnan, Saw, and Saw, 2012).

This research used Davis's (1989) TAM model to construct a framework that assisted in indicating how students and educators at Mount Kenya University perceive improving the accessibility of digital content via mobile technology. Davis's (1989) TAM can also be useful to the prediction of data caching using mobile technology determinants such as internet connectivity, mobile devices, data caching, user literacy, and e-learning policy.

With the acceptance of mobile devices in accessing digital content through m-learning, data caching in m-learning had to improve technology acceptance in accessing digital content. The data caching would be less complex because learners and educators just need to access the content needed when there was an internet connection and after that, he/she would be able to operate the session. This approach of caching content would help learners and educators in continuous learning through m-learning.

The model envisions in this research seeks to enable students to view/read digital content at any time and any place and also view the feedback educators have given in response to their assignments and carry out problem-solving activities online. By enabling this, the use of mobile

technology might better satisfy students' and educators' approaches to new topics with a hunger to learn more.

2.4. Conceptual framework

In this study, Davis's (1989) model TAM was used to demonstrate how internet connectivity, type of mobile devices, user literacy, data caching and e-learning policy assist in improving accessibility to digital content. Factors that influence mobile technology and accessibility to digital content were the components added to the TAM as external variables as shown in Figure 30. This section explains the determinants/constructs used in this study.

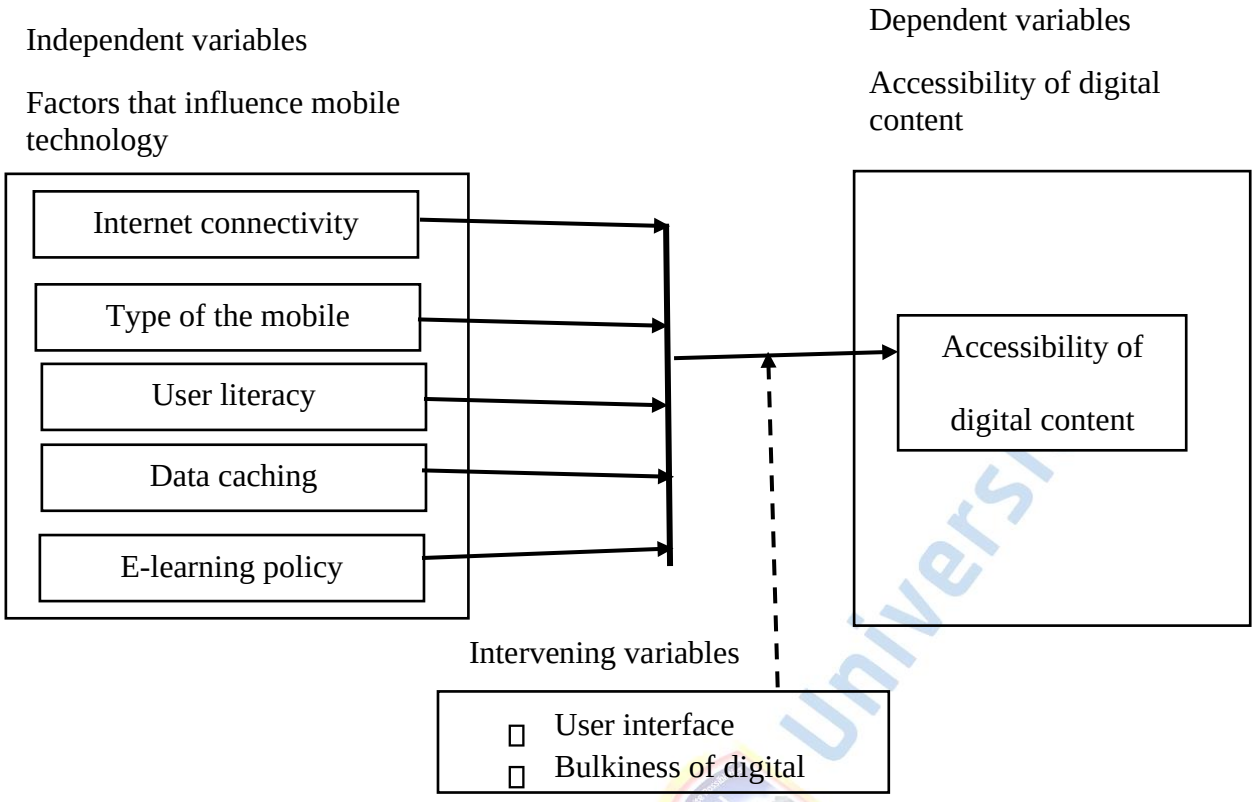


Figure 8: Conceptual Framework

Source: Self

2.4.1. Internet connectivity

Internet connectivity was defined as the way students and educators were linked to the internet through a dial-up connection (mobile lines) or broadband connections or using wireless devices or satellites. According to the research done by Lu, June; Yu, Chung-Sheng; Liu, Chang; and Yao, James (2003), indicated that acceptance of internet connectivity (technology) was positively related to perceived usefulness because students who have the flow of internet connectivity had a good chance of accessing digital content, improve education quality and also had helped students satisfaction. In this study, internet connectivity was hypothesized to be directly affecting the accessibility of digital content through perceived usefulness in the TAM and was the main challenge that students and educators face in everyday activities on accessing

digital content. Internet connectivity was one of the factors that influence mobile technology in accessing digital content but was the challenge that this study identified to affect the accessibility to digital content via mobile technology.

2.4.2. Type of mobile technology

In this study, the type of mobile technology was added in the TAM as an external construct that depends on perceived usefulness. Mobile technology was an arrangement of technology that was used in cellular communication. The mobile technology had better quality from a modest device used for calling and messaging into a multi-tasking device used for GPS navigation, internet browsing, gaming, instant messaging tool (Wilmer, Sherman, Chein, 2017). It also can be referred to as any device that had the capability of having internet which was used for accessing any data from anywhere. These devices include; laptops, tablets smartphones, and iPods. In the 21st century, the mobile revolution had been changing education mostly on accessing digital content. According to Belén Cruz Zapata (2015), tablets and smartphones were changing the way of accessing digital content when students' devices were connected to the internet. Belén Cruz Zapata (2015) found that students interact more and also get more entertained when they were using tablets and smartphones than using desktops. It depends on the type of mobile technology used by both students and educators for learning because, by the use of smartphones, students expect feedback in real-time. The efficiency of digital content accessibility, usage of the e-learning system, and feedback in real-time depending on the type of mobile technology used. In this study type of mobile technology is hypothesized to be directly affecting the accessibility of digital content through perceived usefulness in the TAM.

2.4.3. User literacy

User literacy was the measure of users an ability to use mobile technology, use of the internet to access content, and process of access digital content. Through literacy students and educators can communicate, access digital content comfortably without any block using mobile technology. Educators need to be literate to provide education to their students via mobile technology (Callum, 2014). Callum (2014) concluded that educators and students need to have a high level of literacy to interact with confidants via mobile technology in the classroom and also through m-learning. User literacy was demonstrated using the socio-demographic construct which consist of age, county, typr of devices used and type of internet connectivity. This showed that the user literacy hypothesis had a direct effect on perceived usefulness and perceived ease of use.

2.4.4. Data caching

Data caching was storing data temporarily at proxies or the device browser. Efficient digital content access in the M-learning system was a problem in the 21 century because students used mobile phones which were using limited storage space that prevents students from access a higher large cache of data (Elmorshidy, 2012). A suggestion was made of storing the cache data at proxies that were nearby for mobile devices such as phones to access digital content from those proxies instead of the main server to reduce latency time for ease of use (Elmorshidy, 2012). This showed that the data caching hypothesis had a direct effect on perceived ease of use.

2.4.5. E-learning policy

E-learning policy was a communicated guide in the structured utilization of online learning methods in universities. In this study, the e-learning policy was added in the TAM as an external construct that depends on perceived ease of use. E-learning policy and its awareness were needed to promote the accessibility of digital content to the students and educators and give out quality education via mobile technology. The M-learning policy would promote gender equality and accessibility for learners with disabilities which would meet the higher education goals to provide quality education to all students through the use of ICT strategy of using mobile technology like the vehicle of accessing digital content (Mohamed, Ibtisam, and Nabeela, 2016). People fear the use of their mobile devices to access digital content but university creating e-learning policy awareness, then there will be no fear among educators and some students about their information being disclosed through a network (Mohamed, Ibtisam, and Nabeela, 2016). This showed that the e-learning policy hypothesis had a direct effect on perceived ease of use.

2.4.6. User interface

The user interface was the system that the user used in mobile technology to access digital content. Students and educators need a user interface to access digital content as the intervening variable. The user interface for accessing digital content would be designed and developed very carefully considering the digital content and the students and educators who would be accessing digital content (Dirin, 2017). There were different user interface which was efficient and effective to use via mobile technology using mobile-based information systems. These systems assist in increasing students' and educators' satisfaction and also improves interactivity between students and educators or between students when they were accessing digital content via mobile technology (Mazyar, Chui, 2014). A good and successful user interface for education would be

easy to use by making it to be attractive, less complex, less confusing, and also acceptable as an educational interface. The user interface design would depend on the mobile technology used to tackle the challenge of learning context which include downloading of the digital content, searching the content, tackling assignment and quizzes and also performing discussion within the user interface used. The best factors developer of the software would check when developing the user interface was first, the interface would be controlled easily by the user. Second, the user interface would not take a lot of memory size in any of the mobile technology used, and last the user interface would be consistent for the attraction of the user (Behnam, 2013).

2.5. Critique of the literature review

Digital content had not been specified. Those specifications include: kind of digital content students and educators normally access and the quality of digital content. (Johnson, 2013), in the NMC Horizon Report K-12 Edition educators, didn't build interest to continue using the technology in lecturing students online.

2.6. Knowledge gaps

According to the studies done by other researchers on digital content accessibility via mobile technology, they concentrated more on the benefits of accessing and lecturing being done outside the classroom. According to Komen (2017), in universities such as Makerere University in Uganda and also Open University in Nigeria, learners have shown that mobile devices were better placed in giving learners a well-controlled learning process and access to digital material. The research intended to analyze how to improve the accessibility of digital content by resolving the challenges encountered by students and educators when accessing those digital content. The

mobile-based model was developed so that universities might use it to improve the accessibility of digital content via mobile technology.

2.7. Chapter summary

Usage of mobile technologies to advance the performance of students in universities was something that would be harnessed most by improving internet connectivity where students access digital content either online or offline (Salim, 2013). Through LMS, students were being offered to learn with several books in one device through e-readers and kindles, getting students to use low-cost messages to take tests and digital tracking of learners' performance over time (Salim, 2013).

The research suggested a mobile-based model that might be used to improving the accessibility of digital content via mobile technology.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Introduction

In this chapter, different methodologies were used to gather study data and also analysis the it. These methodologies includes; data collection tools and data analysis, sample size and sampling procedure, location of the study and research design, reliability, and validity of data collection instruments.

3.2. Research design

The research adopted the use of mixed methods (both qualitative and quantitative methods). A realistic research method involves both quantitative and qualitative research approaches to complement one another; realistic research was not static to an exact approach (Creswell, 2013). A realistic researcher was concerned with the research problem instead of the procedure used, thus the researcher had the flexibility to mix and match any of the research procedures. This style was not devoted to any idea; this approach employs both close-ended questions and openended, both quantitative and qualitative data analysis, and both emerging and predetermined approaches (Creswell, 2013).

McMillan and Schumacher (2010), define qualitative research as an inductive process mostly used for organizing data into a set of groups to isolate the patterns among those categories. According to (Creswell, 2013), a qualitative research approach employs open-ended questions and images or text data. This research study used Qualitative research to collect facts to attain a detailed consideration of how mobile technology was being used in accessing digital content.

A descriptive survey research design was embraced in this study. The descriptive survey research design was adopted in this research because this research involved improving the accessibility of digital content via mobile technology. It was useful in gathering information from respondents using questionnaires at a specific point in time in the research to tell how they affect each other and analyzing data.

3.3. Location of the study

The research area chosen for this study was Mount Kenya University whose main campus was located in Thika town along General Kago Road in Kiambu County. The research site was best suited for this study because it had improved the use of technology (Wanja, 2014).

Approximately 20% of the students and 5% of the educators as per the academic year 2015/2016 were able to access Digital learning content via mobile technology without having the face to face sessions. However, in the current academic year 2017/2018, the number of learners and educators who access Digital learning content had increased due to the introduction of the DIBEL mode of study. Now approximately 50% of the students and 60% of educators were accessing Digital learning content using mobile technology.

The university had invested a lot in improving the infrastructure, which supported networking, internet access, and other systems to assist both learners and staff in using their mobile devices in access to digital content. Training and implementation of systems were still ongoing to both students and staff as to learn how to access this digital content.

3.4. Target population

According to Sekaran (2003), the population of a study mainly refers to individuals in the form of a headcount of all elements the finding of the study seeks to represent. The target population of the study was 15123 individuals who accessed digital content in the academic year

2018/2019. The target population includes ODEL students as shown in Table 1, educators, and ICT staff as shown in Table 1a. who uniformly accessed digital content using the university elearning platform via mobile technology. Slovin's formula was used to calculate the sample size. This research used 95% as a confidence level which gave out a confidence interval of 5% (margin error of 0.05).

$$n = N/ (1 + Ne^2)$$

$$15123 / (1 +15123 * 0.05^2) = 390$$

Sample size (n) = 390

Table 1: Target population

Source: university 2018/2019 academic year

Schools	Target population	Sample size
INSTITUTE OF SECURITY STUDIES, JUSTICE AND ETHICS	300	20
SCHOOL OF BUSINESS AND ECONOMICS	2300	60
SCHOOL OF EDUCATION	10000	120
SCHOOL OF ENGINEERING, ENERGY AND THE BUILT ENVIRONMENT	200	8
SCHOOL OF HEALTH SCIENCES	600	30
SCHOOL OF NURSING	300	20
SCHOOL OF PURE AND APPLIED SCIENCES	300	20
SCHOOL OF SOCIAL SCIENCES	500	25
School of Computing and Informatics	250	15
School of Public Health	250	15

Total	**15000**	**333**
Lecturer/ICT staff	123	57
Total	**15123**	**390**

3.5. Sampling

Sampling refers to be the procedure of choosing several individuals for a study in such a way that the people symbolize the greater group from which they selected. In this study, a case study of Mount Kenya University students, staff, and educators was used as sample data. The sample population was established using Sloven's formula which was introduced in 1960 by Micheal Slovin (Isip, 2015). Slovin's formula was introduced to calculate the sample size from the target population. The formula was applicable because the respondent's behavior was not known. The formula in fig. 11:

$$n = N/ (1 + Ne^2)$$ where:

N = Population

error n = Sample

size e = Margin of

error

Figure 9: Slovin's formula

In this study, simple random sampling was used because individuals involved in the population perform the same activities. Simple random sampling was the method of selecting n items from a population of size t where sample size had an equal chance to be drawn (Weiss, 2010).

3.6. Sampling procedures

There were several types of sampling procedures related to probability samples which include; simple random probability, systematic sampling, cluster, and stratified. This research used simple random sampling where everyone had a like opportunity to be selected (Wanjohi, 2012).

The research formulated a comprehensive list of e-learning students in the academic year 2018/2019, educators, and e-learning supportive staff which was the sampling frame of all participants of the population of interest. In this study, the target population had an equal chance of being selected because they use the same system and experience the same challenges. Samples were drawn for individuals or items to have an opportunity of being drawn in the course of each selection round.

3.6.1. Sampling frame

The sampling frame was a list of individuals from where the sample was obtained. This list consists of all those within a population and can be used as a sample. This research used a simple random sampling technique where the e-learning students were in a position for assortment. Using Slovin's formula, this research used 95% as a confidence level which gave out a confidence interval of 5% (margin error of 0.05).

$$n = N/ (1 + Ne^2)$$

$$15123 / (1 +15123 * 0.05^2) = 390$$

Sample size (n) = 390

3.6.2. Sample size

This was the sample to be studied to make an inference to a population. The sample size was taken from the academic year 2018/2019. The sample size was determined by using Slovin's formula which indicates; target population (N)> 1000 where sample size (n) was computed. Out of the target population of 15123, only 390 were used as the sample size who include 333 students, 57 educators, and ICT staff as shown in Table 2.

Table 2: Sample size

Source: Research target population

Respondents	Sample size
students	333
Lecturer/ICT staff	57
Total	390

3.7. Data collection

Data collection was the route used to gather the information required to reply to the research problem. The study comprised mixed data collection from both qualitative and quantitative data. This study used interview sessions, questionnaires as primary data collection methods. The multiple data collection helped in this study to get valid data from the participants.

3.7.1. Interviews

The interview was face-to-face with some of the sample learners and educators. In the resolutions of this study, depth interviews were used. Depth interviews consisted of free and

personal interviews, whose objective was to recognize contestant's passions, moods, and beliefs regarding the accessibility of digital content via mobile technology. The major benefit of private interviews involved private and direct communication between interviewees and interviewers, as well as remove non-response rates. A structured interview deals with strictness concerning the flow of the interview. Interviews also give out reliable data because the interviewee can correct himself/herself and can also pardon the interviewer in case of misinterpretation of the question. It also improves nonverbal communication which was very important in an interview.

3.7.2. Questionnaires

These were chains of questions planned to produce information that was filled by all contestants in the sample. The questions were collected by written questionnaires. Closed questionnaires were used in this study because they were easy, not time-consuming both in time of collecting data and analyzing. The questionnaire was arranged into 3 sections. Section A. presented general information about the mode of study and mode of technology used, section B. established the type of digital content accessed by students and challenges faced on the internet accessibility, and section C. investigated the rate at which students, educators experience challenges. They were also easy to answer and also questionnaires were easy to be compared with other respondents.

3.8. Reliability and Validity of data collection instruments

3.8.1. Validity

According to Kothari (2009), validity was about the accuracy and reliability of the results of conclusions reached in the study. Content validity was determined by giving the questionnaire to colleagues in class and some of the educators in the different University which offer digital

content via mobile technology to wisely and critically examine and assess the importance of the objectives of the study. The class Colleagues and educators were easy to access because of the time given to do the research and also they were within the University premises. Validation of the model was done using statistical significance such as ANOVA (Analysis of Variance), model summary and coefficient which data was collected using a questionnaire.

3.8.2. Reliability

According to Colin and Julie (2006), reliability refers to the notch of tools, or either it can be relied upon to yield the same result each time it was applied. Reliability was determined to administer a test to evaluate all variables under the study were covered in the questionnaire. A test-retest was performed on the questionnaires by giving two respondents who were student colleague and educator a questionnaire twice in different dates to answer at the same time. The results in test 1 and test 2 were then correlated to show the reliability of the questionnaire. This helped in knowing whether respondents interpret and answer questions correctly. Statistical tests were also performed on independent variables and dependent variables from the conceptual framework Figure 10. to ensure that the questionnaires were reliable. Reliability using Cronbach's alpha coefficient to variables was performed to measure internal consistency. Cronbach's alpha coefficient was a measure used for checking the reliability of research instruments such as a questionnaire for a set of scales (Jain, 2017). The Cronbach's alpha was calculated by correlating scale item score with the total score for each response.

The reliability of the research instrument was conducted using Cronbach's alpha coefficient as shown in Table 3.

Table 3: Cronbach's alpha reliability coefficient

Source: Research questionnaire

Items measured	Items (N)	Cronbach's alpha (α)	inter-item correlation	Item-to-total correlation	Reliability outcome
Internet connectivity	5	0.900	0.498-0.987	0.555-0.906	Excellent
Type of mobile technology	5	0.773	0.428-0.984	0.394-0.694	Acceptable
User literacy	5	0.799	0.281-0.775	0.513-0.772	Acceptable
Data caching	5	0.797	0.262-0.671	0.488-0.705	Acceptable
E-learning policy	5	0.754	0.340-0.617	0.506-0.636	Acceptable
Digital content	5	0.795	0.283-0.647	0.501-0.695	Acceptable

Table 5 shows that the responses from respondents were reliable. According to Goforth (2005), internal consistency which leads to reliability for the scale used was reached when Cronbach's

alpha was equal or more than 0.7 ($\alpha \geq 0.7$). The items-correlation both inter-total correlation and item- total-correlation indicated that questionnaire items were reliable.

3.9. Data analysis

Content analysis was applicable in evaluating the information which was composed of discussions. This study was guided by objectives and statement of the problem in collecting data and also analyzing it. Content analysis stretches the capacity in building the qualitative data gathered in a way that supports the achievement of research objectives. Nevertheless, human being error was greatly involved in the content study. The percentage was used where an item occurs more times to perform the analysis. Further, descriptive statistics were used where frequency distributed tables' were generated, inferential statistics were statistical hypothesis testing and estimation of non-parameters. These were methods used for data

analysis.

3.10. Ethical issues

Before administering data collection instruments, this study obtained a Research permit (appendix F) from the office of the Research and Development department through the Ethics Review Committee, a Research license (appendix G) from NACOSTI (National Commission for Science Technology and Innovation) office, and School of Postgraduate letter (appendix H). The research in this study remained neutral and objective and let the respondents' participate voluntarily by seeking their co-operation.

On ethical issues, interviews were done in strict confidence, and participation was done voluntarily. Respondents' details were not collected. For the safety of the questionnaire participants, this research did not include their age and any other personal information in the

questionnaires. In another step, All contestants were fully informed about the objectives of the research and reassuring them that their replies were treated as private and were implemented merely for educational purposes and merely for the resolutions of the specific research and nothing else.

3.11. Operationalization of variables

This section represents the operationalization of both independents and dependent variables. The variables were retrieved from the research objectives as shown in table 4.

Table 4: Operationalisation of variables.

Source: Research objectives

Objectives	Variables	Indicators	Measurement	Scale	Data collection method	Data analysis
To establish the type of mobile technology learners and educators in accessing digital content.	**Independent variable** Type of mobile technology	- Mobility - Storage capacity - E-learning platform features - Digital content compatibility	- easier access to digital content depends on the mobility of the type of mobile technology The storage capacity of digital content depends on the type of technology - E-learning platform features were easily accessible when using a cell phone. - Digital content was compatible when using a cell phone	Ordinal	Questionnaire	Linear regression statistics
To identify challenges and the extent to which they affect the Internet connectivity learners who access digital content via mobile technology	**Independent variable**	- Internet connectivity. Cost limitation - Installed apps/software - Network infrastructure	Rate the accessing of digital content affected because of poor internet connectivity - The cost of internet bundles limits the digital content access -	Ordinal	Questionnaire	Linear regression statistics

		- Type of internet connection				
To develop a mobile-based model to mitigate the Data caching challenges facing students and educators in accessing digital content via mobile technology	**Independent variable**	- improve the accessibility of the digital content				
To validate the model developed in objective 3.	**dependent variable** accessibility to digital content	- Type of digital content accessed - Time was taken to access digital content				
			- Poor network infrastructure - Installed apps in the device affect the speed of the internet connection - The slow/speed of the type of internet use	Ordinal	Questionnaire	Linear regression

	- E-learning platform statistics and cell phones having data caching for easier access to digital content			
	- Type of digital content statistics accessed - Taking part in online discussions and downloading digital content	Ordinal	Questionnaire	Linear regression

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSION

4.1. Introduction

This chapter presents the research findings/results and discussion of the first, second ,third and four objectives of the study. These objectives sought to establish the factors that influence mobile technology in accessing digital content and identifying the challenges and extent to which they affect the students and educators in accessing digital content via mobile technology. The study sample was 390 participants comprising of students, educators, and ICT staff drawn from Mount Kenya University's main campus. The respondents were retrieved from the 2018/2019 academic year. Based on the literature review, the main parameters that influence the accessibility of digital content via mobile devices were identified to be internet connectivity, data caching, type of mobile technology, user literacy, e-learning policy, and accessibility of digital content. The internet connectivity and data caching were some of the factors that influence mobile technology in accessing digital content but were the challenges that this study identified to affect the accessibility to digital content via mobile technology. Internet connectivity was the study problem to be resolved to improve the accessibility of digital content in objective 3 and be validated in objective 4. A conceptual representation of these factors was presented in section 2.4 (Fig. 10). The tools for data collection (especially the questionnaires) were further developed in line with these factors as described in chapter 3.

The findings of this research have shown that accessibility of digital content was a challenge due to poor internet connection that needed to be mitigated to ensure the university achieved its objectives of implementing the accessibility of digital content via mobile technology. The

analysis was done using descriptive statistics and regression statistics. Regression statistics applied to all questions that involved independent and dependent variables of the research, descriptive statistic was used to investigate the central tendency and dispersion

4.2. Response rate

The questionnaires were distributed to the respondents physically. The respondents were given enough time to read and give their responses in the questionnaires. This approach was taken because it was easy to reach respondents who were in the university during a specific study session. The response rate was displayed in Table 5.

Table 5: Questionnaire Return rate

Source: Research data

Respondents	Sample size	Questionnaire issued	Questionnaire returned	Questionnaires return rate (%)
students	333	333	319	95
Lecturer/ICT staff	57	57	52	95
Total	**390**	**390**	**371**	**95**

Table 5 shows that 390 questionnaires were distributed to the respondents. A total of 371 (95%) questionnaires were returned. This represented a very high rate according to **(Fryrear, 2015)**.

4.3. Demographic characteristics

The respondents' demographics were presented in this section. The data were analyzed using descriptive statistics as shown below;

4.3.1. Distribution of the respondents' by gender

The respondents' genders were recorded using the research questionnaire for students, educators, and ICT staff. It indicates that digital content was access by everybody regardless of gender. The research data provided was collected using the research questionnaire on gender: male [ ], female [ ]. The following information was obtained as shown in Table 6, Table 7, and Figure 13:

Table 6: Distribution of respondents gender

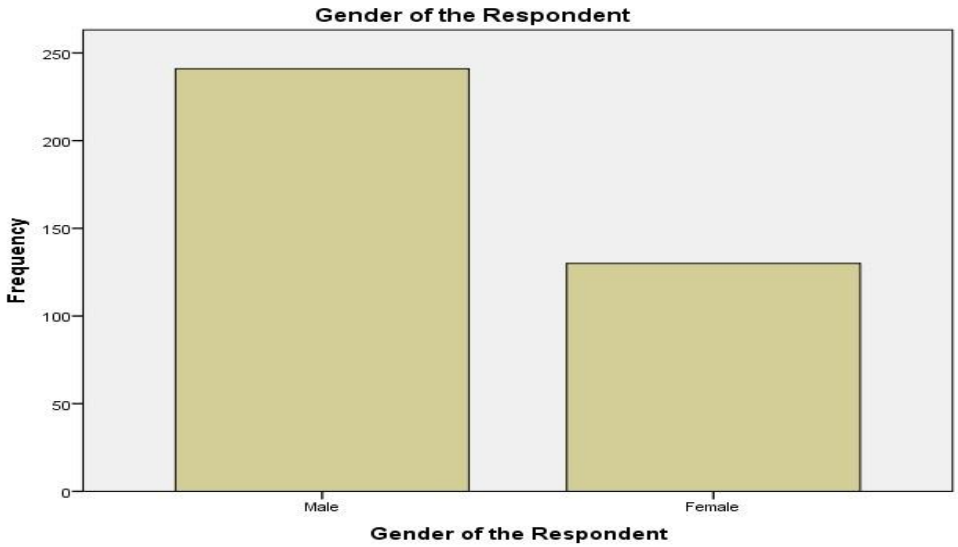
Source: Research data

	Gender of the Respondent	
	Male	Female
Total	241	130

Table 7: Distribution of the respondents by gender

Source: Research data

(Gender)	f	**%**
Male	241	65
Female	130	35
Total	371	100.0



Pie Chart

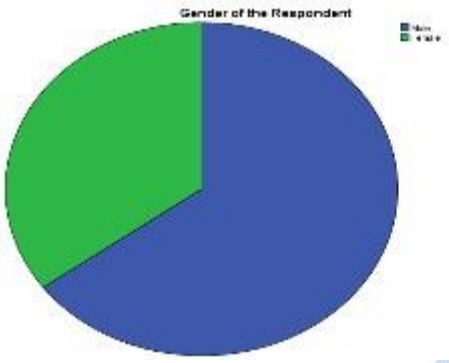


Figure 10: Pie chart on the gender of the respondents

Source: Research data

Table 7 shows that the majority of the respondents, 241 (65%) were male while respondents 130 (35%) were female. It indicates that digital content was being accessed by both genders which was a good indicator of good learning. It also indicates that the majority of the respondents who access digital content via mobile technology were male.

4.3.2. Distribution of the respondents by age

Access to digital content via mobile technology does not hinder any person of any age to access it. The research data provided was collected using the research questionnaire on; Age: 16-25 [ ], 26-35 [ ], 37-45 [ ], 46 and above [ ]. The following information was obtained as shown in Table 8, and Figure 14:

Table 8 shows how access to digital content was distributed among different age groups.

Table 8: Distribution of respondents age

Source: Research data

(Age)	f	%
16-25	95	25.6
26-35	105	28.3
37-45	138	37.2
46 and above	33	8.9
Total	371	100.0

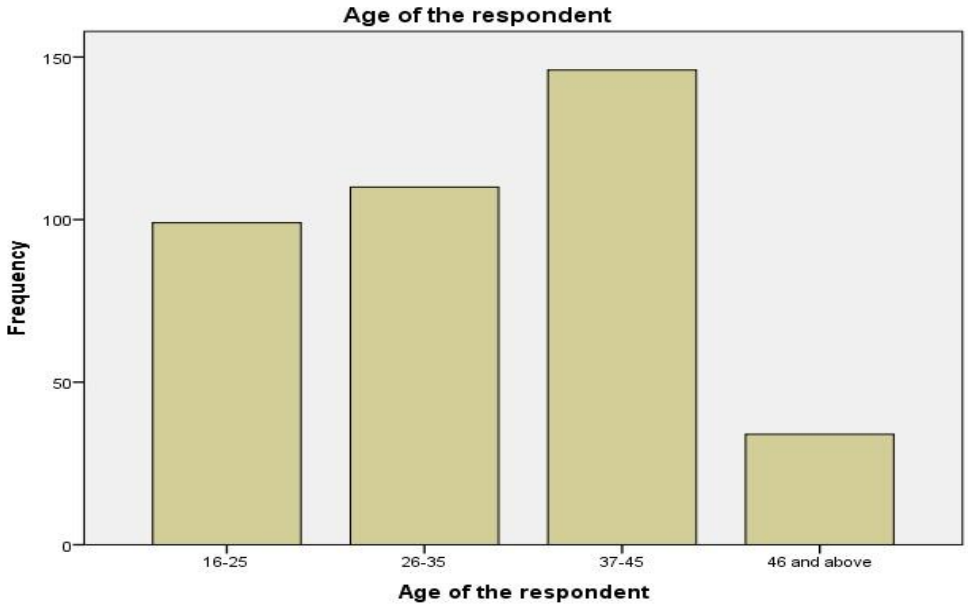


Figure 11: Chart on respondents age

Table 8 shows age does not limit people from accessing digital content whether respondents were young or old. Table 8 indicates that digital content was more accessed via mobile technology by the respondents whose ages were between 37-45 age by 37.2 % (138 respondents), 26-35 age by 28.3 % (105 respondents), and 16-25 age by 25.6 % while access decreased between 46 and above 8.9 % (33 respondents).

4.3.3. Distribution of respondents by County

Kenya had 47 counties and People who access digital content via mobile technology were distributed in different counties as shown in Table 9 below. The research data provided was collected using the research questionnaire on; indicate county……. The following information was obtained as shown in Table 9 and Figure 15:

Table 9: respondents by county

Source: Research data

(County)	f	**%**
Malindi	15	4.0
Meru	34	9.2
Kiambu	43	11.6
Isiolo	3	.8
Garissa	21	5.7
Nyeri	21	5.7
Mombasa	12	3.2
Homa Bay	5	1.3
Kakamega	39	10.5
Kisumu	37	10.0
Trans Nzoia	47	12.7
Nairobi	24	6.5
Kitui	10	2.7

Eldoret	10	2.7
Lamu	15	4.0
Murang'a	15	4.0
Nakuru	7	1.9
Taita Taveta	13	3.5
Total	371	100.0

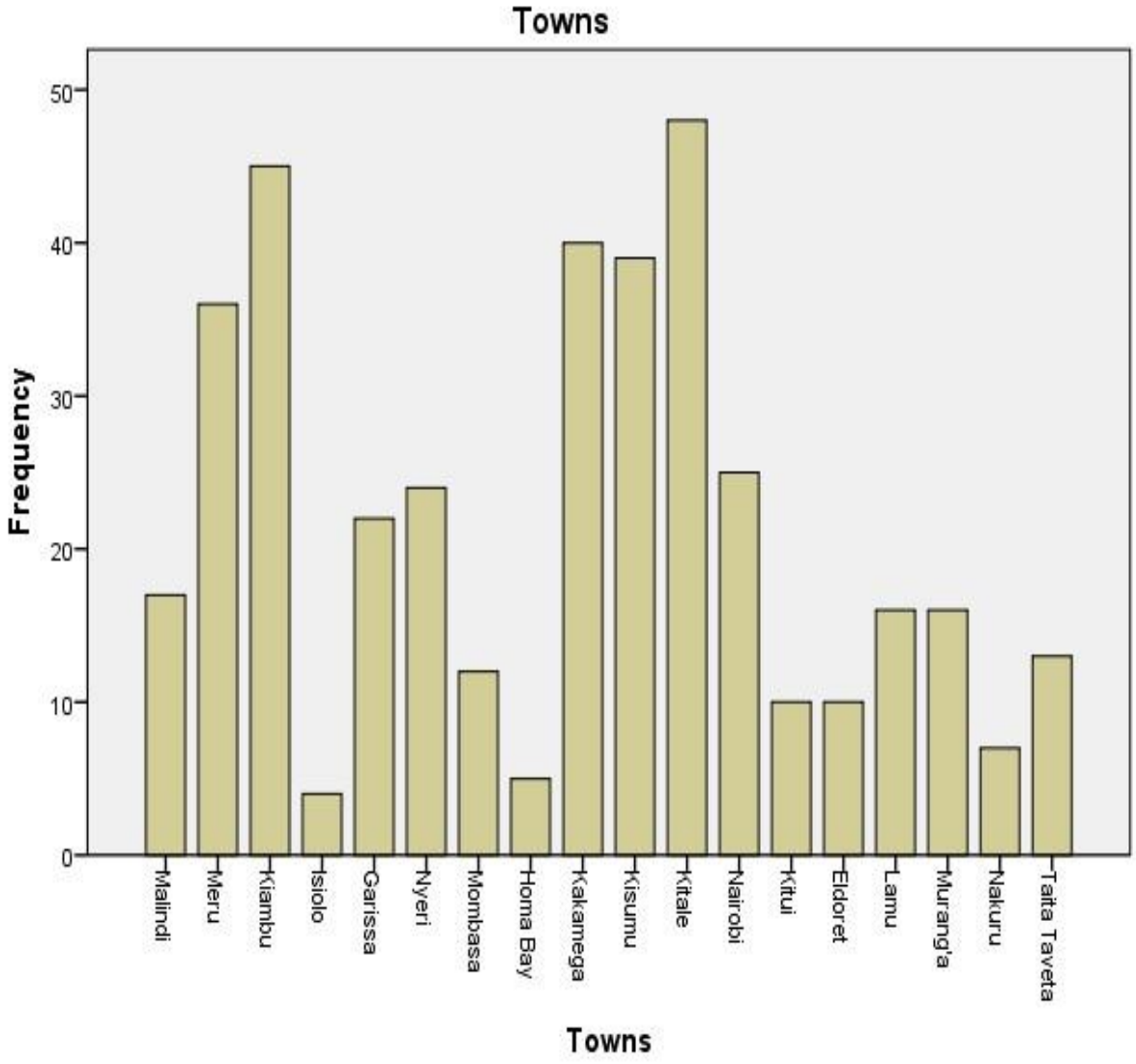


Figure 12: Chart on respondents counties

Source: Research data

Table 9 shows that respondents were spread all over the country and it indicates that access to digital content was very high in the country, which needs to improve digital content accessibility via mobile technology.

4.3.4. Type of device used

Table 10 shows that respondents use different types of devices. The research data provided was collected using the research questionnaire on; Which type of devices have you been using: Mobile phone [ ], Laptop [ ], Desktop [ ], Tablets [ ]. The following information was obtained as shown in Table 10, Table 11, and Figure 16 respectively:

Table 10: Type of device statistics

Source: Research data

Descriptive Statistics

	N	Mean	Std. Deviation	Variance
Type of device: Mobile Phone	371	1.18	.383	.147
Type of device: Laptop	371	1.29	.454	.206
Type of device: Desktop	371	1.56	.497	.247
Type of device: Tablets	371	1.86	.385	.119

Table 10 shows that mobile phone usage was at mean = 1.18, variance = 0.147 and standard deviation =0.383, laptop usage was at mean =1.29, variance = 0.206 and standard deviation = 0.454, desktop usage was at mean of 1.56, variance = 0.247 and standard deviation = 0.497 and tablets usage was at mean =1.86, variance = 0.119 and standard deviation = 0.385.

Students, educators, and ICT staff gave varied views on which types of mobile technology they used whenever they were learning digital content during their daily studies. The information was categorized according to the type of mobile technology usability. These included Mobile

phones, laptops, desktops, and tablets. The usage of mobile phones, laptops, desktops, and tablets was shown in Table 11.

Table 11: Devices used as a type of mobile technology

Source: Research data

	Mobile Phone		Laptop		Desktop		Tablets	
	f	%	*f*	%	*f*	%	*f*	%
Yes	305	82.2	264	71.2	164	44.2	51	13.7
No	66	17.8	107	28.8	207	55.8	320	86.3
Total	371	100.0	371	100.0	371	100.0	371	100.0

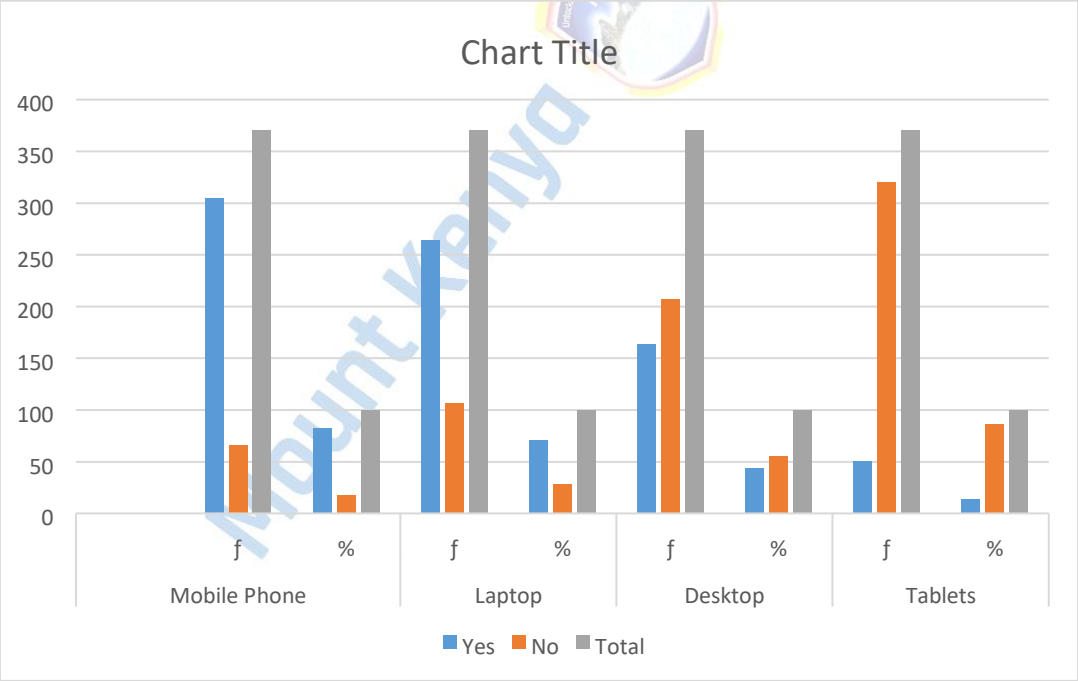


Figure 13: Chart on type of devices

Source: Research data

Table 11 shows that the majority of the respondents, 305 (82.2%) use mobile phones as a type of device in accessing digital content. This indicated that mobile phones were adopted by respondents for learning digital content without necessary assembling in either a lecture room or cyber to study. The mobility of mobile phones made respondents use them to access digital content and the acceptability of technology by respondents in accessing digital content. Table 11 shows that the majority of the respondents, 264 (71.2%) use the laptop as a type of mobile technology in accessing digital content. It was also shown that laptops were the second adopted type of device by respondents for learning digital content without necessarily assembling in either a lecture room or cyber to study.

Table 11 shows that the desktops were the least used type of device in accessing digital content by 207 (55.8%) of respondents. Table 8 shows that there was an improvement in reducing resistance by lecturers on the use of mobile technology in educating learners through online platforms.

Table 11 shows that the tablets were the least used type of device in accessing digital content by 320 (86.3%) of respondents. Table 10 shows that despite the tablets being a good type of device, most of the respondents did not use them to access the content.

4.3.5. Distribution of the type of devices usage

In this section the distribution of the type of device usage among respondents computed. The research data provided was collected using the research questionnaire on; Which type of devices have you been using: Mobile phone [ ], Laptop [ ], Desktop [ ], Tablets [ ] and Which was your current user status: Lecturer [ ], Student [ ] , ICT staff [ ]. The following information was obtained as shown in Table 12:

Table 12: Distribution of the respondents by the usage of devices

Source: Research data

		Mobile Phone		Laptop		Desktop		Tablets	
		Yes	No	Yes	No	Yes	No	Yes	No
Current status	Lecturer	43	7	43	7	34	16	5	45
	ICT staff	1	3	1	3	3	1	3	1
	student	261	56	220	97	127	190	43	274
Total		305	66	264	107	164	207	55	320

To establish the association between respondents and the usage of mobile phones, Pearson chisquare was computed. The findings were presented in Table 12 shows that 261 students, 43 educators, and 1 ICT staff access digital content via mobile phones, and 220 students, 43 educators, and 1 ICT staff access digital content via laptops while the higher number of students 190, educators 18 shows that they did not access digital content via desktop. The access to digital content via desktop was low due to lack of time to assemble in the classroom and cyber café. Table 12 also shows that the number of respondents who accessed tablets was less by 43 students and 5 educators which indicates that either tablet was not easy to acquire or they do not know the importance of using tablets in education.

Distribution of the mobile phone

In this section, the distribution of mobile phone usage among respondents was tested to measure the null Hypothesis. The research data provided was collected using the research questions on; Which type of devices have you been using: Mobile phone [ ], Laptop [ ], Desktop [ ], Tablets [ ] and Which was your current user status: Lecturer [ ], Student [ ] , ICT

staff [ ]. The following information was obtained as shown in Table 13, Figure 17, and the chi-square test in Table 14.

Table 13: Distribution of the mobile phone

Source: Research data

	Mobile Phone	
	f	**%**
Yes	305	82.2
No	66	17.8
Total	371	100.0

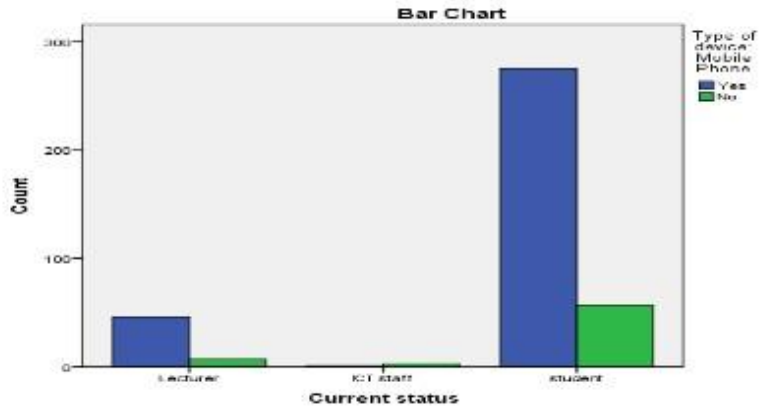


Figure 14: Distribution respondent by the mobile phone usage

Source: Research data

Table 13 shows that the majority of the respondents, 305 (82.2%) use mobile phones as a type of device in accessing digital content. This indicated that mobile phones were adopted by respondents for learning digital content without necessary assembling in either a lecture room

or cyber to study. The mobility of mobile phones made respondents use them to access digital content and the acceptability of technology by respondents in accessing digital content.

Table 14: The respondents by the usage of mobile phone test

Source: Research data

Chi-Square Tests

	Value	df	Asymp. Sig. (2sided)
Pearson Chi-Square	9.446[a]	2	.009
Likelihood Ratio	6.778	2	.034
Linear-by-Linear Association	.202	1	.653
N of Valid Cases	371		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count was .71.

Table 14 shows mobile phones were a very important type of mobile technology used by students, educators, and ICT staff in accessing digital content. Table 12 shows that this research was significant at x^2 (2,305) =9.446, $e < 0.009$, α=0.05) and the null hypothesis were rejected.

Distribution of the laptops

In this section, the distribution of laptop usage among respondents was tested to measure the null Hypothesis. The research data provided was collected using the research questions on; Which type of devices have you been using: Mobile phone [ ], Laptop [ ], Desktop [ ], Tablets [ ] and Which was your current user status: Lecturer [ ], Student [ ] , ICT staff [ ]. The following information was obtained as shown in Table 15, Figure 18, and the chi-square test in Table 16.

Table 15: Distribution of the laptops

Source: Research data

	Laptop	
	f	**%**
Yes	264	71.2
No	107	28.8
Total	371	100.0

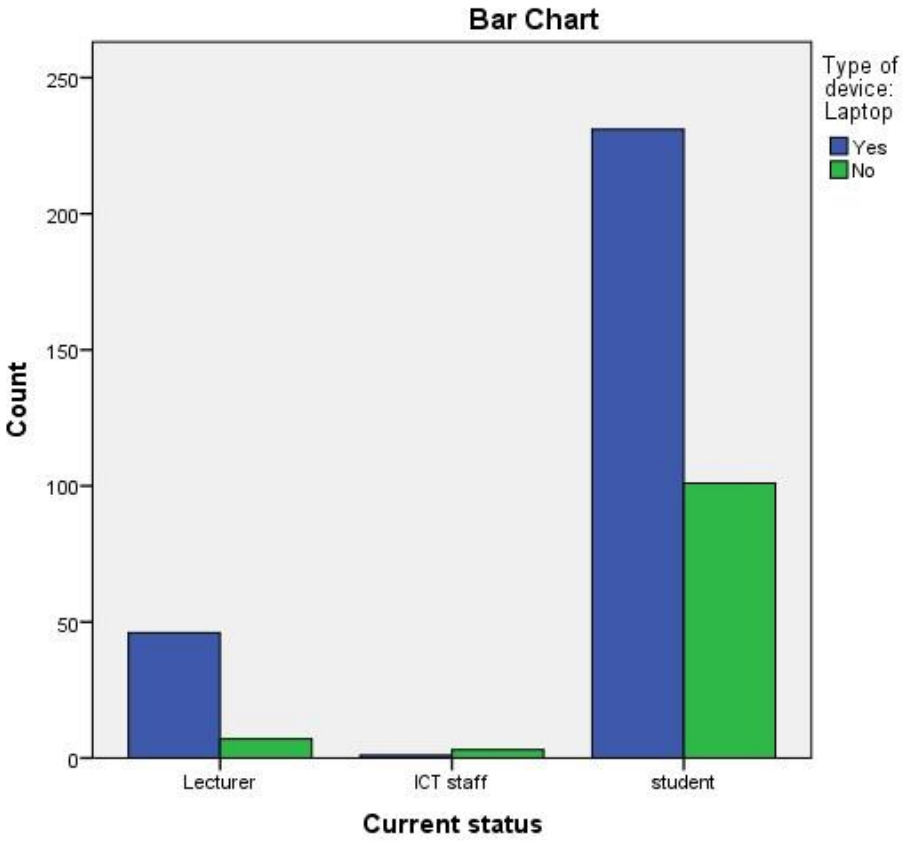


Figure 15: distribution of the respondents by the usage of the laptop

Source: Research data

Table 15 shows that the majority of the respondents, 264 (71.2%) use the laptop as a type of mobile technology in accessing digital content. It was also shown that laptops were the second adopted type of device by respondents for learning digital content without necessarily assembling on either a lecture room or cyber to study.

Table 16: The respondents by the usage of Laptop test

Source: Research data

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.996[a]	2	.007
Likelihood Ratio	10.287	2	.006
Linear-by-Linear Association	5.192	1	.023
N of Valid Cases	371		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count was 1.15.

Table 16 shows laptops were also a very important type of mobile technology used by students, educators, and ICT staff in accessing digital content. Table 16 shows that this research was significant at x^2 (2,264) =9.996, $e < 0.007$, α=0.05) and the null hypothesis were rejected.

Distribution of the desktop

In this section, the distribution of desktop usage among respondents was tested to measure the null Hypothesis. The research data provided was collected using the research questions on;

Which type of devices have you been using: Mobile phone [ ], Laptop [ ], Desktop [ ], Tablets [ ] and Which was your current user status: Lecturer [ ], Student [ ] , ICT staff [ ]. The following information was obtained as shown in Table 17, Figure 19 tested to measure the null Hypothesis. Table 18.

Table 17: Distribution of the desktop

Source: Research data

	Desktop	
	f	%
Yes	164	44.2
No	207	55.8
Total	371	100.0

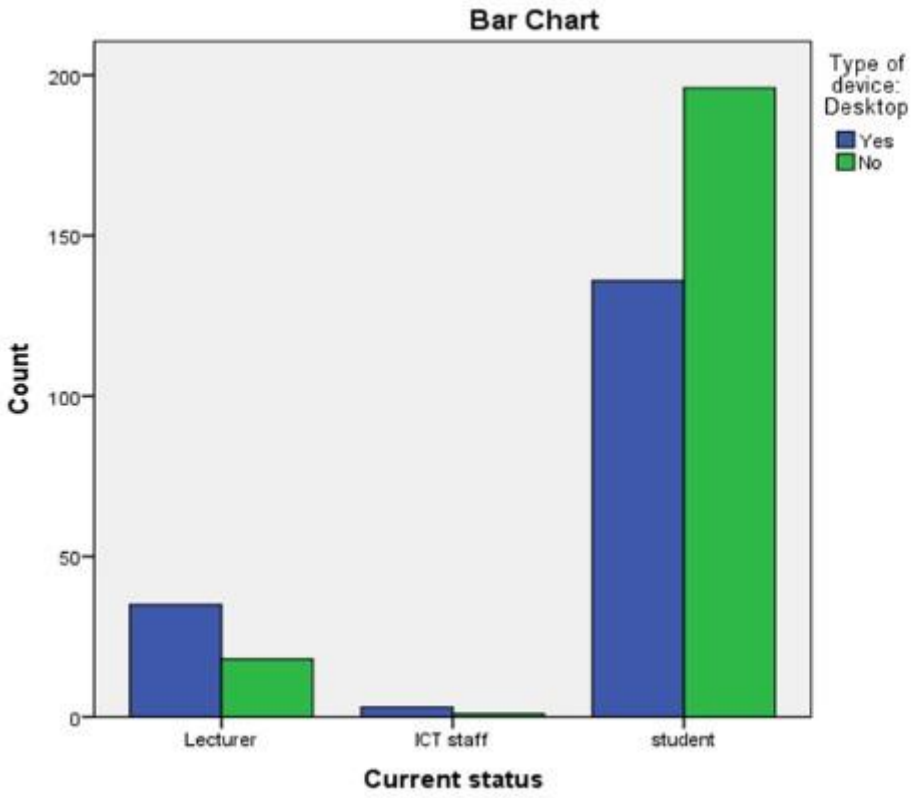


Figure 16: distribution of the desktop

Source: Research data

Table 17 shows that the desktops were the least used type of device in accessing digital content by 207 (55.8%) of respondents. Table 17 shows that there was an improvement in reducing resistance by lecturers on the use of mobile technology in educating learners through online platforms.

Table 18: The respondents by the usage of desktop test

Source: Research data

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.221[a]	2	.000
Likelihood Ratio	15.283	2	.000
Linear-by-Linear Association	14.133	1	.000
N of Valid Cases	371		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count was 1.77.

Table 18 shows that desktops were not used as a type of mobile technology by students, educators, and ICT staff in accessing digital content. Table 18 shows that this research on desktops was significant at x^2 (2,207) =15.221, $e < 0.000$, α=0.05) and the null hypothesis was rejected.

Distribution of the Tablets

In this section, the distribution of the usage of the tablets among respondents was tested to measure the null Hypothesis. The research data provided was collected using the research questions on; Which type of devices have you been using: Mobile phone [ ], Laptop [ ], Desktop [ ], Tablets [ ] and Which was your current user status: Lecturer [ ], Student [ ] , ICT staff [ ]. The following information was obtained as shown in Table 19, Figure 20, and the chi-square test in Table 20.

Table 19: Distribution of the Tablets

Source: Research data

	Tablets	
	f	**%**

Yes	51	13.7
No	320	86.3
Total	371	100.0

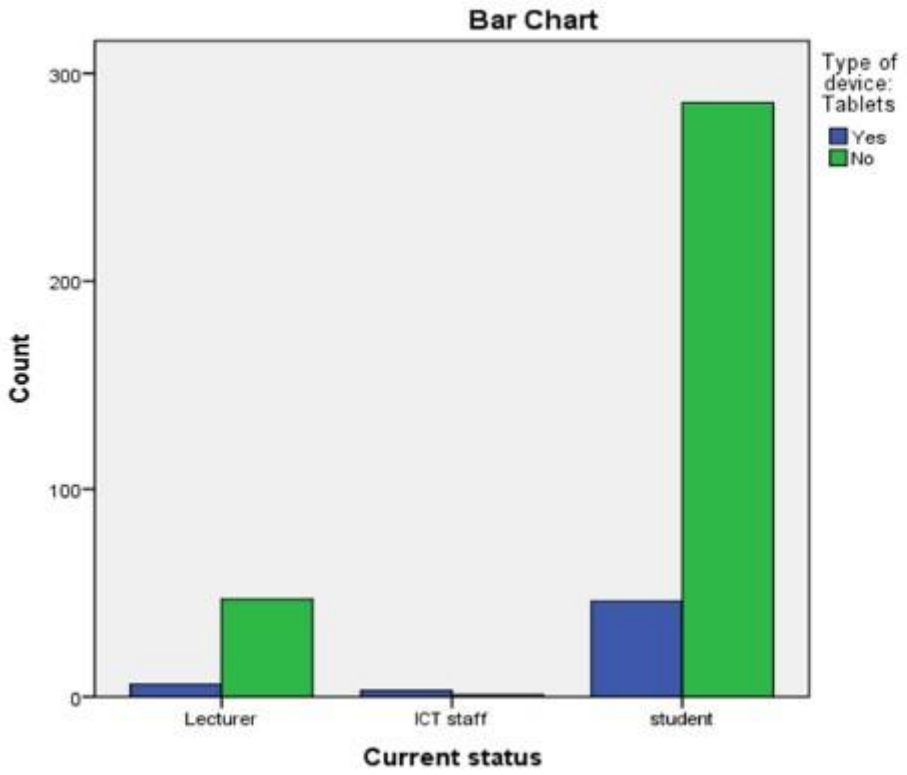


Figure 17: Distribution of the tablets

Source: Research data

Table 19 shows that the tablets were the least used type of device in accessing digital content by 320 (86.3%) of respondents. Table 10 shows that despite the tablets being a good type of device, most of the respondents did not use them to access the content.

Table 20: The respondents by the usage of tablets test

Source: Research data

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.258[a]	2	.001
Likelihood Ratio	8.357	2	.015
Linear-by-Linear Association	.217	1	.642
N of Valid Cases	371		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count was .55.

Table 20 shows that tablets were not used as a type of mobile technology by students, educators, and ICT staff in accessing digital content. Table 20 shows that this research on tablets was significant at x^2 (2,320) =13.258, $e < 0.001$, $\alpha=0.05$) and the null hypothesis was rejected.

The finding in these tables indicates that majority of students, educators, and ICT staff used laptops (71.2%), Mobile phone (82.2%), Desktop (44.2%) and other specify (13.7%) as a type of devices used to describe the type of mobile technology. These findings indicate that students, educators, and ICT staff usually use mobile technology to access digital content because of mobile technology mobility, acceptability among the respondents.

4.3.6. Type of cell phone used

In this section, the type of cell phones used by the respondents to access digital content. There were two types of cell phones: featured cell phones and smartphones. The featured cell phone did not have many features and was not smart but had small storage capacity, a browser that was less advanced and was small in size while the smartphone had a good feature and a better storage capacity and advanced browsers. The data collected showed how cell phones were distributed among respondents. The research data provided was collected using the research

questionnaire on; If you use the mobile phone, indicate the type of cell phone: smartphone [ ] or feature phone [ ]. The following information was obtained as shown in Table 21, Table 22, and Figure 21 respectively.

Table 16 shows that the majority of the respondents, 305 (82.2%) use mobile phones as a type of device in accessing digital content. This indicated that mobile phones were adopted by respondents for learning digital content without necessary assembling in either a lecture room or cyber to study. The type of cell phone respondents used was also collected to access digital content as shown in table 22. The mobile phones were in two different types of cell phones; smartphone and feature phone. Feature phones were phones that had incorporate features which had ability access internet, make a call, send and receive messages, play music but there lack advanced features which had more functions like in smartphone.

Table 21: Type of cell phone

Source: Research data

Descriptive Statistics

	N	Mean	Std. Deviation	Variance
Type of cell phone	281	1.15	.357	.128
Valid N (listwise)	281			

Table 21 shows that cell phone usage was at mean = 1.15, variance = 0.128 and standard deviation =0.357.

Table 22: Different type of cell phone

Source: Research data

		f	%
Valid	Smartphone	239	64.4
	Feature phone	42	11.3
	Total	281	75.7

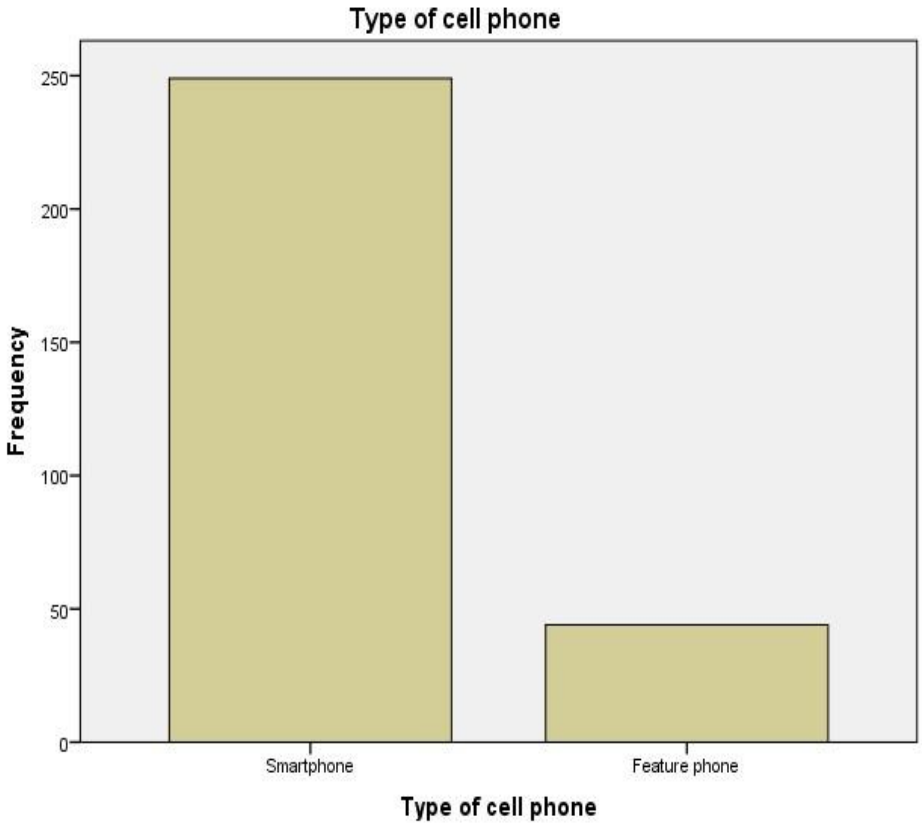


Figure 18: Distribution of type of cell phone

Source: Research data

Table 22 shows that the respondents used smartphones 249 (64%) as the type of cell phone while 44 (11.3%) were feature phones. Table 22 shows that some of the respondents were still using feature phones which need to be catered for when developing a model to improve their digital content accessibility.

4.3.7. Type of internet connection

For respondents to access digital content via mobile technology at any time, respondents need to be connected to the internet via mobile technology using different types of internet connection such; WIFI, fiber optic, Modem Local area network, satellite, and cellular. Despite the challenges involves the type of internet connection used by the respondents. The research data provided was collected using the research questionnaire on; Indicate the type of internet connection you use to access digital content: fiber optic [ ], modem [ ], WIFI [ ], Local area network [ ], satellite [ ], cellular [ ]. The following information was obtained as shown in Table 23, and Figure 22 respectively.

Table 23 shows that all respondents were having access to the different types of internet connection. The challenges that affect internet connection include; high taxes on mobile services providers, weak types of internet connection, and poor policy on internet usage (West, 2015). Table 23 shows how respondents used different types of internet connection to access digital content via mobile technology.

Table 23: Distribution of the respondents by type of internet connection

Source: Research data

		f	%
Valid	Fiber optic	11	3.0
	Modem	68	18.3
	Wifi	73	19.7
	Modem and Cellular	55	14.8
	LAN	11	3.0
	Cellular	50	13.5
	Fiber optic and Cellular	56	15.1

Fiber optic and Wifi	45	12.1
Modem and WIFI	1	.3

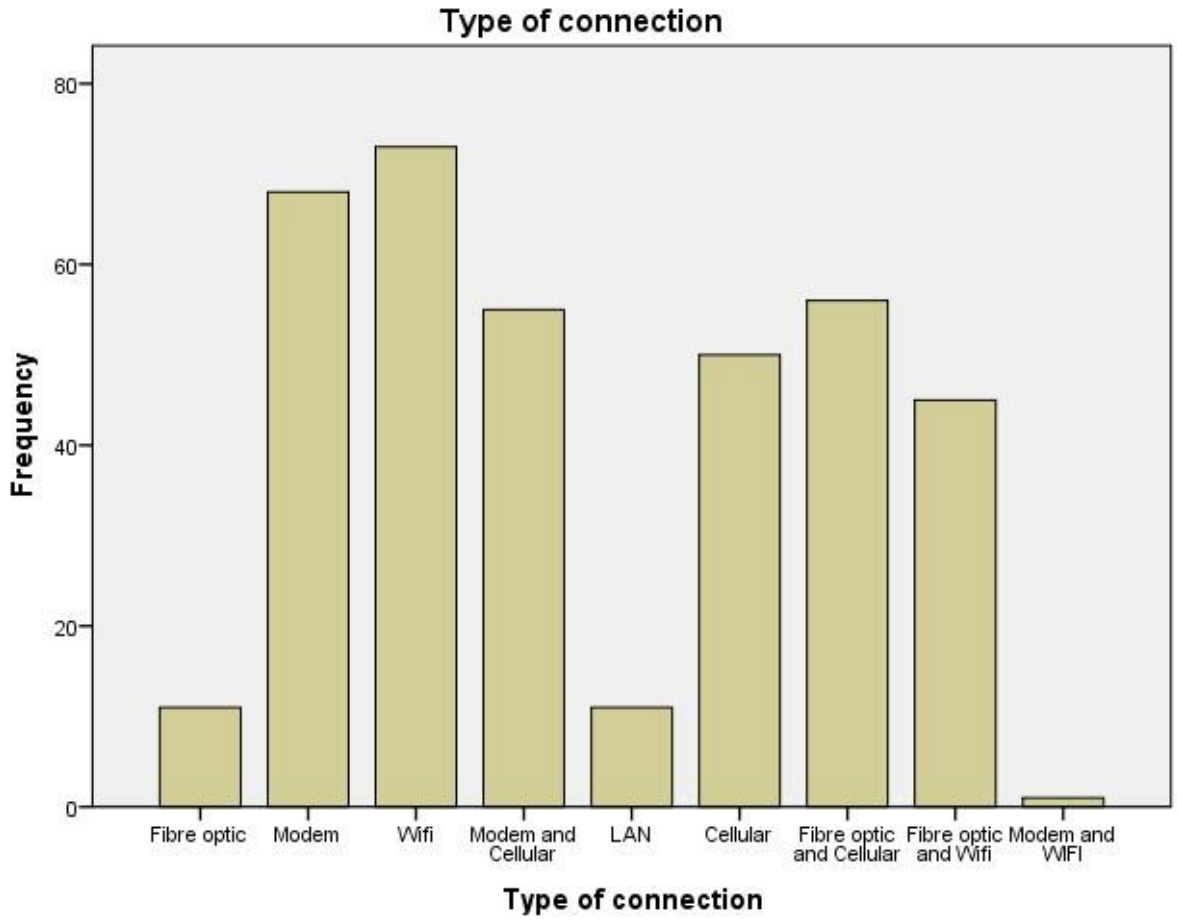


Figure 19: distribution of the type of connection

Source: Research data

Table 23 shows that all respondents used to access the internet through different types of internet connection. it also shows that the most used types of internet connection were; Wifi, Modem, Cellular, and fiber optic cable. The findings indicate that respondents were not limited by the setting of the types of internet connection because they were able to connect to the internet at any time mostly those were using the cellular, modem, and Wifi. Those using cellular (50 respondents) indicates that they were using their mobile phone whether smartphone or feature

phone. Those using modem and cellular (55 respondents) indicates that they were using both mobile phone and laptops to access digital content. Those using Wifi (73 respondents) indicates that respondents used laptops or mobile phone to access digital content. Table 23 shows that very few respondents used fiber optic cable and LAN to access digital content because, by the use of these types of internet connection, respondents need to assemble to access the internet. The findings indicate that internet connection plays a very important role in accessibility to digital content.

4.4. Data treatment

4.4.1. Testing of normality and normal Q-Q plot on variables

In this section, The normality of the data in a normal distribution was tested using KolmogorovSmirnov and Shapiro – Wilk test. The research data provided was collected using the section 3 research questionnaire which was divided according to conceptual framework variables on; Indicate your opinion of the following statements concerning internet connectivity, Indicate your opinion of the following statements concerning the type of mobile technology use in accessing digital content, Indicate your opinion of the following statements concerning user literacy on the accessibility to digital content, Indicate your opinion of the following statements concerning data caching on digital content, Indicate your opinion of the following statements concerning e-learning policy on the accessibility to digital content, and Indicate your opinion of the following statements concerning digital content accessed. The statements' data was transformed by computing statistics per variable as shown in table 24. The variables statistics were used to perform the normality test as shown in Table 25.

Table 24: statistics of the research variables

Source: Research data

Statistics

		InternetConnectivity	TypeofMobileTechnology	UserLiteracy	DataCaching	ElearningPolicy	AccessibilityofDigitalContent
N	Valid	371	371	371	371	371	371
Mean		4.00	3.46	4.14	4.23	4.24	4.26
Std. Deviation		.540	1.029	.476	.464	.569	.423

Table 25: Testing of normality

Source: Research data

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
AccessibilityofDigitalContent	.184	371	.000	.902	371	.000
ElearningPolicy	.167	371	.000	.936	371	.000
UserLiteracy	.147	371	.000	.946	371	.000
TypeofMobile	.188	371	.000	.930	371	.000
InternetConnectivity	.146	371	.000	.961	371	.000
DataCaching	.190	371	.000	.900	371	.000

a. Lilliefors Significance Correction

Table 25 shows that the model was statistically significant at $\alpha = 0.05$ ($P < 0.001$) using the Shapiro-Wilk test. this indicates that the dependent variable "accessibility to digital content" was normally distributed and the null hypothesis was accepted.

Normal Q-Q Plot

In this section, Normal distribution normality was also tested using a normal Q-Q plot. The research data provided was collected using the section 3 research questionnaire which was divided according to conceptual framework variables on; Indicate your opinion of the following statements concerning internet connectivity, Indicate your opinion of the following statements concerning the type of mobile technology use in accessing digital content, Indicate your opinion of the following statements concerning user literacy on the accessibility to digital content, Indicate your opinion of the following statements concerning data caching on digital content, Indicate your opinion of the following statements concerning e-learning policy on the accessibility to digital content, and Indicate your opinion of the following statements concerning digital content accessed. The statements' data was transformed by computing statistics per variable as shown in table 24. The variables statistics were used to generate the graphs as shown in Figure 23, 24, 25, 26, 27, 28.

According to the graphs below, accessibility of digital content, internet connectivity, type of mobile technology, user literacy, data caching, and e-learning policy variables were normally distributed because the data closely point to the diagonal lines.

Normality measure of digital content accessibility

The research data provided was collected using section 3 research questions which were divided according to the conceptual framework variable on; Indicate your opinion of the following statements concerning digital content accessed. The statements' data was transformed by computing statistics of digital content accessibility variable which was used to generate the graph as shown in Figure 23.

Figure 20: Normality measure of digital content accessibility

Source: Research data

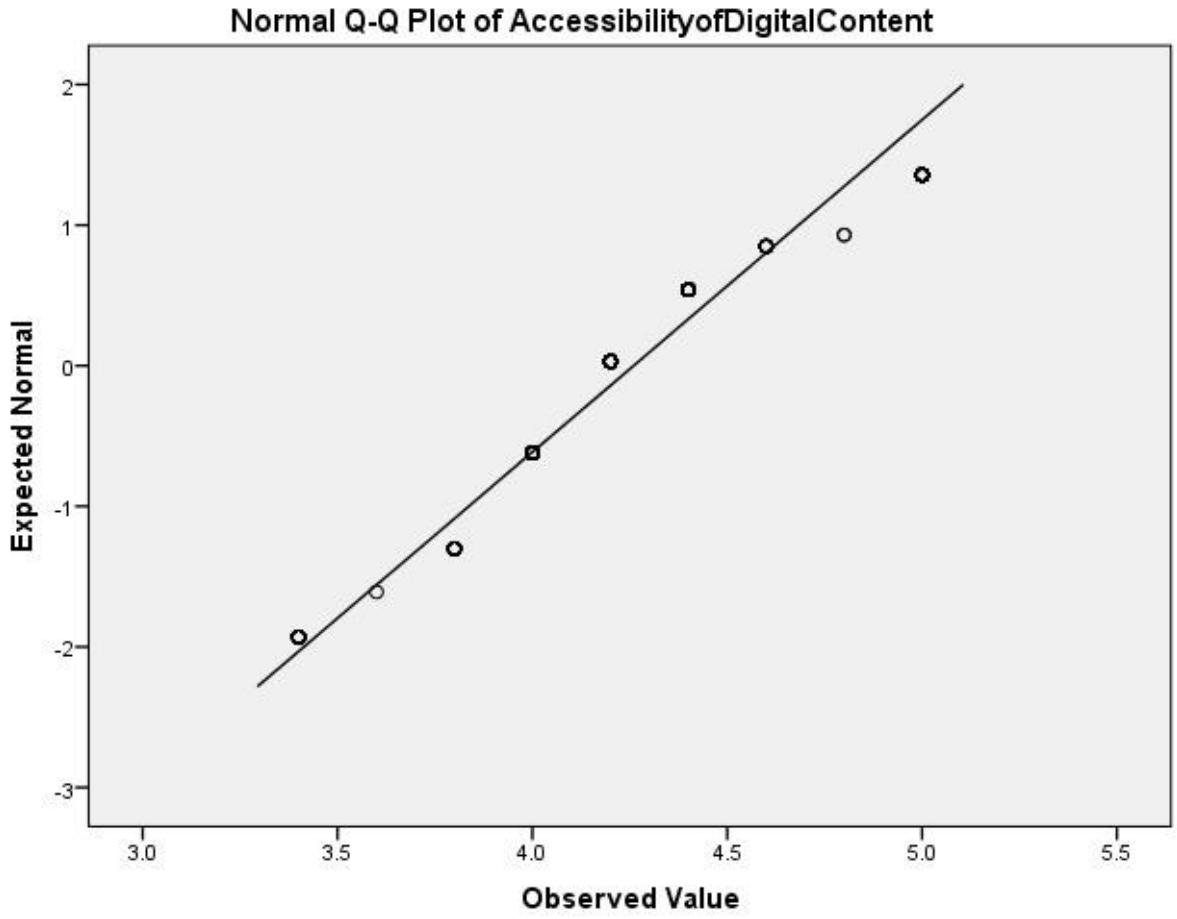


Figure 23 represents a graph that shows that the accessibility of digital content was normally distributed because the data closely point to the diagonal lines.

Normality measure of e-learning policy

The research data provided was collected using section 3 research questions which were divided according to conceptual framework variables on; Indicate your opinion of the following statements concerning e-learning policy on the accessibility to digital content. The statements' data was transformed by computing statistics of digital content accessibility variable which was used to generate the graph as shown in Figure 24.

Figure 21: Normality measure of e-learning policy

Source: Research data

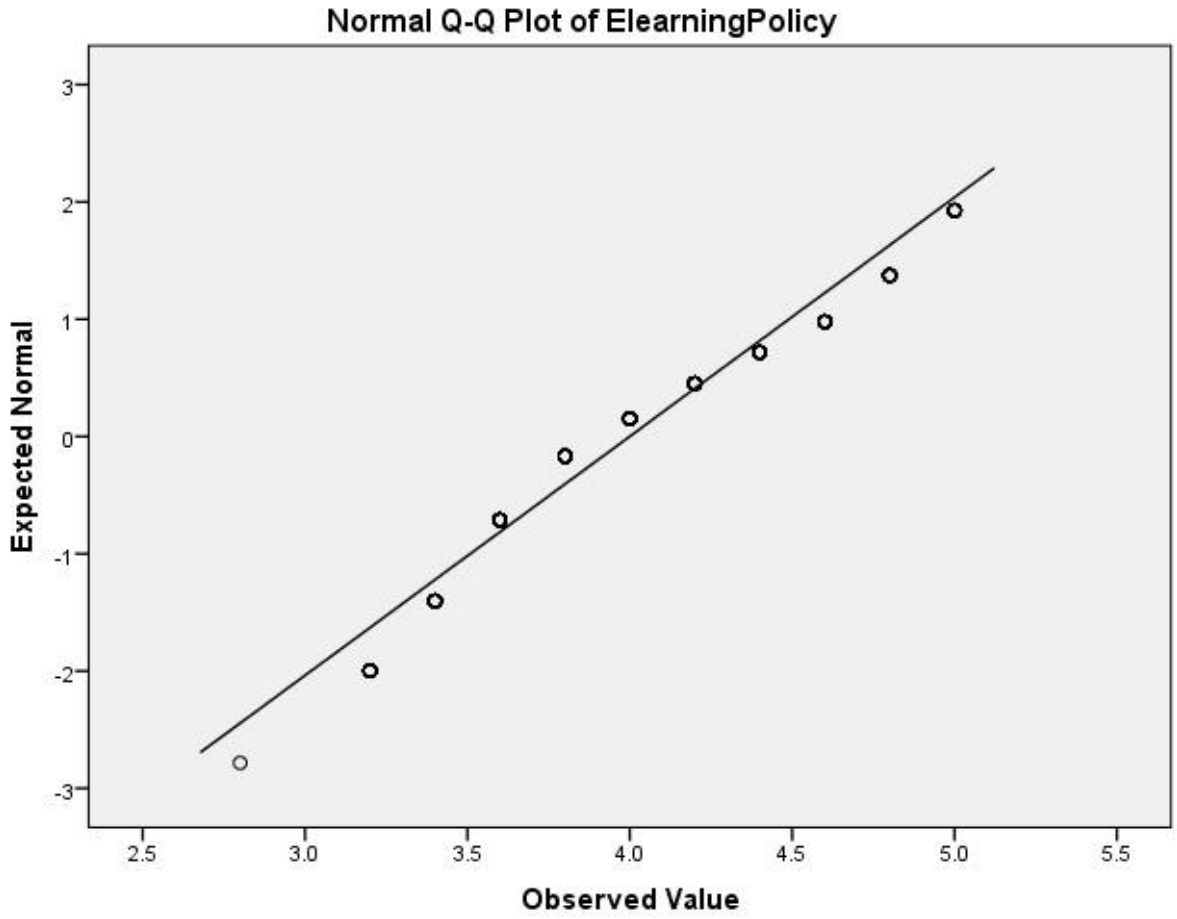


Figure 24 represents a graph that shows that the e-learning policy was normally distributed because the data closely point to the diagonal lines.

Normality measure of User literacy

The research data provided was collected using section 3 research questions which were divided according to conceptual framework variables on; Indicate your opinion of the following statements concerning user literacy on the accessibility to digital content. The statements' data was transformed by computing statistics of user literacy variable which was used to generate the graph as shown in Figure 25.

Figure 22: Normality measure of User literacy

Source: Research data

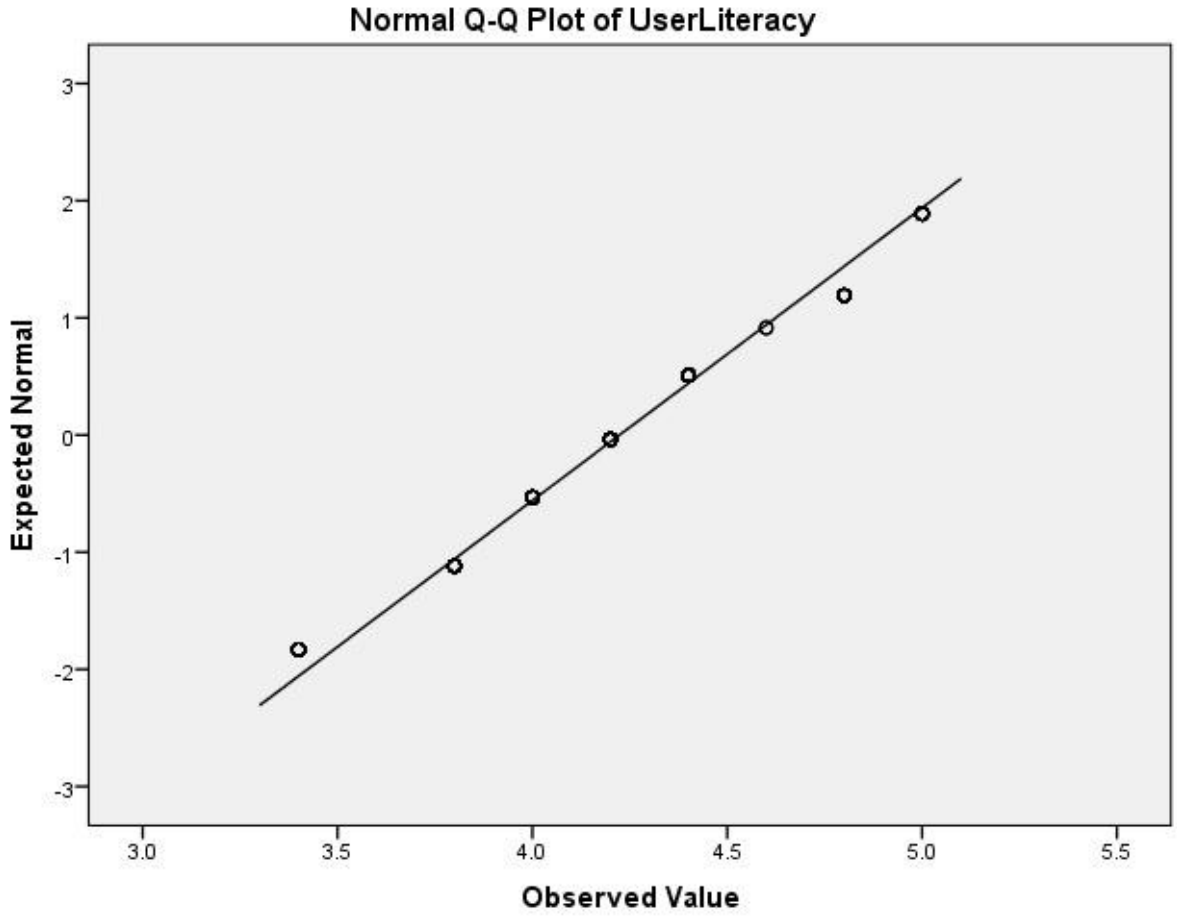


Figure 25 represents a graph that shows that user literacy was normally distributed because the data closely point to the diagonal lines.

Normality measure of the type of mobile technology

The research data provided was collected using section 3 research questions which were divided according to conceptual framework variables; Indicate your opinion of the following statements concerning the type of mobile technology use in accessing digital content. The statements' data was transformed by computing statistics of type of mobile technology variable which was used to generate the graph as shown in Figure 26.

Figure 23: Normality measure of the type of mobile technology Source:

Research data

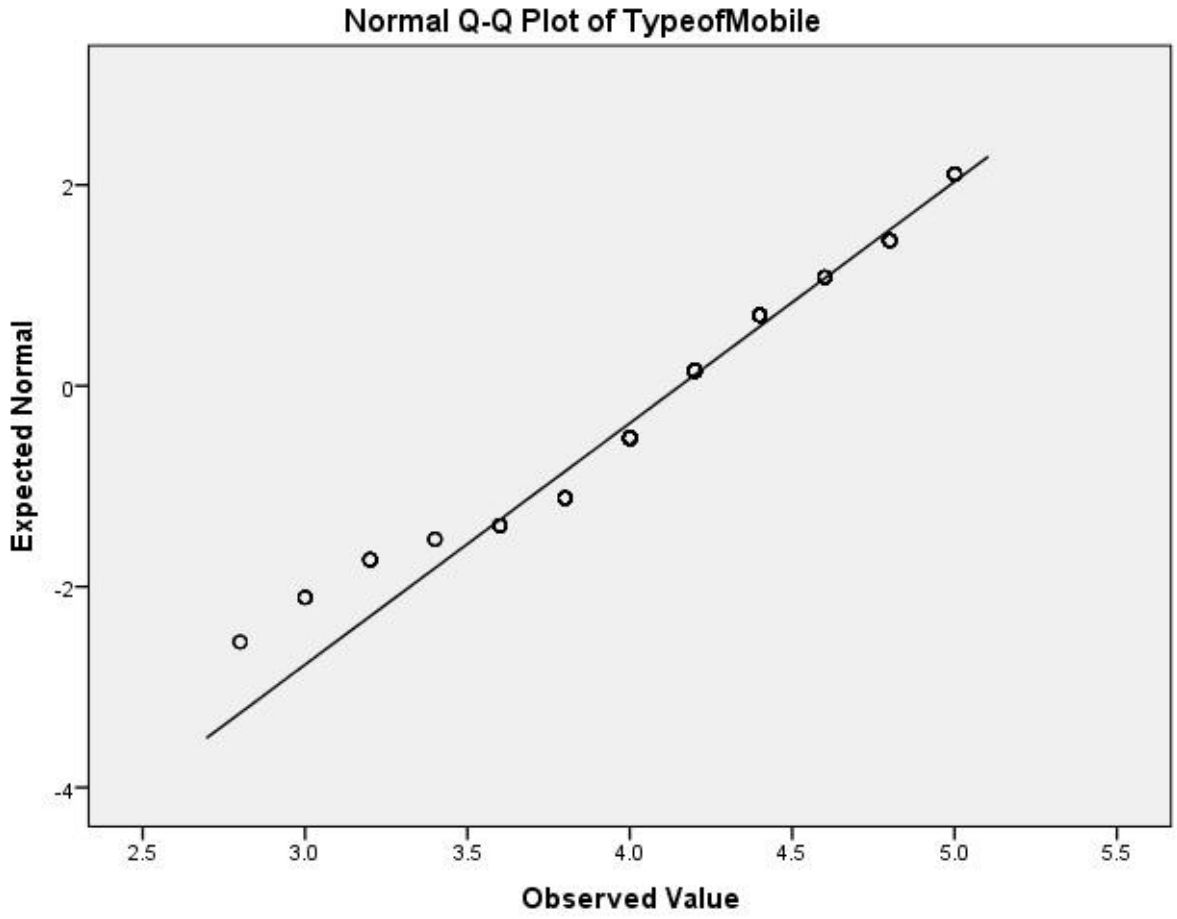


Figure 26 represents a graph that shows that the type of mobile technology was normally distributed because the data closely point to the diagonal lines.

Normality measure of internet connectivity

The research data provided was collected using section 3 research questions which were divided according to conceptual framework variables on; Indicate your opinion of the following statements concerning internet connectivity. The statements' data was transformed by computing statistics of internet connectivity variable which was used to generate the graph as shown in Figure 27.

Figure 24: Normality measure of internet connectivity

Source: Research data

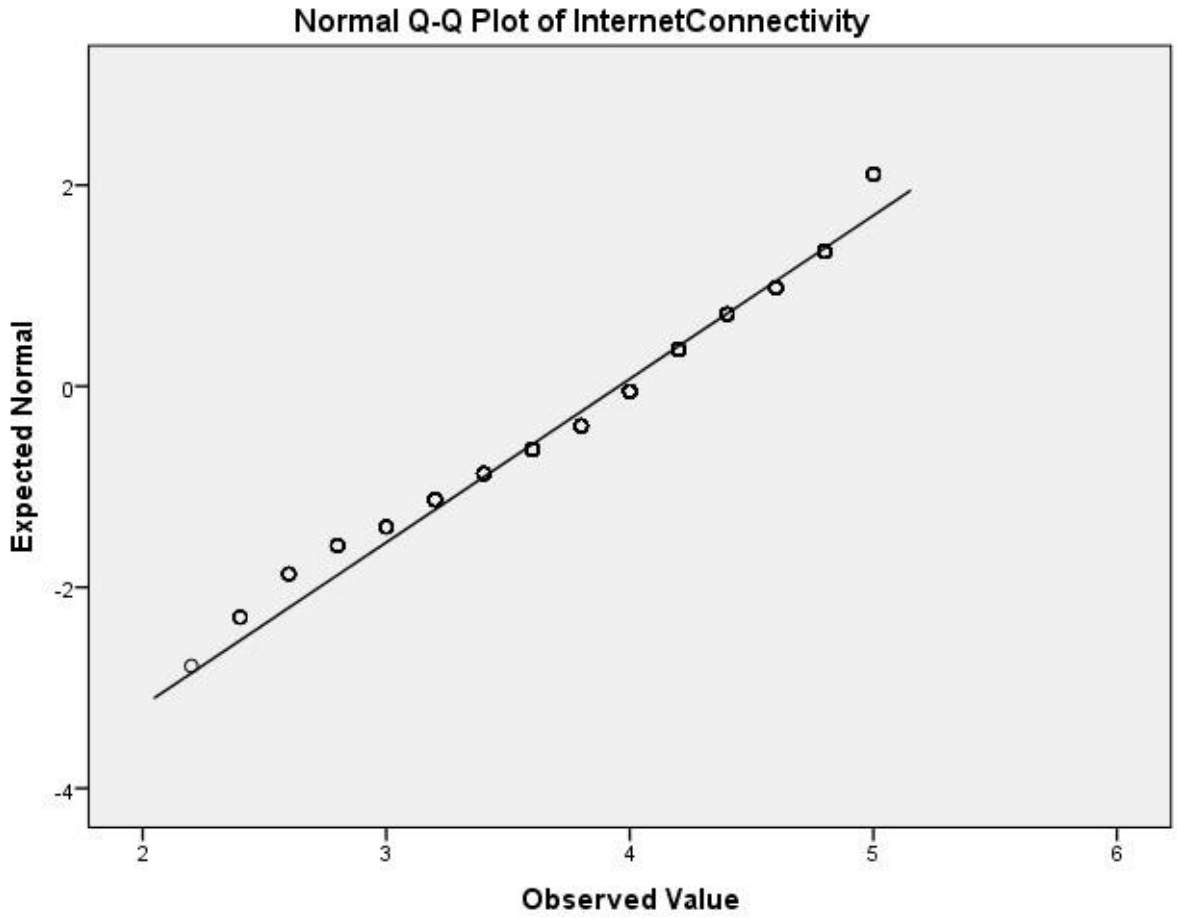


Figure 27 represents a graph that shows that internet connectivity was normally distributed because the data closely point to the diagonal lines.

Normality measure of data caching

The research data provided was collected using section 3 research questions which were divided according to conceptual framework variables on; Indicate your opinion of the following statements concerning data caching on digital content. The statements' data was transformed by computing the statistic of the data caching variable which was used to generate the graph as shown in Figure 28.

Figure 25: Normality measure of data caching

Source: Research data

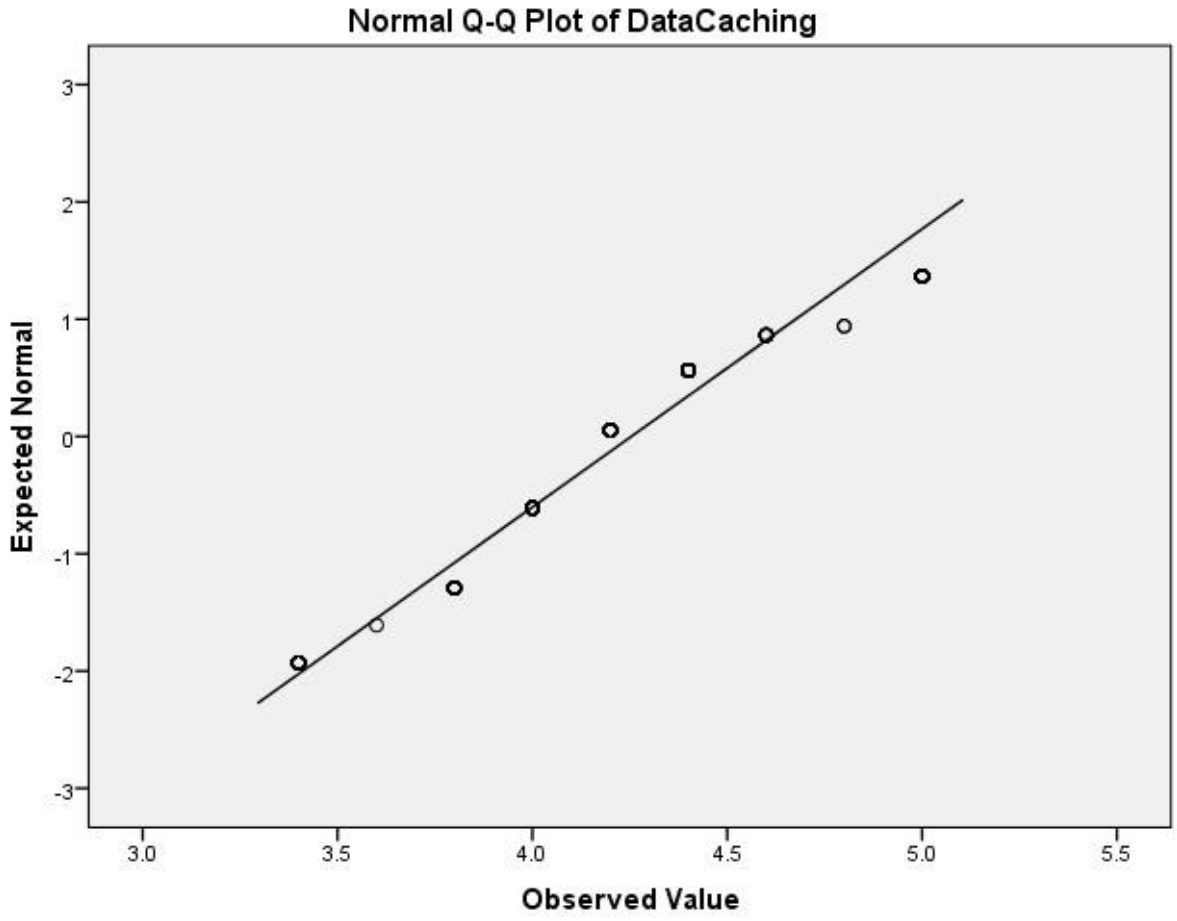


Figure 28 represents a graph that shows that data caching was normally distributed because the data closely point to the diagonal lines.

4.4.2. Multicollinearity

In this section, multicollinearity was occurrences that indicate when two or more predictors were correlated. Multicollinearity takes place when there was a strong linear relationship between predictors variables in a regression model. Table 26 shows the collinearity statistics. The research data provided was collected using the section 3 research questionnaire which was

divided according to conceptual framework variables on; Indicate your opinion of the following statements concerning internet connectivity, Indicate your opinion of the following statements concerning the type of mobile technology use in accessing digital content, Indicate your opinion of the following statements concerning user literacy on the accessibility to digital content, Indicate your opinion of the following statements concerning data caching on digital content, Indicate your opinion of the following statements concerning e-learning policy on the accessibility to digital content, and Indicate your opinion of the following statements concerning digital content accessed. The statements' data was transformed by computing statistics per variable as shown in table 24. The variables statistics were used to analyze the multicollinearity as shown in Table 26.

Table 26: Multicollinearity

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.254	.094		2.699	.007		
	InternetConnectivity	.090	.015	.114	5.814	.000	.965	1.036
	TypeofMobileTechnology	.024	.008	.057	2.948	.003	.984	1.016
	UserLiteracy	.266	.025	.299	10.707	.000	.476	2.100
	DataCaching	.605	.025	.664	24.068	.000	.490	2.042
	ElearningPolicy	.033	.009	.075	3.523	.000	.829	1.206

a. Dependent Variable: AccessibilityofDigitalContent

The model of this study was as follows

$Y = 0.254 + 0.090\ x_1 + 0.024\ x_2 + 0.266\ x_3 + 0.605\ x_4 + 0.033\ x_5 + 0.157$

The Variance inflation factor (VIF) gives a measure of the degree of collinearity (Dormann, 2013). Table 26 shows the VIF run between 1 and 2 which indicates that the multicollinearity was low. In this case no collinearity among predictor variables. Table 26 shows that the tolerance of all variables in the regression was not equal to 0 which indicates that the regression equation was valuable.

4.5. Factors that influence mobile technology in accessing digital content

In this section, the opinion provided by respondents (students, educators, and ICT staff) on the accessibility of digital content via mobile technology was tested. The information was provided depending on the research objective 1: To establish the factors that influence mobile technology in accessing digital content. The information was also provided depending on the research question asked using a Likert scale: what were the factors that influence mobile technology in accessing digital content at Mount Kenya University? Likert scale data were tested using regression analysis and correlation analysis. 5% significance level ($\alpha = 0.05$) was used in these tests.

Regression analysis involves describing the relationships among research variables while correlation involves analyzing how strong the linear relationship was in the variables. The variables analyzed in the research include; types of mobile technology, internet connectivity, and user literacy on the accessibility of digital content, data caching on digital content, and elearning policy on the accessibility of digital content. The regression analysis was used by (Ya Xiao, 2019) to analyze the relationship between ICT impact factors and early adolescents' reading proficiency. The linear regression analysis was performed which involved statistical analysis of descriptive and correlation analysis.

4.5.1. Type of mobile technology used in accessing digital content

In this section, the respondents' views on the type of mobile technology used in accessing digital content were analyzed. There were different types of mobile technology that were to be used to access digital content such as mobile phones, laptops, and tablets. Every respondent had chosen the type of mobile technology to use. The finding was collected by requiring the respondents to respond to research questionnaire on; The mobility of a cell phone makes access to digital content easier, The laptop had a larger digital content storage capacity, Mount Kenya University e-learning platform features were easily accessible when using a cell phone or tablet, It was easy to use and access digital content using a cell phone or laptop or tablet, and Digital content format was compatible when using a cell phone. Table 11 shows that the majority of the respondents used mobile phones and laptops especially. The respondents had various reasons concerning the type of mobile technology to be used and fit in accessing digital content. The responses were collected in a five points (Likert scale) where 1= strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. The mean and standard deviation was calculated in this study on these five points and the results were displayed as shown in table 27.

Table 27: Types of mobile technology attributes

Source: Research data

	N	Mean	Std. Deviation
Cell phone mobility	371	4.23	.571
Laptop storage capacity	371	4.23	.568
E-learning system features	371	3.83	.867
easy to use	371	4.30	.686
Format compatibility	371	4.18	.541
TypeofMobileTechnology (grand mean)	**371**	**4.15**	**.416**

Table 27 shows that respondents agreed that mobility of cell phone help respondents to access digital content without assembling in the classroom or libraries (mean = 4.23, standard deviation = 0.571), laptop storage capacity helps respondents to store downloaded digital content while the cell phone had a small capacity to store documents with big capacity (mean = 4.23, standard deviation = 0.568), e-learning platform feature was easily accessible when using a cell phone or tablet (mean = 3.83, standard deviation = 0.867), it was easy to use and access digital content using a cell phone or laptop or tablets (mean = 4.30, standard deviation = 0.686), and digital content format was compatible when using a cell phone (mean = 4.18, standard deviation = 0.514).

These results indicate that mobile technology was mostly used by both learners and educators to access digital content from any corner of the country as indicated in table 9. This was an indication that mobile technology was a very important aspect of improving accessibility to content.

Correlation test

According to Frost (2019), a correlation was a change in value where one variable changes affect another variable in a specific direction. The direction can be positive coefficients which indicate that there was a positive relationship between variables and the slope on a scatter plot runs upward while the negative coefficients indicate that there was a negative relationship between variables and the slope on a scatter plot runs downward (Frost, 2019). The correlation coefficient values run between -1 and +1 where + 1 indicates that there was a strong relationship between variables while -1 indicates there was a negative relationship. The research data provided was collected using the section 3 research questionnaire which was divided according to conceptual framework variables on; Indicate your opinion of the following statements

concerning the type of mobile technology use in accessing digital content, and Indicate your opinion of the following statements concerning digital content accessed. The statements' data was transformed by computing statistics per variable as shown in table 24. The variables statistics were used to perform the correlation between the type of mobile technology and accessibility of digital content test as shown in Table 28.

Table 28: Correlation between type of mobile technology and accessibility to digital content

Source: Research data

		TypeofMobileTechnology	AccessibilityofDigitalContent
TypeofMobileTechnology	Pearson Correlation	1	.427*
	Sig. (2-tailed)		.014
	N	371	371
AccessibilityofDigitalContent	Pearson Correlation	.427*	1
	Sig. (2-tailed)	.014	
	N	371	371

*. The correlation was significant at the 0.05 level (2-tailed).

Table 28 shows that there is a strong relationship between type of mobile technology and accessibility to digital content at ($r = 0.427$, $p < 0.014$ at $\alpha = 0.05$). This relationship indicates that the null hypothesis was accepted.

4.5.2. User literacy on the accessibility to digital content

In this section, the respondents' views on user literacy on the accessibility to digital content were analyzed. The finding was collected by requiring the respondents to respond to research questionnaire on; Uploading and downloading of digital content to the e-learning platform was easy, My level of education helps in understanding the procedure and correct digital content to

access, My level of education enables me to easily access digital content, My exposure to technology enables in accessing digital content, and The I.T. courses learned have enabled me to easily access digital content. The responses were collected in a five points (Likert scale) where 1= strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. The mean and standard deviation were calculated on these five points and the results were displayed as shown in table 29.

Table 29: user literacy attributes

	N	Mean	Std. Deviation
Uploading and downloading	371	4.25	.431
Understanding the procedure	371	4.42	.494
My level of education	371	4.18	.401
Technology exposure	371	4.04	.837
I.T. couses learned	371	4.24	.559
UserLiteracy (grand mean)	**371**	**4.22**	**.400**

Table 29 shows that respondents agreed that uploading and downloading of digital content to the e-learning platform was easy (mean = 4.25, standard deviation = 0.431), the level of education helps in understanding the procedure and correct digital content access (mean = 4.42, standard deviation = 0.494), the exposure to the technology enables respondents in accessing digital content (mean = 4.04, standard deviation = 0.837), level of education enables respondents to access digital content easily (mean = 4.18, standard deviation = 0.401), and the I.T. course learned by respondents have enabled them to easily access digital content (mean = 4.24, standard deviation = 0.559).

These results indicate that user literacy helped both learners and educators to access digital content via mobile technology from any corner of the country as indicated in table 7. This was an indication that user literacy was a very important aspect of improving accessibility to content.

Correlation test

According to Frost (2019), a correlation was a change in value where one variable changes affect another variable in a specific direction. The direction can be positive coefficients which indicate that there was a positive relationship between variables and the slope on a scatter plot runs upward while the negative coefficients indicate that there was a negative relationship between variables and the slope on a scatter plot runs downward (Frost, 2019). The correlation coefficient values run between -1 and +1 where + 1 indicates that there was a strong relationship between variables while -1 indicates there was a negative relationship. The research data provided was collected using the section 3 research questionnaire which was divided according to conceptual framework variables on; Indicate your opinion of the following statements concerning user literacy in accessing digital content, and Indicate your opinion of the following statements concerning digital content accessed. The statements' data was transformed by computing statistics per variable as shown in table 24. The variables statistic was used to perform the correlation between user literacy and accessibility of digital content test as shown in Table 30.

Table 30: Correlation between user literacy and accessibility to digital content Source:

Research data

		UserLiteracy	AccessibilityofDigitalContent
UserLiteracy	Pearson Correlation	1	.725

	Sig. (2-tailed)		.000
	N	371	371
AccessibilityofDigital Content	Pearson Correlation	.725	1
	Sig. (2-tailed)	.000	
	N	371	371

Table 30 shows that there is a strong relationship between user literacy and accessibility to digital content at ($r = 0.925$, $p < 0.001$ at $\alpha = 0.05$). This relationship indicates that the null hypothesis was accepted.

4.5.3. E-learning policy on digital content

In this section, the respondents' views on e-learning policy on improving the accessibility to digital content were analyzed. The e-learning policy plays a big role in the privacy of mobile technology on the accessibility of digital content. The finding was collected by requiring the respondents to respond to the research questionnaire on; I am aware of university e-learning policy which involves the accessibility of digital content via mobile technology, I believe that the e-learning policy gives surety of personal data privacy, A good e-learning policy would support gender equality and learners with disabilities, A good e-learning policy would be integrated with ICT policy, and E-learning policy was an important tool when it comes to accessing digital content via smartphone. The responses were collected in a five points (Likert scale) where 1= strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. The mean and standard deviation were calculated on these five points and the results were displayed as shown in table 31.

Table 31: E-learning policy attributes

Source: Research data

	N	Mean	Std. Deviation
awareness concerning e-learning policy	371	2.90	1.051
Personal data privacy surety	371	4.33	.488
Support gender equality	371	4.42	.499
E-learning policy had been integrated with ICT policy	371	4.21	.432
E-learning poliy importance	371	4.14	.778
ElearningPolicy (grand mean)	**371**	**4.00**	**.491**

Table 31 shows that respondents agreed that e-learning policy awareness will help in improving accessibility of digital content (mean = 2.90, standard deviation = 1.051), using e-learning policy will give surety of personal data privacy (mean = 4.33, standard deviation = 0.488), good e-learning policy supports gender equality and learners with disabilities (mean = 4.42, standard deviation = 0.499), e-learning policy would be integrated with ICT policy (mean = 4.21, standard deviation = 0.432), and e-learning policy was referred to important tool when it comes to accessing digital (mean = 4.14, standard deviation = 0.778).

These results indicate that institutions need to give awareness of e-learning policy to improve accessibility to digital content via mobile technology among learners and educators.

Correlation test

According to Frost (2019), a correlation was a change in value where one variable changes affect another variable in a specific direction. The direction can be positive coefficients which indicate that there was a positive relationship between variables and the slope on a scatter plot

runs upward while the negative coefficients indicate that there was a negative relationship between variables and the slope on a scatter plot runs downward (Frost, 2019). The correlation coefficient values run between -1 and +1 where + 1 indicates that there was a strong relationship between variables while -1 indicates there was a negative relationship. The research data provided was collected using the section 3 research questionnaire which was divided according to conceptual framework variables on; Indicate your opinion of the following statements concerning e-learning policy on accessing digital content, and Indicate your opinion of the following statements concerning digital content accessed. The statements' data was transformed by computing statistics per variable as shown in table 24. The variables statistics were used to perform the correlation between the type of mobile technology and accessibility of digital content test as shown in Table 32.

Table 32: Correlation between e-learning policy and accessibility to digital content Source: Research data

		ElearningPolicy	Accessibilityof DigitalContent
ElearningPolicy	Pearson Correlation	1	.781
	Sig. (2-tailed)		.000
	N	371	371
AccessibilityofDigital Content	Pearson Correlation	.781	1
	Sig. (2-tailed)	.000	
	N	371	371

Table 32 shows that there is a strong relationship between e-learning policy and accessibility to digital content at ($r = 0.881$, $p < 0.001$ at $\alpha = 0.05$). This relationship indicates that the null hypothesis was accepted.

4.5.4. Summary

In this section, research data on objective 1 were analyzed depending on the variables: type of mobile technology in accessing digital content, user literacy on the accessibility to the digital content, e-learning policy on digital content. These variables through the findings indicated that for students and educators to access digital content, these variables must be part of very important factors that influence mobile technology in accessing digital content. The mobility of cell phones and laptops made students and eductors to had access to digital content easier without settling in the classroom. The mobility of mobile devices also influenced students and educators to be more literate on how to access digital content. User literacy on accessibility to digital content influenced students and educators to had an interest in knowing e-learning policy on digital content.

4.6. Challenges and extent to which they affect the students and educators to access digital content

In this section, the opinion provided by respondents (students, educators, and ICT staff) on the challenges they encounter when accessing digital content via mobile technology was tested. The information was provided depending on the research objective 2: To identify the challenges and extent to which they affect the students and educators who access digital content at Mount Kenya University via mobile technology. The information was also provided depending on the research question asked using a Likert scale on; which challenges and to what extent do they affect in accessing digital content via mobile technology? Likert scale data were tested using regression analysis and correlation analysis. 5% significance level ($\alpha = 0.05$) was used in these tests.

4.6.1. Internet connectivity

In this section, the respondents' views on the various area of internet connection challenges were analyzed. These challenges affect the accessibility to digital content via mobile technology. The finding was collected by requiring the respondents to respond by indicating whether the various aspects of internet connectivity affect the way of accessing enough digital content as possible. This was done using a research questionnaire on; I have difficulty accessing digital content due to poor internet connectivity, Access to digital content was limited by the cost of internet bundles, Poor network infrastructure affects the continuous flow of the internet, Installed apps/software in my device affects the speed of internet connectivity, and The type of internet connection I use to download digital content was slow and not reliable. The responses were collected in a five points (Likert scale) where 1= strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. The mean and standard deviation were calculated on these five points and the results were displayed as shown in Table 33.

Table 33: Internet connectivity attributes

Source: Research data

	N	Mean	Std. Deviation
Poor internet connectivity	371	3.86	.879
Cost of internet bundles	371	4.26	.750
Poor network Infractructure	371	3.87	.915
Installed apps on my device	371	3.89	.800
Type of connection	371	3.88	.882
InternetConnectivity (grand mean)	**371**	**3.96**	**.615**

Table 33 shows that respondents agreed that poor internet connectivity affects accessibility to digital content via mobile technology (mean = 3.86, standard deviation = 0.879). The cost of

internet bundles was usually too high for respondents to keep on accessing digital content continuously (mean = 4.26, standard deviation = 0.750) both the student and educators agreed that if the cost of internet bundles would low down to affordable price then accessing of digital content would be improved to better. The poor network infrastructure which depends on the providers of the network affects the continuous flow of the internet (mean = 3.87, standard deviation = 0.915) both students and educators agreed that some internet providers had poor services when it came to the internet due to its fluctuation connection while other internet provider services were too expensive to sustain. The installed apps/software in the devices affects the speed of internet connectivity (mean = 3.89, standard deviation = 0.800) because of the mobile device storage space or processer capacity, and the type of internet connection used to download digital content was slow and not reliable (mean = 3.88, standard deviation = 0.882).

These results indicate that internet connectivity was one area that needs to be addressed by institutions to improve the accessibility to digital content via mobile technology. These results also indicated that students and educators had a problem and digital content accessibility would be high once the internet connection issue gets resolved.

Correlation test

According to Frost (2019), a correlation was a change in value where one variable changes affect another variable in a specific direction. The direction can be positive coefficients which indicate that there was a positive relationship between variables and the slope on a scatter plot runs upward while the negative coefficients indicate that there was a negative relationship between variables and the slope on a scatter plot runs downward (Frost, 2019). The correlation coefficient values run between -1 and +1 where + 1 indicates that there was a strong relationship between variables while -1 indicates there was a negative relationship. The research data

provided was collected using the section 3 research questionnaire which was divided according to conceptual framework variables on; Indicate your opinion of the following statements concerning internet connectivity, and Indicate your opinion of the following statements concerning digital content accessed. The statements' data was transformed by computing statistics per variable as shown in table 24. The variables statistics were used to perform the correlation between internet connectivity and accessibility of digital content test as shown in Table 34.

Table 34: Correlation between internet connectivity and accessibility to digital content

Source: Research data

		InternetConnectivity	**AccessibilityofDigitalContent**
InternetConnectivity	Pearson Correlation	1	.787
	Sig. (2-tailed)		.014
	N	371	371
AccessibilityofDigitalContent	Pearson Correlation	.787	1
	Sig. (2-tailed)	.014	
	N	371	371

Table 34 shows that there is a strong relationship between internet connectivity and accessibility to digital content at ($r = 0.787$, $p < 0.014$ at $\alpha = 0.05$). This relationship indicates that the null hypothesis was accepted.

4.6.2. Data caching on digital content

In this section, the respondents' views on data caching experience on improving the accessibility to digital content were collected. Data caching was a technique that speeds up digital content reading. Instead of reading digital content from the source, the digital content

was accessed directly from a mobile technology cache or the proxies. This technique helps in reducing the queuing of requested content, delay of access to the content, reduces the network cost because the digital content would be closer to the students and educators, and also saves bandwidth by increasing system performance. The finding was collected by requiring the respondents to respond to how data caching improves access to digital content through research questionnaire on; Data caching will help to improve the accessibility of digital content, I support the implementation of data caching because it will ease the digital content accessing process, I usually download digital content from the e-learning platform, If the e-learning platform had data caching, digital content can be easily accessed, and If my cell phone had data caching, digital content can be easily accessed. The responses were collected in a five points (Likert scale) where 1= strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. The mean and standard deviation were calculated on these five points and the results were displayed as shown in Table 35.

Table 35:Mean and standard deviation for data caching on digital content Source:

Research data

	N	Mean	Std. Deviation
Data caching will improve access	371	4.33	.488
Data caching will reduce the time taken	371	4.41	.498
Downloading of digital content	371	4.17	.406
data caching will ease accessibility	371	4.12	.799
data caching in my cell phone	371	4.24	.563
DataCaching (grand mean)	**371**	**4.25**	**.422**

Table 35 shows that respondents agreed that data caching will help in improving accessibility of digital content (mean = 4.33, standard deviation = 0.488), data caching once implemented it

will ease the process for accessing digital content (mean = 4.41, standard deviation = 0.498), downloading content from e-learning platform (mean = 4.17, standard deviation = 0.406), elearning had data caching which ease the access digital content (mean = 4.12, standard deviation = 0.799), and data caching technology in the mobile technology will ease the process of accessing digital content (mean = 4.24, standard deviation = 0.563).

These results indicate that data caching technology will help institutions to improve accessibility to digital content via mobile technology among learners and educators. This was an indication that data caching was a very important aspect of improving accessibility to content in the institution.

Correlation test

According to Frost (2019), a correlation was a change in value where one variable changes affect another variable in a specific direction. The direction can be positive coefficients which indicate that there was a positive relationship between variables and the slope on a scatter plot runs upward while the negative coefficients indicate that there was a negative relationship between variables and the slope on a scatter plot runs downward (Frost, 2019). The correlation coefficient values run between -1 and +1 where + 1 indicates that there was a strong relationship between variables while -1 indicates there was a negative relationship. The research data provided was collected using the section 3 research questionnaire which was divided according to conceptual framework variables on; Indicate your opinion of the following statements concerning data caching on digital content, and Indicate your opinion of the following statements concerning digital content accessed. The statements' data was transformed by computing statistics per variable as shown in table 24. The variables statistics were used to

perform the correlation between data caching and accessibility of digital content test as shown in Table 36.

Table 36: Correlation between data caching and accessibility to digital content Source:

Research data

		DataCaching	AccessibilityofDigitalContent
DataCaching	Pearson Correlation	1	.596*
	Sig. (2-tailed)		.000
	N	371	371
AccessibilityofDigital Content	Pearson Correlation	.596*	1
	Sig. (2-tailed)	.000	
	N	371	371

*. The correlation was significant at the 0.05 level (2-tailed).

Table 36 shows that there is a strong relationship between data caching and accessibility to digital content at ($r = 0.596$, $p < 0.001$ at $\alpha = 0.05$). This relationship indicates that the null hypothesis was accepted.

4.6.3. Summary

In this section, research data on objective 2 were analyzed depending on the variables: internet connectivity and data caching on digital content. These variables through the findings indicated that for students and educators to access digital content, these variables made the accessibility of digital content challenging. Students and educators had difficulty accessing

digital content due to poor internet connectivity and access to digital content was limited by the cost of internet bundles. This was the extent to which this internet connectivity challenges affected the students and educators. Data caching was also another challenge that affected both students and educators because according to the findings, mobile technology did not have enough storage for storing digital content.

4.7. The kind of digital content accessed and how was accessed

4.7.1. Digital content accessed

In this section, the respondents' views on digital content accessed via mobile technology were analyzed. The finding was collected by requiring the respondents to respond about which digital content they do access from the institution systems through research questionnaire section 4 on; I do access the assignment using the Mount Kenya University e-learning platform, I do access the reading materials using the Mount Kenya University e-learning platform, I do access and download videos (tutorial) from the Mount Kenya University e-learning platform, I do take part in on-line discussions from the Mount Kenya University e-learning platform, and The digital content I access from Mount Kenya university e-learning platform was rich in ideas. The responses were collected in a five points (Likert scale) where 1= strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. The mean and standard deviation were calculated on these five points and the results were displayed as shown in Table 37.

Table 37: digital content accessed attributes

Source: Research data

	N	Mean	Std. Deviation
Assignment	371	4.34	.490

Reading materials	371	4.43	.495
Videos	371	4.18	.414
On-line discussion	371	4.12	.799
Rich in ideas	371	4.24	.563
AccessibilityofDigitalContent (grand mean)	**371**	**4.26**	**.423**

Table 37 shows that respondents agreed that they do access assignments using institution elearning platform (mean = 4.34, standard deviation = 0.490), they do access the reading materials using institution e-learning platform (mean = 4.34, standard deviation = 0.495), they access and download vidoes using institution e-learning platform (mean = 4.18, standard deviation = 0.414), they take in online discussions using institution e-learning platform (mean = 4.12, standard deviation = 0.799), and digital content accessed from the institution systems were rich in ideas (mean = 4.14, standard deviation = 0.778).

This was an indication that the learners and educators argue to learn more about digital content via mobile technology.

Correlation test

The correlation of accessibility to digital content was strong at ($R_{371} = 1$).

4.7.2. Summary

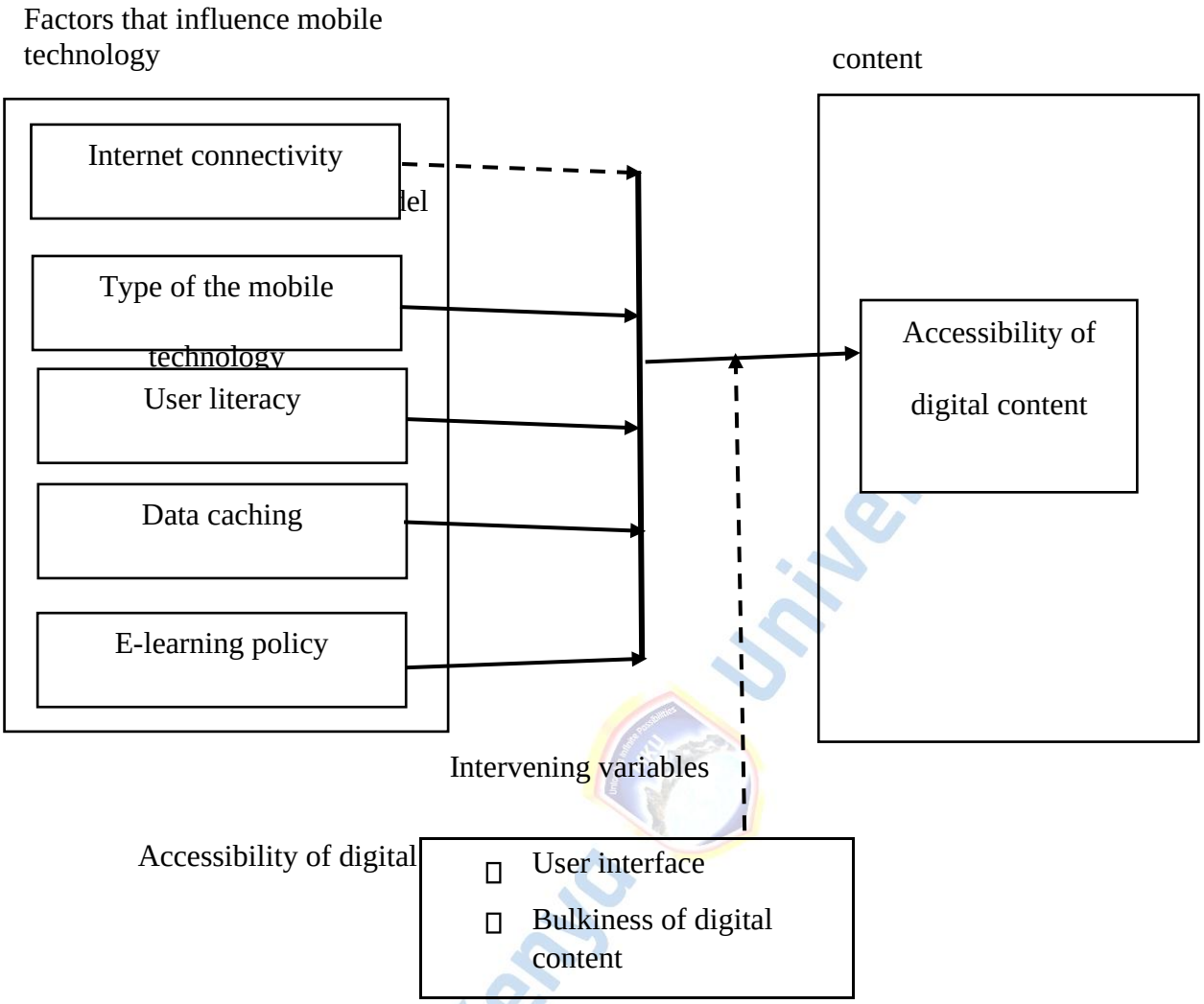
In this chapter, the descriptive and regression analysis were used, and also did the discussion of the findings of this study. Using descriptive analysis, each variable under the Likert scale was discussed and measured using mean and standard deviation. The statistical analysis indicated the extent to which the adoption of variables associated with this study. As for the closed-ended questions, the frequencies and percentages were obtained in this study. The hypotheses were

tested using correlation and regression analysis where hypotheses were confirmed. The interpretations have been made using statistical knowledge and the existing body of the theoretical and empirical literate.

4.8. Conceptual model

Dependent variables

Independent variables



Source: Self

Figure 28 shows the independent variables, dependent variables, and intervening variables of the conceptual model. These variables include the type of mobile technology, user literacy, data caching, and e-learning policy which were positively and directly effective to the accessibility to mobile technology. Due to challenges faced by both students and educators on accessibility digital content using the internet, internet connectivity was eliminated as a variable that directly contributes to accessibility to digital content.

4.9. Model analysis

Table 38: Model Summary

Source: Research data

Model	R	R Square	Adjusted R Square	Std. The error of the Estimate
1	.930[a]	.864	.862	.157

a. Predictors: (Constant), InternetConnectivity, ElearningPolicy, TypeofMobileTechnology, DataCaching, UserLiteracy b. Dependent Variable: AccessibilityofDigitalContent

Table 38 shows that an adjusted R^2 =0.862. This shows that 86.2% of the total variation accessibility can be explained by internet connectivity, e-learning policy, type of mobile technology, data caching, and user literacy. According to IBM (2010), R square was the coefficient of determination. The analysis was done using transformed data from the research

questions under questionnaire per conceptual variables where the accessibility of digital content was constant.

Table 39: ANOVA

Source: Research data

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	57.234	5	11.447	464.377	.000[b]
	Residual	8.997	365	.025		
	Total	66.232	370			

a. Dependent Variable: AccessibilityofDigitalContent

b. Predictors: (Constant), InternetConnectivity, ElearningPolicy, TypeofMobileTechnology, DataCaching, UserLiteracy

Table 39 shows that the model was statistically significant at $\alpha = 0.05$ ($P < 0.001$). This indicates that the regression model predicts the significance of the dependent variable (the regression model was fit for the data). Leung (2011), used ANOVA to analyze the significant relationship between different generations attitudes about new worlds of work. The analysis was done using transformed data from the research questions under questionnaire per conceptual variables where accessibility of digital content was constant the significance of the dependent variable in this research

Table 40: Coefficient

Source: Self

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.254	.094		2.699	.007
	InternetConnectivity	.090	.015	.114	5.814	.000
	TypeofMobileTechnology	.024	.008	.057	2.948	.003
	UserLiteracy	.266	.025	.299	10.707	.000
	DataCaching	.605	.025	.664	24.068	.000
	ElearningPolicy	.033	.009	.075	3.523	.000

a. Dependent Variable: AccessibilityofDigitalContent

$y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + e_i$

y = 0.254 + 0.09 * internet connectivity + 0.024 * typeofmobiletechnology + 0.266 * userliteracy + 0.605 * datacaching + 0.033 * elearningpolicy + 0.157

This model is statistically significant at ($f(5,370) = 464.377$, $p < 0.001$)

Table 40 shows the significance level p-value of the predictors (sig. column) which indicates that internet connectivity ($p < 0.001$, e-learning policy ($p = 0.003$), type of mobile technology ($p < 0.001$), data caching ($p < 0.001$) and user literacy ($p < 0.001$) were statistically significant to the model. The p-value of these predictors was less than 0.05 which rejects the null hypothesis. In the coefficient table, the p-value of each variable tests the null hypothesis where the coefficient = 0. The null hypothesis was rejected when the p-value was low than 0.05 which indicates that the specified predictor had a meaningful addition to your model because changes in the predictor's value were related to changes in the response variable (Ellis, Ogee, and Mark, 2013). The analysis was done using transformed data from the research questions under questionnaire per conceptual variables where the accessibility of digital content was constant in this research. The mobile-based model was developed.

4.10. Mobile-based model

One of the findings from this study was that internet connectivity was a major challenge that affected both educators and learners during their daily learning process via mobile technology in the university. The multicollinearity statistical test that was summarized in Table 25 shows the relationship with other factors affecting the accessibility of digital content via mobile technologies.

From the foregoing, it was noted that to manage the internet connectivity, what was required was a way to manage the bandwidth without the requirement to be persistently connected to the server. To ensure optimum use of the connectivity, caching, and distribution of servers were the strategies used for improving accessibility.

According to (Westberg, 2013), he invented mobile network caching which used Radio based station terminals to cache digital content. The terminals are used to hold and transfer digital content to the areas of request. The transmission of the digital content used to be distributed among different networks which were also limited by the capacity of the requests. This mobile network caching used the cache manager aspect for controlling digital content distribution from the stored called cache domain. In the cache domain, the cache manager received notifications about the user requests. An object distributor was another aspect introduced to distribute user digital content by instructing caches in the network to send digital content to the user using transmission of the network capacity. According to (Westberg, 2013) research, mobile network caching does not solve fully the issue of accessing digital content freely. Westberg research still shows that the user must be in a given network to access the content and if the network had so many requests from the users then there was a delay in sending the requests back to the users. It also shows that when the digital content was not cached in the radio-based station then the

user was having a problem accessing digital content when there was no internet connection within the network.

Based also on ICT policy which promotes e-learning that integrates ICT in learning and training to improve the quality education and access of education of the progressing students, and also to avoid this issue of caching digital content in the radio-based station, the mobile-based model was developed using the objective 3 on; To develop a mobile-based model to mitigate the challenges facing students and educators in accessing digital content via mobile technology. To develop this mobile-based model, this study responded to the research question; How will the mobile-based model be developed? The mobile-based structure was developed based on the main server, sub-servers, WIFI, content caching interface, Ethernet, and mobile devices as shown in figure 29. A flowchart was also created to explain how the digital content was transmitted from the main server to the sub-server and then to the students and educators and from students/ educators to the sub-servers and then to the main server as shown in Figure 26 and 27. Digital content transmission from the main server to sub server, accessibility of digital content from sub servers to students/educators, and vice versa were also demonstrated using Figure 29. To improve the accessibility to digital content via mobile technology, a mobile-based model was developed as shown in Figure 28.

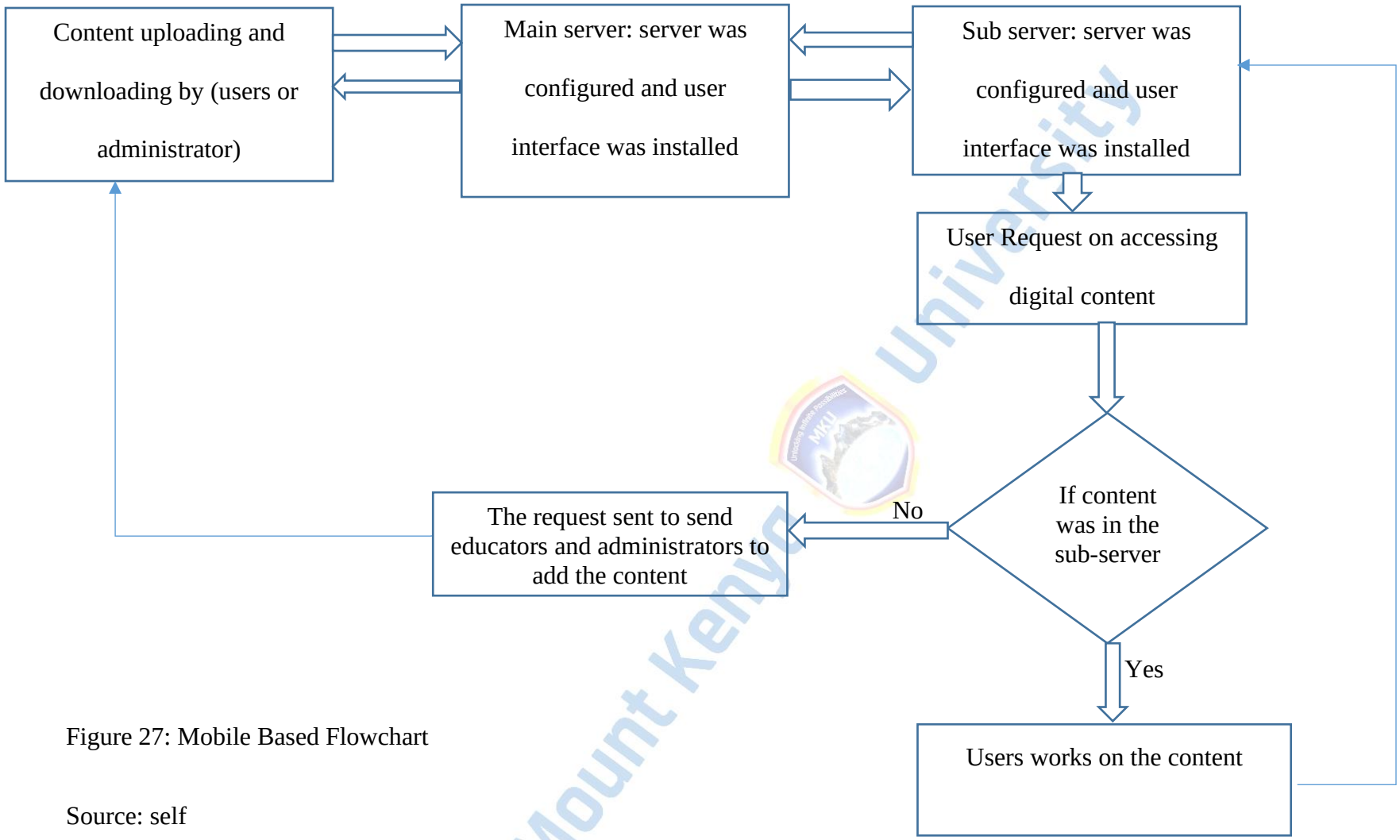


Figure 27: Mobile Based Flowchart

Source: self

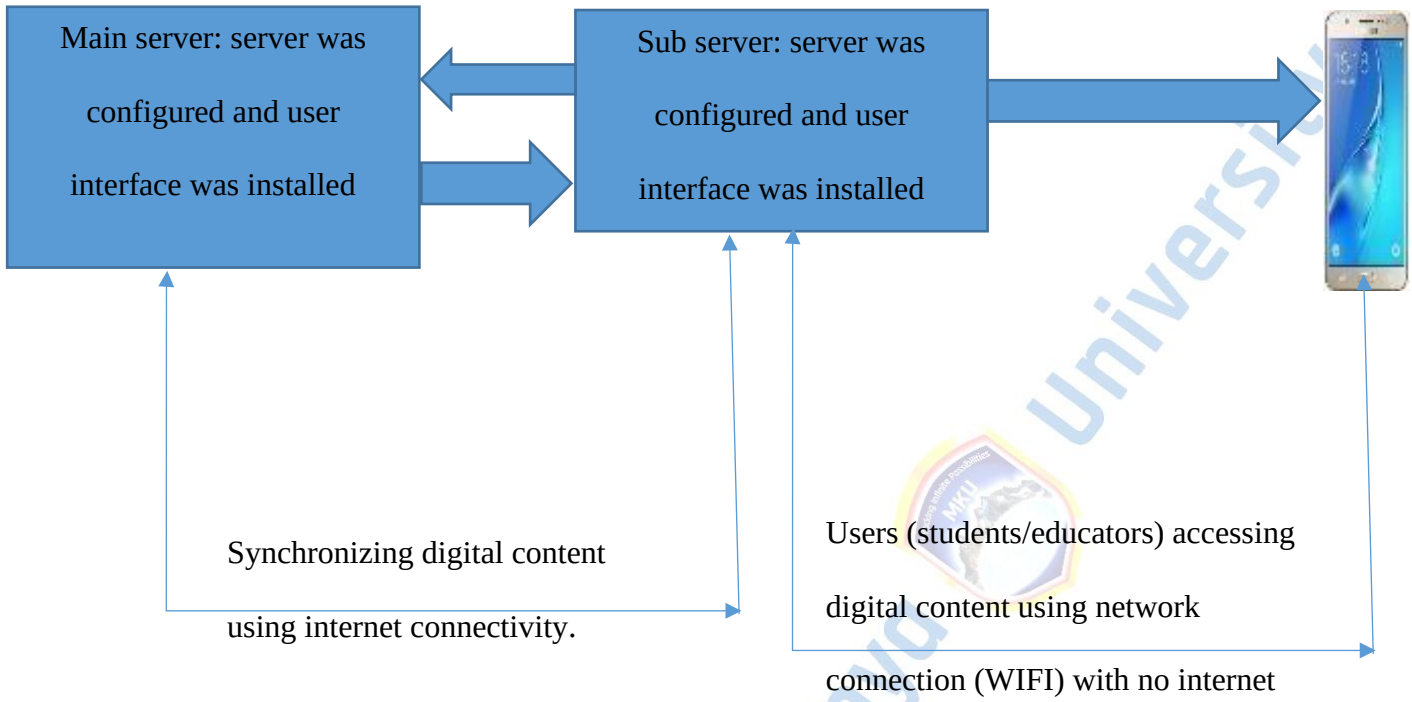
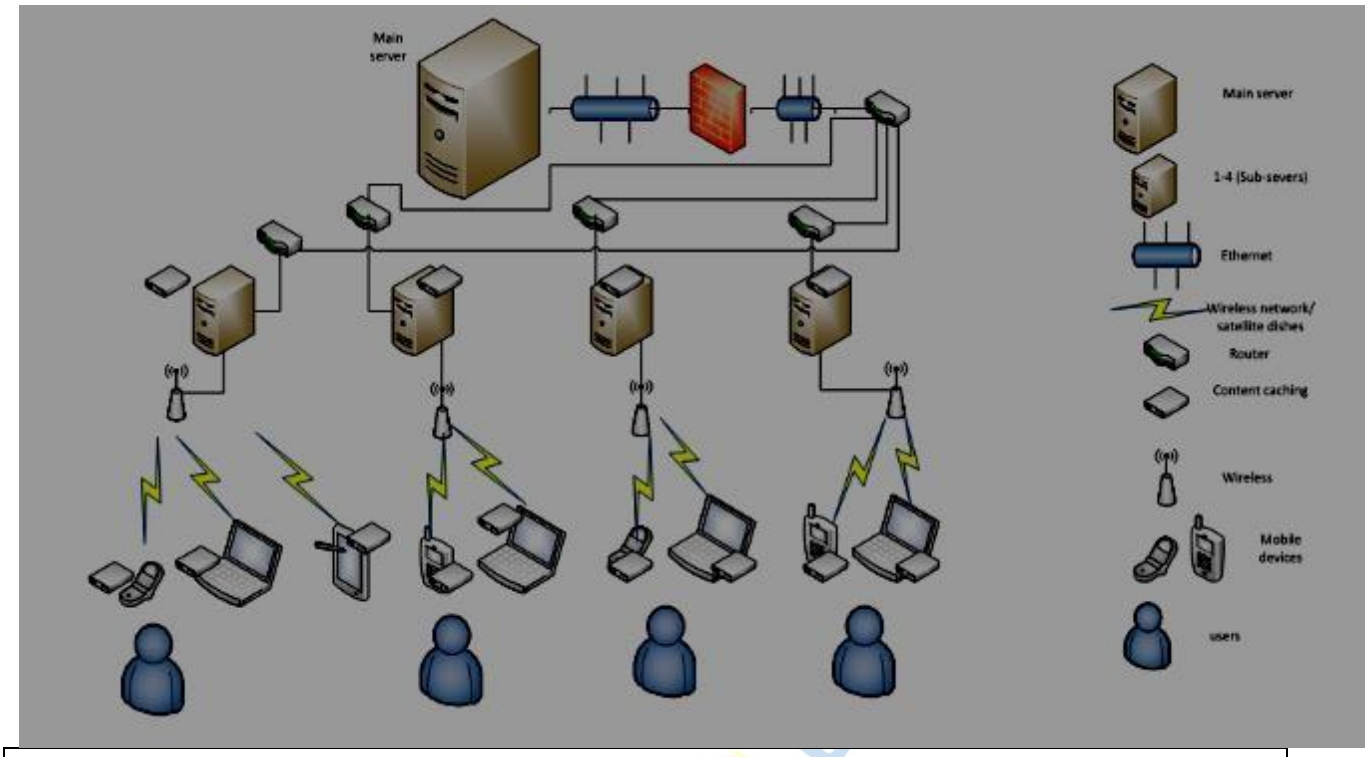


Figure 28: Mobile-based flowchart 2

Source: Self



Key

Figure 29: Mobile-based Structure

Source: Self

To ease the process of both students and educators to access digital content directly from the university main server and also reducing the challenge of internet connection, using the model developed, digital content was cached in sub-servers and mobile technology where sub-servers were located in different towns such as Nakuru, Lodwar, Kisumu, Nairobi, Mombasa, Garissa, and Eldoret. Caching of the content in sub-servers, learners and educators were able to access digital content freely without being connected to the main server. It also helped students and educators in accessing digital content even when these sub-servers were not connected to the internet because what students needed was the sub-server network to access digital content through WIFI. This sub-server connects to the main server for uploading/ updating details that had been submitted by either students or lecturers. Using mobile technology which was highly used according to finding table 11, any digital content requested by the educator or learner was cached in their mobile technology for a given duration. The digital content was also held in the sub-server. This helped them to reduce the challenge of internet connectivity which came in because of connecting to the main server every time they need to access the content. The assignments, tests and quiz, and any other content were tackled offline then later be submitted to the server once the mobile technology or sub-server gets connected to the internet.

This model's development was informed by the principles of the Technology Acceptance Model which indicates Perceived Usefulness and perceived Ease of Use. According to the mobile-based model, perceived usefulness was achieved after introducing sub-servers that serve either with the internet or not. When the sub-server was connected to the internet, students and educators were able to access digital content from any areas of the surrounding and also upload any required content which was a product to them. The sub-server also served those students who used feature phones with less storage capacity or those that did not have enough money to buy a bundle. These sub-servers had a technology that assists students to

access digital content using WIFI when was offline. Some of the cell phones were able to cache digital content for so time which was good and the technology was useful to both the students and educators. Perceive ease of use was achieved after students and educators the technology proved the usability to both students and educators. The students and educators were excited about the technology because it helped them to achieve the goal of accessing digital content at any time and any place. This study used TAM to develop this mobile-based model and also to improve the TAM. The model was developed and validated using an expert questionnaire, prototype, and Business Process Model and Notation (BPMN) rule.

4.11. Validation

After performing data collection and analysis, the mobile-based model was developed as explained in section 5.1. the validation was done to the response on objective 4: To validate the model which was developed in objective 3 and also to the response on a research question on; How was a model improve the accessibility of digital content via mobile technology be validated? The model was validated using statistical measures such as; ANOVA as shown in Table 40 which indicated that the model was fit for this study at a statistical significance of α =0.05 ($P < 0.001$), model summary analysis of the relationship strength was also done as shown in Table 39 which indicated that 86.2% of the total variation explained the variables used in this study, coefficient of research variables for the model was also tested as shown in Table 40 which indicated that internet connectivity ($p < 001$), e-learning policy ($p = 003$), type of mobile technology ($p < 0.001$), data caching ($p < 0.001$) and user literacy ($p < 0.001$) were statistically significant to the model.

The mobile-based structure was also validated using expert questionnaires, Business Process Model and Notation (BPMN) rule, and a prototype as shown below.

4.11.1. Validation using Expert Questionnaire

The model was validated using 15 expert questionnaires that were given to the digital learning user, ICT expert, and educator. The areas validated in this model include; digital content accessibility speed by the users, data caching in the mobile technology, and retrieving and caching of digital content in the sub-servers from different locations. The expert questionnaire was designed as shown in Appendix F below. The experts were selected from two-level of qualification; masters and bachelor holders in the area of information systems. All the experts who were selected for this study were based at Mount Kenya University. The expert questionnaire contained 6 questions in section 2 where the data was collected using a Likert scale where) 1= strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. The questions were analyzed as follows:

Question I: The system in the sub server was capable of retrieving and caching digital content

Table 41: Question 1 results

Source: Research data

Capabilities of digital content caching in the		***f***	**% sub-server system**
Valid	Agree	8	53.3
	Strongly agree	7	46.7
	Total	15	100.0

Question II: The sub-servers system connects to the main server and sends digital content during internet connectivity.

Table 42: Question II results

Source: Research data

Connection of the sub-servers and main server		***f***	%
Valid	Agree	8	53.3
	Strongly agree	7	46.7
	Total	15	100.0

Question III: The system used in mobile technology assists in caching the digital content for the duration of time.

Table 43: Question III results

Source: Research data

The capability of digital content caching in mobile technology using the system		***f***	%
Valid	Agree	3	20.0
	Strongly agree	12	80.0
	Total	15	100.0

Question IV: Data cached was clearable when the mobile technology user needs to clear

Table 44: Question IV results

Source: Research data

Data cached would be clearable from mobile technology	***f***	%
Valid	Agree	4	26.7
	Strongly agree	11	73.3
	Total	15	100.0

Question V: Digital content cached was easy and fast to access

Table 45: Question V results

Source: Research data

Digital content cached was easy and fast to access		*f*	%
Valid	Agree	9	60.0
	Strongly agree	6	40.0
	Total	15	100.0

Question VI: Cached data was sent to the sub-servers whenever mobile technology was connected to the internet

Table 46: Question VI results

Source: Research data

cached data was sent to the main server from sub-server once get connected to the internet		*f*	%
Valid	Agree	8	53.3
	Strongly agree	7	46.7
	Total	15	100.0

The above analysis indicates that the majority of the respondents agreed and strongly agreed with the performance of the mobile-based model and thus it indicated that the mobile-based model was acceptable by the experts.

4.11.2. Validation of the Structure using the Business Process Model and Notation (BPMN) rule

The model was also validated using the Business Process Model and Notation (BPMN) rule as shown in Figure 29.

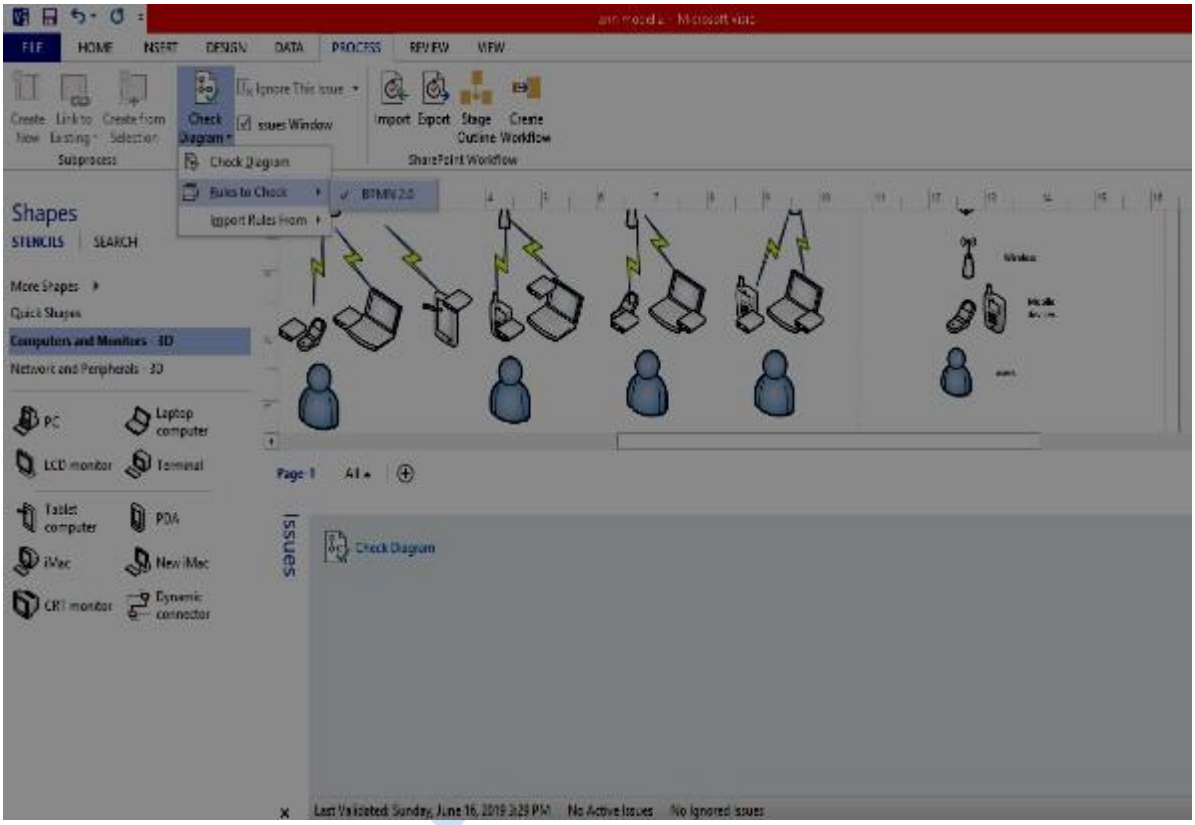


Figure 30: Model validation

Source: Self

The research adopted the Business Process Model and Notation (BPMN), as a standard for business process modeling. The model's main thrust was in managing the process that involves communication between servers and mobile technology-based access. The digital content was being retrieved either from the servers to mobile-based devices for learners and educators to access. The digital content was being cached in the mobile technology for a specified duration.

BPMN provided a graphical notation that helped in communicating the setup structure and procedures in a standard manner.

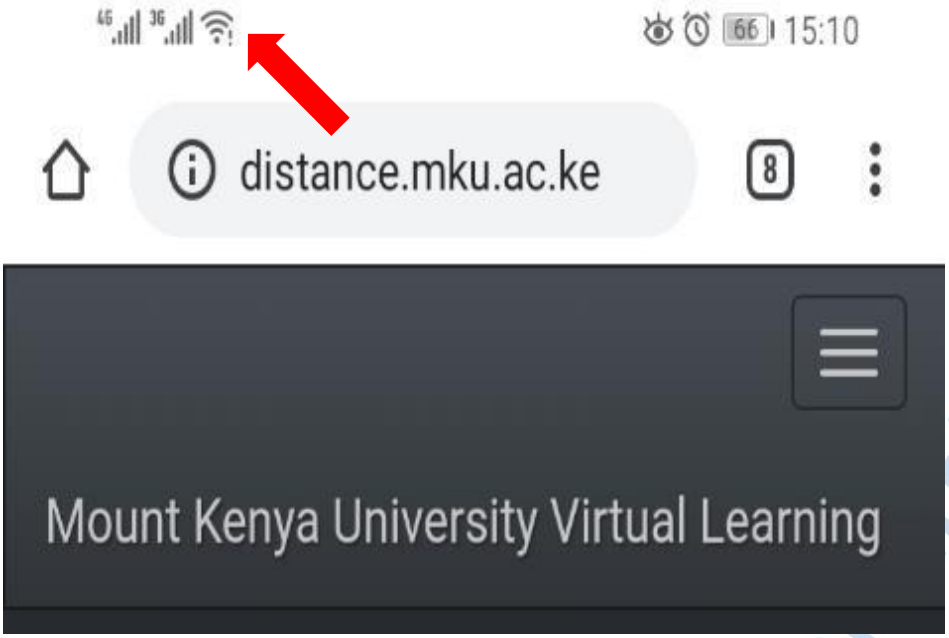
According to Figure 32, model validation was successfully done with no active issues and no ignored issues. This indicated that the mobile-based model was applied to improving the accessibility of digital content via mobile technology.

The model was also validated by implementing the model in the university which worked successfully as showed in this prototype below.

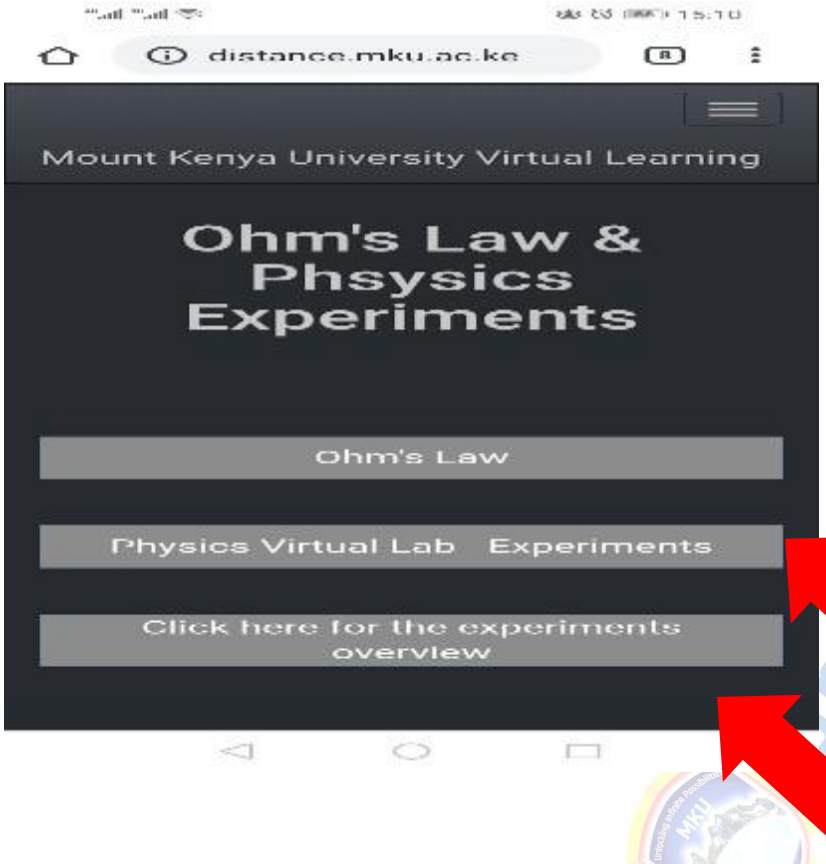
4.11.3. Mobile-based prototype

This was the main server located at the main campus. Students and educators to access this server need an internet connection to access digital content using URL via mobile technology which was a problem to many students and educators because of a lack of an internet connection at their place of stay. For example, students and educators living in areas where there was low access to the internet connection were unable to access digital content. In this study, a sub-server was introduced to cater to this challenge of internet connectivity.

This was the portable sub-server that was located in the different counties for better access to digital content by the students and educators. The sub-server had been configured with the user interface used by the university to access digital content. The user interface was cached in this sub-server and it contains all digital content that students and educators access from the main server direct. The sub-server had two ways, network connection, and internet connection. Students and educators access digital content through network connection via mobile technology then once the sub-server get connected to the internet connection, the digital content uploaded in the user interface gets synchronized to the main server and if there were update done in the main user interface in the main server, it also gets synchronized to the sub server for students/ educators to access. This indicated that students and educators were able to access digital content without connecting to the internet as shown below.



The image shows that the mobile phone was connected to the WIFI but didn't have the internet connection and also it shows that students and educators were able to access the university user interface through URL link distance.mku.ac.ke.



According to this image, students and educators were in the position to access and upload any digital content without the challenge of the internet connection. Any changes that were made on the digital content, there were cached in the sub server inside the user interface which was later synchronized to the main server once the sub server gets connected to the internet. This indicated that students and educators do not need to be in the area that had the internet for them to access digital content. It also indicated that the research to improve the accessibility of digital content via mobile technology was successfully achieved.

4.12. Discussion

In this section, a discussion of the analysis results was presented. It was structured according to each of the study objectives that were set out in chapter 1. The objective of the section was to relate study results to the objectives and summarize the key learning in the study.

4.12.1. Factors that influence mobile technology in accessing digital content

The first objective of the study was to establish the factor that influences mobile technology used by learners and educators to access digital content at Mount Kenya University. This was accomplished by examining the respondents on which type of devices they use to access digital content, and why they used a specified type of mobile technology. The other factor examined was user literacy on the access to digital content via mobile technology and e-learning policy to digital content accessible via mobile technology. The finding indicates that the majority of the respondents used cell phones followed by laptops in accessing digital content. These show that students, educators do not need to assemble in the classroom or cyber café to access digital content. The respondents who used a laptop to access digital content reported that the reasons for using laptops were because a laptop had a larger storage capacity for storing digital content. The respondents who used cell phone indicated that cell phone was mobile, e-learning platform features were easily accessed, easy to use, and digital content was compatible when using a cell phone. This indicates clearly that people have adapted the method of distance learning where they access digital content via mobile technology without assembling it in the classroom. This also indicates that improving the accessibility of digital content via mobile technology was easily adopted. The use of mobile technology had been applied to all levels of age (from 16 years – 46 years and above) and also to gender. The majority of people who use mobile technology to access digital content were male with 65% will female with 35% which indicates that acceptance of mobile technology in society and university at large. This indicates clearly that digital content was an important way of educating students.

This study assumed that the type of mobile technology had direct effects on the accessibility of digital content. The effect of the type of mobile technology used to access learning digital content was statistically significant which indicates that the more people get access to mobile technology the more access to digital content gets improved. Mobile technology had gained

popularity as the major means of technology used to access digital content. Accessing digital content via mobile technology had a high potential of being used by learners and educators because it had given rise to solving learning issues (Neupane, 2012).

The navigation of mobile technology on how to access digital content and the importance of digital content in society helped people to easily adapt to learning. This was proved by respondents on a question on user literacy which indicated respondents knew how to upload and download the content (mean = 4.25), respondents through the level of education (mean = 4.18) understood very well the procedure used to access digital content via mobile technology. The respondents were also well exposed to technology (mean = 4.04) and the IT courses respondents learned helped them very well when operating the mobile technology (mean = 4.24).

The finding also indicates that the majority of the respondents agreed that user literacy would affect the accessibility of digital content if learners and educators were not knowledgeable enough on how to operate mobile technology when access digital content. Respondents' overall agreement on user literacy was at a grand mean of 4.24 which indicates that user literacy was also an aspect that can be used to improve the accessibility to digital content. The user literacy scores on accessibility digital content were exposed to a correlation test and the results generated a moderate and positive relationship between user literacy and accessibility digital content that was statistically significant. The assumption that there was a relationship between user literacy and access to digital content was then approved. The results were aligned with existing literature where user literacy was an aspect which can help in improving the quality education learned by learners and educator from institutions systems and also other libraries systems via mobile technology. User literacy had barriers to developing countries from growing in terms of accessing digital content due to low level of reading ability or mobile technology technical skills which prevents learners from engaging with digital content (UNICEF, 2017)

This study assumed that user literacy had direct effects on the accessibility of digital content. The effect of the User literacy used to access digital content was statistically significant which indicates that as the more people got educated and became literate on the operation the mobile technology, the importance of digital content, and also how to access digital content via mobile technology, the more access to digital content gets improved and the more people will be enrolled for learning.

The e-learning policy on accessing digital content via mobile technology was also a very important factor according to the findings. E-learning policy awareness of mobile technology users was proved to be an essential factor in improving the accessibility of digital content (mean = 2.90). The response showed that the institution would educate students and educators on the use of mobile technology in accessing digital content. When the students and educators use mobile technology, they would know the personal data privacy according to the e-learning policy procedure which was put or would be put in place by the institution (mean =4.33). A good e-learning policy would accommodate gender equality and students and educators with disabilities (mean = 4.42) on the issue of accessing digital content via mobile technology which would be integrated with the ICT policy on how to use mobile technology (mean = 4.21). The UNESCO policy was developed to guide students, educators, and even parents on mobile learning. The UNESCO policy considered, first develop or update mobile learning policies related, second training and support educators to operate mobile learning to advance learning, third improve educational content that was usable via mobile devices, fourth education promotion would ensure equitability of gender to students, and fifth to improve internet connectivity to ensure equity among students and educators and sixth to improve content learning via mobile technology (UNESCO, 2013)

This study assumed that the e-learning policy had direct effects on the accessibility of digital content. The effect of the e-learning policy on access to digital content was statistically significant which indicates that as more students and educates got or would be oriented on concerning e-learning policy mostly on the procedure of accessing digital content via mobile technology and this would give students and educators assuredly that accessing digital content via mobile technology will improve their learning knowledge and also the privacy of their data and more people will be enrolled for learning.

4.12.2. Challenges and their effects on the learners

The second objective of this study was to identify challenges and the extent to which they affect the learners who access digital content via mobile technology. This was achieved by examining the challenges experienced by respondents when using the internet connection to access digital content, how user literacy had affected accessibility to digital content via mobile technology, and how lack of data caching in their mobile technology, and how the type of device used affected the accessibility to digital content via mobile technology.

The finding indicates that the majority of the respondents agreed that internet connection was a challenge to them. This challenge involved general poor internet connectivity, internet bundles cost limitation, poor infrastructure which affects the continuous flow of the internet, and the type of internet connection used as indicated in table 26. Respondents' overall agreement on internet connectivity was at the grand mean of 3.96 which indicates that issues on the internet connectivity needed to be addressed in a way that would improve the accessibility to digital content. The internet connectivity scores on accessibility to digital content were exposed to a correlation test and the results generated a moderate and positive relationship between internet connectivity and accessibility digital content that was statistically significant. The assumption that there was a relationship between internet connectivity and access to digital content was

then proven. The results were aligned with existing literature where internet connectivity was the main challenge in accessing quality education from institutions' systems and also other library systems whenever the learner was learning digital content via mobile technology (Zuhyle, Mirandilla, 2015). Most of the rural areas, some of the metropolitan areas, and low-density areas have a problem with internet connection because of low, expensive, and poor broadband services from the providers (Zuhyle, Mirandilla, 2015).

To resolved the challenge of internet connectivity, data caching was introduced which was confirmed through the finding that was another challenge. The data caching factor was used to cache digital content in the user interface. The respondents agreed that there was a need to introduce data caching in mobile technology to improve accessibility to digital content (mean = 4.33)and also it would reduce the time taken through a network connection to the main servers.

Based on the findings from these two objectives, this research went further to develop and validate a model (objectives three and four).

4.12.3. Contribution to the Davis model (1989)

In this study, the Technology Acceptance Model (TAM) was adopted as the point of departure and was contextualized further as shown in Figure 30 and Figure 31 based on this study's variables under investigation.

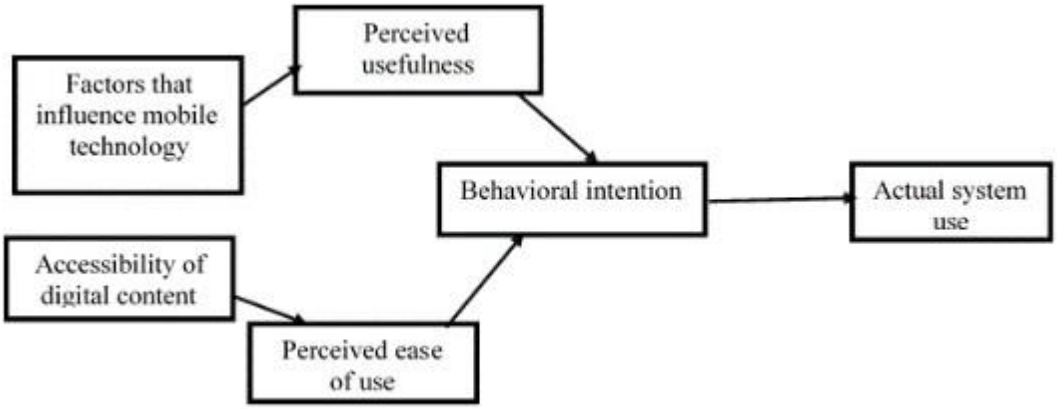


Figure 31: mobile technology & accessibility of digital content model based on the Davis model (modified by Self)

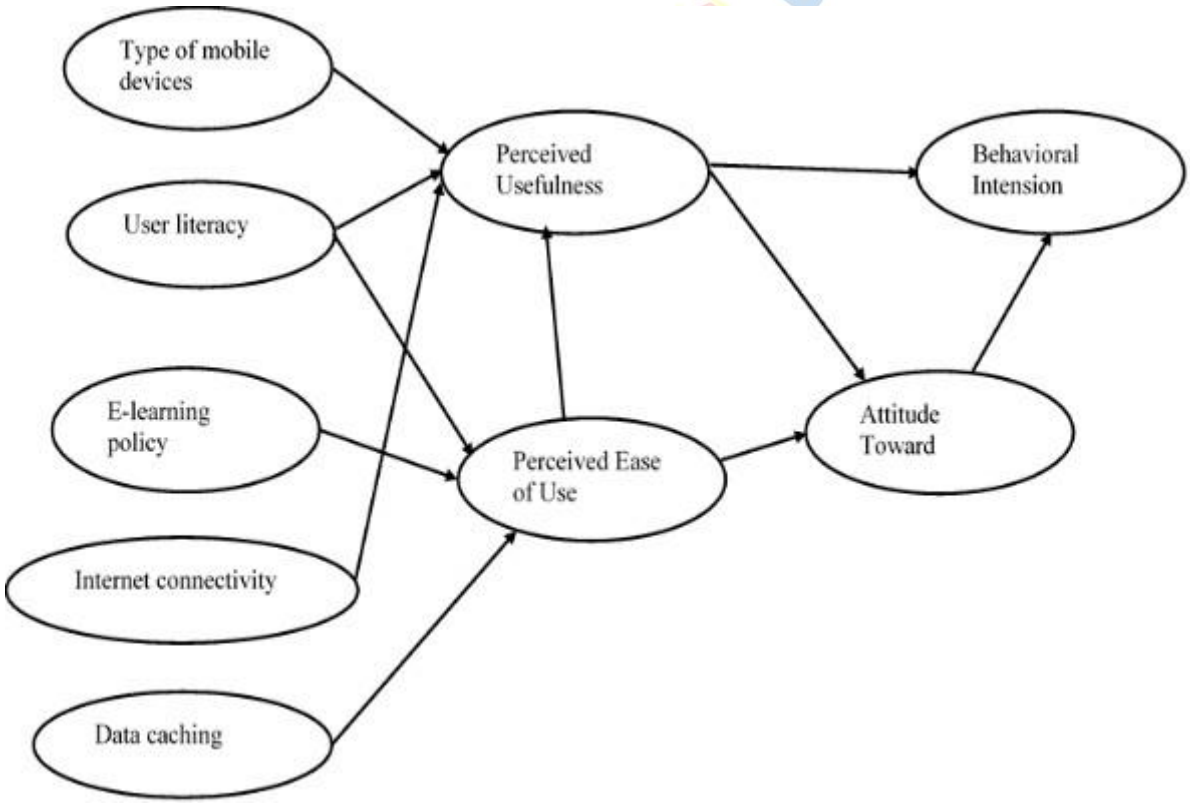


Figure 32: Theoretical model incorporating the study objectives based on Davis (1989) (Modified by Self)

Despite the improvement in the TAM like UTAUT, TAM was used in this study because it was related to the research done. The TAM was extended in this study by contextualizing it to the factors that influence mobile technology acceptance and accessibility of digital content as shown in Figure 30.

Perceived usefulness was modified using factors that influence mobile technology. This is similar to the work of Ngo and Gwangyong (2014) that extended TAM's, perceived usefulness was adding quality of service and system commitment directly while factors related to perceived mobility, students, and perceived social interaction indirectly. Factors that influence mobile technology in this study were very important in extending the TAM construct (Perceive usefulness). Mobility, better features, and the size of mobile devices were established in this study to be the key indicators that made mobile technology be used by students and educators to access digital content without assembling in the classroom. Students and educators were able to afford smartphones, tablets, and laptops for learning purposes.

The issue of internet connectivity was another factor that influences mobile technology's perceived usefulness. Using internet connectivity to access digital content via mobile technology was a challenge because the internet was not sustained which was established to be improved by introducing sub servers and data caching. Students and educators were able to access digital content from sub servers or cached data without necessarily connecting to the internet. Students and educators were able to download digital content, access university systems, and also submit assignments while educators were able to mark the assignment and upload digital content in the university systems.

User literacy on ICT was also a factor that influences mobile technology on modifying perceived usefulness which was established to be useful to both students and educators due to

the process of accessing digital content via mobile technology. Enhancing students' and educators' user literacy on ICT was established to improve navigation of mobile technology and also to be familiar with the university system and to achieve this the university did training to students and educators. Perceive usefulness indicates that students and educators believed that the new model would assist to improve their performance or efficiency.

For better accessibility of digital content, data caching was predicted to perceive ease to use. Mobile technology that was accepted by the students and educators helped in caching the data to improve digital content access. The use of data caching was established in this study to be improved by modifying digital content bulkiness to assist students and educators access more digital content without connecting to the internet. For better accessibility of digital content, students and educators need to be supported to embrace the use of mobile technology, improve internet connectivity, learn and understand e-learning policy, and user ICT literacy level require adequate attention as shown in Figure 30 and Figure 31 above.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1. Introduction

In this chapter, the research summary, conclusions, and recommendations were presented according to the findings in chapter 4.

5.2. Summary of the result findings

This section summarized the findings of the study on the type of digital content accessed via mobile technology and internet connectivity challenges faced by learners when accessing digital content.

5.2.1. Type of Digital content

Findings on digital content indicate that there were several types of content accessed by learners and educators using the e-learning system that had been install by the University for learning.

This content include reading materials, video, assignments, discussions, and tests & quiz. The finding indicates that the majority of learners and educators were unable to access discussion platforms, video, audio, and test & quiz as there were required every week of the academic semester because of poor internet connection. finding done on the supportive staff indicate that the majority of the learners and educators did not perform online discussion, doing videos, and performing tests and quiz. They also indicated that the majority of learners had difficulty in access assignments and submitting those assignments.

According to the finding majority of the learners and educators uses mobile devices such as smartphone, Android phones, laptops, and tablets to access digital contents. The majority of learners who left in rural areas such as Garrison, Isiolo, Turkana, and many other places have difficulty in access those digital content as indicated in the findings. Findings on type of digital content indicate that the learner confirmed that reading materials were brief but no practical exercises and some were not up to date. If digital content accessibility was improved, it was very easy to use mobile technology in learning online because LMS features were well structured.

5.2.2. Internet connectivity challenges

Findings on internet connectivity challenges indicate that the majority of learners and educators in most of the rural areas cannot access the internet frequently because of the geographical features and cost of buying bundles in the country Kenya, respondents had issues of access the internet. In urban areas, most of the learners had internet while very few of them were disadvantaged on the internet accessibility. Geographical features include; mountains, deserts, and valleys. For example, in desert areas, most of the internet signals were weak according to finding corrected from learners who Resident County was from those areas of countryside. The

strength of signals in those areas depends on a specific location. Most of the learners such as DIBEL indicated that internet signals were always weak.

Other findings on internet connectivity challenges indicate that submission of assignments and access to digital content without internet services was impossible according to the mean of 100%. This was a big challenge to the learners and educators in all areas. They were challenging that access on digital content to be improved to access content anytime and anywhere without waiting for internet connectivity to access again mostly on setting up assignments and posting answers.

Also, internet connectivity was the key issue to the learners and educators in accessing digital content because the mean of 100% shows indicate that internet connectivity was the mean factor of both DIBEL and distance learning in MKU. This was also supported by ICT staff who do support e-learning systems in the University.

5.3. Conclusion

Most of the learners have good mobile devices such as smartphones, laptops, and tablets that have good features to access and learn more content which was produced to their education but used only materials taken during a tutorial session on holidays and also downloaded materials. Although mobile devices were preferred devices for M-learning in the university, the majority of those interviewed and those who responded to the questionnaire indicated that written materials and downloaded were easily accessed content depending on the situation. Most of the learners did not access digital content directly from the system provided by the university such as performing discussions online, accessing assignments uploaded by educators, and also attending tests and quiz.

Most learners and educators experienced their disappointment with internet connectivity in the areas. They indicated that unless someone had access to internet connectivity which sometimes had difficulty achieving because of geographical features that affect the internet signals then access to digital content comfortably becomes a challenge to them. Most learners and educators confirmed that the use of mobile technology was at the advanced level where it would assist in accessing digital content at any time or any place.

These findings point out that mobile technology was in a high position to assist in improving the accessibility of digital content through m-learning but was not fully utilized because of internet connectivity challenges. Davis's (1989) TAM theory shows that acceptance of digital content learning needs to be improved by data caching prediction in mobile technology which was to tackle the issue of poor internet connectivity. It indicates that connecting of data source through learning, sharing of ideas, and the ability to connect in concept, were to help in knowledge improving to both learners and educators.

5.4. Recommendations

The following recommendations have been derived from research finding to improve the accessibility of digital content via mobile technology:

1. This study recommends Mount Kenya University management board and other higher education learning institutions together with researchers and policymakers would develop a mobile-based caching system. The system would be deployed in mobile technology for the caching of content. The system would assist in caching content in mobile devices as long as learners and educators were working on it. For example, the learner would able to submit assignments whether on the internet or not. They would also develop a content caching policy and also e-learning policy that will govern

operations of digital learning using mobile technology. The policy would indicate how long will content be cached in mobile technology which would be integrated with the caching system.

2. Other colleges and private/public universities who have the same challenge of digital content the accessibility would do more research on a mobile-based caching system to come up with a more global picture on how to improve the accessibility of digital content.

3. After the development of the system, Mount Kenya University management board and any other higher education learning institution would invest in sub-servers. Learners and educators would access easily the cached content in these sub-servers without accessing the main server (centralized server). This would help when there was no internet connectivity in the main server.

4. The scientific and knowledge enlarged from this research would be deliberated by policymakers when putting down procedures for learners and educators' support systems in e-learning education programs in Kenya universities and Globally.

5.5. Suggestions for further research in this field of study

The following were further study recommended in this study:

1. A researcher can investigate the challenges faced in implementing the mobile-based model developed in this research.

2. The researcher also suggested an investigation of the bulky digital content that was accessed by learners and educators and how to reduce digital content bulkiness.

3. The researcher also suggested an investigation on why reading materials in the form of video and audio can be accessed and how to improve on those reading materials.

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APPENDICES

Appendix A: CONSENT FORM

The Chairman,

MKU IREC,

P.O. Box 342-01000,

Thika.

Consent form

School: School of Computing and Informatics

Research Thesis Title: Improving the accessibility of digital content via mobile technology in a chartered private university: A case study of Mount Kenya University

Name of Researcher: Ann Wanjiku Githinji

Reg. No; MIT/49507/2016

The purpose of the research study was to partially fulfillment of the requirements for the award of the degree of Master of Science in Information Technology of Mount Kenya University.

The objective of this study was to improve the accessibility of digital content accessed by both students and educators in private universities using mobile technology.

Name of Participant: ……...

1. I understand well the purpose and objective of this research as stated above.
2. I understand that my participation in this research was only based on the purpose and objective stated above.
3.
4. I understand that I as participate, I am free to withdraw at any time without giving any reason or any other document.

5. The data collected from any participant was only be used according to the research objective.
6. I understand that the interview process was verbal and no video recording.
7. After I sign and return this consent form, the researcher will retain it.

Participant Signature: ……. Date: ……..

Appendix B: QUESTIONNAIRE FOR STUDENTS AND EDUCATORS

The objective of this study was to improve the accessibility of digital content accessed by both students and educators in private universities using mobile technology.

The purpose of this questionnaire was to collect data on improving the accessibility of digital content. Data collected will be used as the only purpose of the study. Participation was voluntary and confidentiality will be observed.

SECTION I: Demographic characteristics

1. **Gender : Male [ ] Female [ ]**
2. **Age : 16-25 [ ], 26-35 [ ], 37-45 [ ], 46 and above [ ]**

3. **County……..**

SECTION II

4. **a. were you currently studying? Yes [ ]**

No [ ]

b. If yes indicate the level of education

Level of education	**Tick where appropriate (√)**
Certificate	
Diploma	
Bachelors	
Masters	
PhD	

c. If No, which was your current status

Status	**Tick where appropriate (√)**
Lecturer	
Alumni	
ICT staff	

d. Indicate your mode of study if you were a student.

Mode of study	Tick where appropriate (√)
Regular / Day	
DIBEL/ SchoolBased	
Weekend	
Distance learning / Virtual	

5. **How long have you been using E-learning in your case?**

years	Tick (√) where appropriate
1-2	
3-4	
5-6	
7-8	
Above 8	

6. **Which type of devices have you been using?**

	Tick (√) where appropriate
Mobile phone	
Laptop	
desktop	
Tablets	

7. **If you use the mobile phone, indicate the type of cell phone**

	Tick where appropriate (√)
smartphone	
Feature phone	

8. **Indicate the type of internet connection you use to access digital content?**

	Tick where appropriate (√)
Fiber optic	
Modem	
Wifi	
Local area network	
Satellite	
cellular	

SECTION III: Internet connectivity and accessibility of digital content

Indicate your opinion of the following statement concerning internet connectivity and accessibility of digital content

SerialNo	Variable	Strongly agree	agree	Neutral	disagree	Strongly disagree
A	**Internet connectivity**					
I	I have difficulty accessing digital content due to poor internet connectivity.					
II	Access to digital content was limited by the cost of internet bundles.					
III	Poor network infrastructure affects the continuous flow of the internet.					
IV	Installed apps/software in my device affects the speed of internet connectivity.					
V	The type of internet connection I use to download digital content was slow and not reliable.					
B	**Type of mobile technology use in accessing digital content**					
I	The mobility of a cell phone makes access to digital content easier.					
II	The laptop had a larger digital content storage capacity.					

III	Mount Kenya University e-learning platform features were easily accessible when using a cell phone or tablet					
IV	It was easy to use and access digital content using a cell phone or laptop or tablet					
V	Digital content format was compatible when using a cell phone.					
C	**User literacy on the accessibility of digital content**					
I	Uploading and downloading of digital content to the e-learning platform was easy.					
II	My level of education helps in understanding the procedure and correct digital content to access.					
III	My level of education enables me to easily access digital content.					
IV	My exposure to technology enables in accessing digital content					
V	The I.T. courses learned have enables me to easily access digital content.					
D	**Data caching on digital content** **Data caching was a technique that speeds up digital content reading. Instead of reading digital content from the source, the digital content was accessed directly from a mobile technology cache. This technique helps in reducing the queuing of requested content and delay of access to the content and also saves bandwidth by increasing system performance.**					

I	Data caching will help to improve the accessibility of digital content.					
II	I support the implementation of data caching because it will ease the digital content accessing process.					
III	I usually download digital content from the elearning platform.					
IV	If the e-learning platform had data caching, digital content can be easily accessed.					
V	If my cell phone had data caching, digital content can be easily accessed.					
E	**E-learning policy on the accessibility of digital content**					
I	I am aware of university e-learning policy which involves the accessibility of digital content via mobile technology.					
II	I believe that the elearning policy gives					
	surety of personal data privacy.					
III	A good e-learning policy would supports gender equality and learners with disabilities.					
IV	A good e-learning policy would be integrated with ICT policy.					

V	E-learning policy was an important tool when it comes to accessing digital content via smartphone.					

SECTION IV

SerialNo	Variable	Strongly agree	agree	Neutral	disagree	Strongly disagree
F	**Digital content accessed**					
I	I do access the assignment using the Mount Kenya University e-learning platform.					
II	I do access the reading materials using the Mount Kenya University e-learning platform.					
III	I do access and download videos (tutorial) from the Mount Kenya University elearning platform.					
IV	I do take part in on-line discussions from the Mount Kenya University e-learning platform.					
V	The digital content I access from Mount Kenya university elearning platform was rich in ideas.					

Appendix C: QUESTIONNAIRE FOR STUDENTS AND EDUCATORS

The objective of this study was to improve the accessibility of digital content accessed by both students and educators in private universities using mobile technology.

The purpose of this interview was to collect data on improving the accessibility of digital content. Data collected will be used as the only purpose of the study. Participation was voluntary and confidentiality will be observed.

SECTION I: Demographic characteristics

9. **Gender : Male [ ] Female [ ]**

10. **Age : 16-25 [ ], 26-35 [ ], 37-45 [ ], 46 and above [ ]**

11. **County……..**

SECTION II

12. **a. were you currently studying? Yes [ ]**

No [ ]

b. If yes indicate the level of education

Level of education	**Tick where appropriate (√)**
Certificate	
Diploma	
Bachelors	
Masters	
PhD	

e. If No, which was your current status

Status	**Tick where appropriate (√)**
Lecturer	
Alumni	
ICT staff	

f. Indicate your mode of study if you were a student.

Mode of study	Tick where appropriate (√)
Regular / Day	

DIBEL/ SchoolBased	
Weekend	
Distance learning / Virtual	

13. How long have you been using E-learning in your case?

years	Tick (√) where appropriate
1-2	
3-4	
5-6	
7-8	
Above 8	

14. Which type of devices have you been using?

	Tick (√) where appropriate
Mobile phone	
Laptop	
desktop	
Tablets	

15. If you use the mobile phone, indicate the type of cell phone

	Tick where appropriate (√)
smartphone	
Feature phone	

16. Indicate the type of internet connection you use to access digital content?

	Tick where appropriate (√)
Fiber optic	

Modem	
Wifi	
Local area network	
Satellite	
cellular	

SECTION III: Internet connectivity and accessibility of digital content

Indicate your opinion of the following statement concerning internet connectivity and accessibility of digital content

SerialNo	Variable	Strongly agree	agree	Neutral	disagree	Strongly disagree
A	**Internet connectivity**					
I	I have difficulty accessing digital content due to poor internet connectivity.					
II	Access to digital content was limited by the cost of internet bundles.					
III	Poor network infrastructure affects the continuous flow of the internet.					
IV	Installed apps/software in my device affects the speed of internet connectivity.					
V	The type of internet connection I use to download digital content was slow and not reliable.					

B	**Type of mobile technology use in accessing digital content**					
I	The mobility of a cell phone makes access to digital content easier.					
II	The laptop had a larger digital content storage capacity.					
III	Mount Kenya University e-learning platform features were easily accessible when using a cell phone or tablet					
IV	It was easy to use and access digital content using a cell phone or laptop or tablet					
V	Digital content format was compatible when using a cell phone.					
C	**User literacy on the accessibility of digital content**					
I	Uploading and downloading of digital content to the e-learning platform was easy.					
II	My level of education helps in understanding the procedure and correct digital content to access.					
III	My level of education enables me to easily access digital content.					
IV	My exposure to technology enables in accessing digital content					

V	The I.T. courses learned have enables me to easily access digital content.					
D	**Data caching on digital content** **Data caching was a technique that speeds up digital content reading. Instead of reading digital content from the source, the digital content was accessed directly from a mobile technology cache. This technique helps in reducing the queuing of requested content and delay of access to the content and also saves bandwidth by increasing system performance.**					
I	Data caching will help to improve the accessibility of digital content.					
II	I support the implementation of data caching because it will ease the digital content accessing process.					
III	I usually download digital content from the elearning platform.					
IV	If the e-learning platform had data caching, digital content can be easily accessed.					
V	If my cell phone had data caching, digital content can be easily accessed.					
E	**E-learning policy on the accessibility of digital content**					
I	I am aware of university e-learning policy which involves the accessibility					
	of digital content via mobile technology.					
II	I believe that the elearning policy gives surety of personal data privacy.					

III	A good e-learning policy would supports gender equality and learners with disabilities.					
IV	A good e-learning policy would be integrated with ICT policy.					
V	E-learning policy was an important tool when it comes to accessing digital content via smartphone.					

SECTION IV

SerialNo	Variable	Strongly agree	agree	Neutral	disagree	Strongly disagree
F	**Digital content accessed**					
I	I do access the assignment using the Mount Kenya University e-learning platform.					
II	I do access the reading materials using the Mount Kenya University e-learning platform.					
III	I do access and download videos (tutorial) from the Mount Kenya University elearning platform.					
IV	I do take part in on-line discussions from the Mount Kenya University e-learning platform.					

V	The digital content I access from Mount Kenya university elearning platform was rich in ideas.					

Appendix D: EXPERT QUESTIONNAIRE

The objective of this study was to improve the accessibility of digital content accessed by both students and educators in private universities using mobile technology.

The purpose of this expert questionnaire was to validate the performance of the model on improving the accessibility of digital content. Participation was voluntary and confidentiality will be observed.

SECTION I: Demographic characteristics

1. **Gender : Male [ ] Female [ ]**
2. **Respondent Number _____**
3. **Level of qualification; Bachelors [ ]**

   Masters [ ]
4. **Job Position _____**
5. **Years of experience _____**

SECTION II: Model performance

SerialNo	Variable	Strongly agree	agree	Neutral	disagree	Strongly disagree
I	The system in the sub server was capable of retrieving and caching digital content.					
II	The sub-servers system connects to the main server and sends digital content during internet connectivity.					

III	The system used in mobile technology assists in caching the digital content for the duration of time.					
IV	Data cached was clearable when the mobile technology user needs to clear.					
V	Digital content cached was easy and fast to access					
VI	Cached data was sent to the main server whenever sub-server was connected to the internet					

Appendix E: MKU CERTIFICATE OF ETHICAL CLEARANCE

Mount Kenya University

MARCH 19, 2019

Ref. No. MKU/ERC/1159

CERTIFICATE OF ETHICAL CLEARANCE

This is to certify that the proposal titled **"IMPROVING ACCESSIBILITY OF DIGITAL CONTENT VIA MOBILE TECHNOLOGY IN A CHARTERED PRIVATE UNIVERSITY: A CASE STUDY OF MOUNT KENYA UNIVERSITY"** whose Principal Investigator is Ann Githinji (MIT/4950/2016) has been reviewed by Mount Kenya University Ethics Review Committee (ERC), and found to adequately address all ethical concerns.

Dr Francis W. Makokha
Secretary, Mount Kenya University ERC

Sign: _____ **Date:** 13.03.2019

Prof. Francis W. Muregi
Chairman, Mount Kenya University ERC

Sign: _____ **Date:** 20.03.2019

The Chairman
Mount Kenya University
Ethics Review Committee

Main Campus, General Kago Road, P.O. Box 342-01000 Thika. Tel: +254 67 2820 000,
Cell: +254 720 790 796, 0709 153 000
Email:info@mku.ac.ke, Web: www.mku.ac.ke
Chartered and ISO 9001 : 2008 Certified Institution.
Unlocking Infinite Possibilities

Appendix F: SCHOOL OF POSTGRADUATE LETTER

Mount Kenya University

SCHOOL OF POSTGRADUATE STUDIES

MIT/49507/2016

1st April, 2019

The Director, Research Coordination Division
National Commission for Science, Technology & Innovation
Utalii House, 8th & 9th Floor
P.O Box 30623- 00100
NAIROBI

Dear Sir/Madam,

RE: ANN GITHINJI – REGISTRATION NO. MIT/49507/2016

The purpose of this letter is to introduce the above named student who is pursuing **Master of Science in Information Technology** in the **Department of Information Technology** in the **School of Computing and Informatics.**

The title of her research is ***"Improving Accessibility of Digital Content via Mobile Technology in a Chartered Private University: A Case Study of Mount Kenya University."***

She has been cleared by the University's Ethics Review Committee (Certificate attached) and now has to proceed to the field to collect data for her research between **April and June, 2019.**

Any assistance accorded to her will be highly appreciated.

Thank you.

Mount Kenya University
Dean, School of Postgraduate Studies
P. O. Box 342 - 01000
Thika

Dr. Samuel M. Karenga, Ph.D
Dean, School of Postgraduate Studies
Enc.

Appendix G: NACOSTI RESEARCH CLEARANCE PERMIT

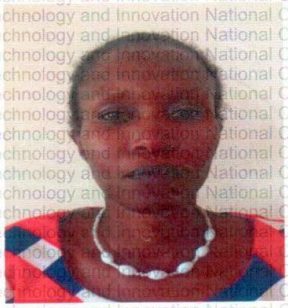
THIS IS TO CERTIFY THAT:
MISS. ANN WANJIKU GITHINJI
of MOUNT KENYA UNIVERSITY, 342-1000
Thika,has been permitted to conduct
research in*All Counties County*

on the topic: *IMPROVING ACCESSIBILITY OF DIGITAL CONTENT VIA MOBILE TECHNOLOGY IN A CHARTERED PRIVATE UNIVERSITY: A CASE STUDY OF MOUNT KENYA UNIVERSITY*

for the period ending:
25th April,2020

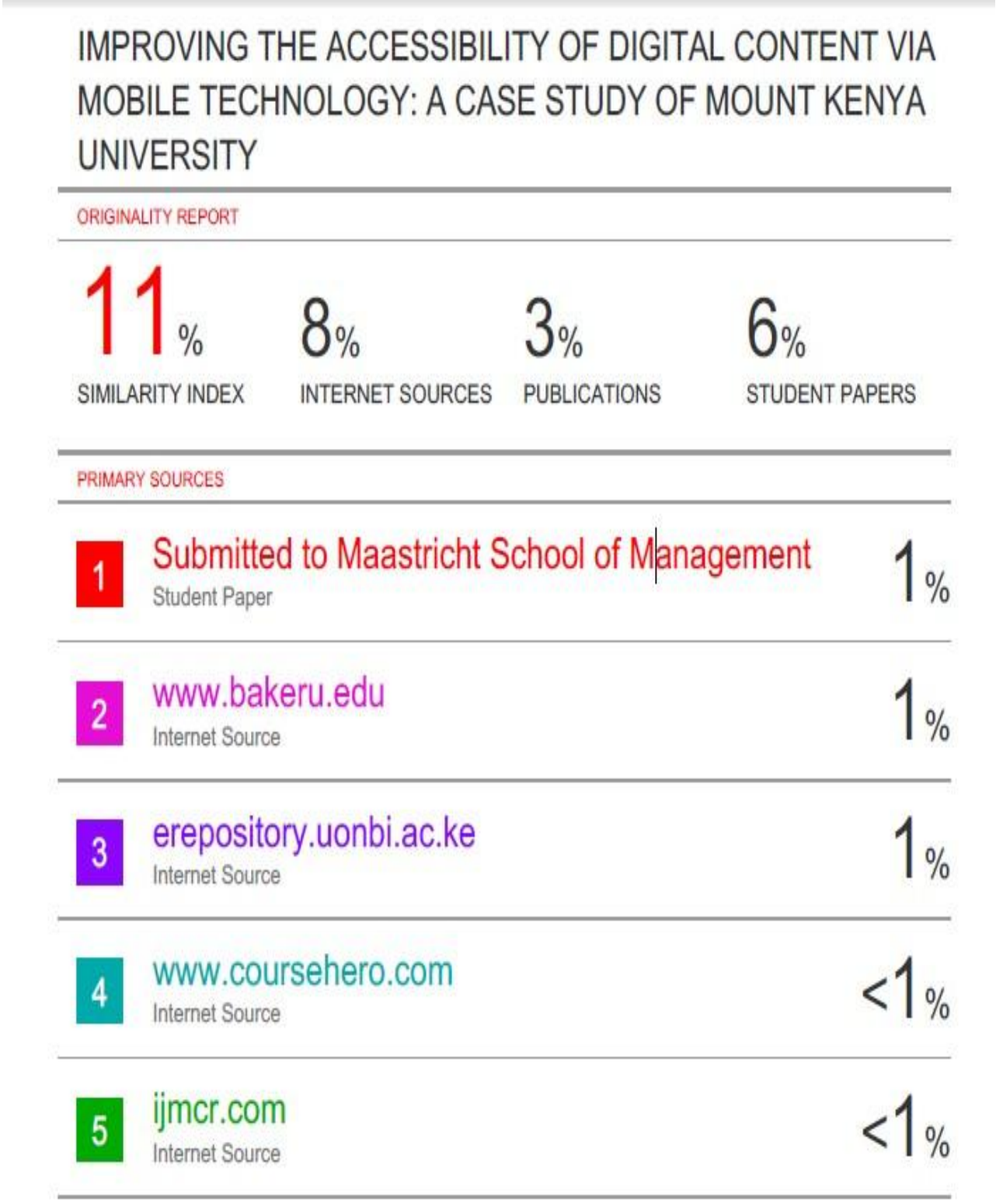
.....
Applicant's Signature

Permit No : NACOSTI/P/19/34652/29407
Date Of Issue : 25th April,2019
Fee Recieved :Ksh 1000



.....
Director General
National Commission for Science, Technology & Innovation

Appendix H: RESEARCH PLAGRISM REPORT



IMPROVING THE ACCESSIBILITY OF DIGITAL CONTENT VIA MOBILE TECHNOLOGY: A CASE STUDY OF MOUNT KENYA UNIVERSITY

ORIGINALITY REPORT

11%	8%	3%	6%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Maastricht School of Management Student Paper	1%
2	www.bakeru.edu Internet Source	1%
3	erepository.uonbi.ac.ke Internet Source	1%
4	www.coursehero.com Internet Source	<1%
5	ijmcr.com Internet Source	<1%