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PROJECT FINAL REPORT

M-LEARING MODEL TO SUPPORT ACCESS TO LEARNING CONTENT IN PRIMARY SCHOOLS

BY

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Submitted for the partial fulfillment of the requirements of the Master of Science in Computer Science

An educator's greatest responsibility,

is not to teach or inform,

it is to motivate and inspire.

Anonymous

Dedication

This dissertation is dedicated to my husband Patrick and my son David.

ABSTRACT

Mobile technology has penetrated Kenya with depth and rapidity. Mobile devices have become integrated in our daily lives. Unfortunately this has not extended to education. This proposal looks at a model for mobile learning (m-learning) that can be used to promote access to learning content. M-learning is not meant to replace formal learning, but rather to complement it. The research involves creating a prototype for mobile learning that will host content that the students can access from mobile phones. The content hosted will be class notes and quizzes.

The target group is standard seven pupils and the subject is social studies. We look at how they have been accessing content before the mobile learning system used and make a comparison with after using the system. This is to find out if mobile learning can increase access to learning content. The methodology involved was a pair difference test. It tests the same sample before and after treatment. The students were tested on how they accessed content before m-learning (BML) and after m-learning (AML).

The research was carried out on 17 students. Content is put into two categories class notes and quizzes and hosted on a web server and accessed on a web server. In order to measure accessibility, the project looked at number of quizzes/exams are accessed per week, number of times per week that quizzes/exams are attempted and lastly the number of times per week that the class notes are accessed. In all three measures m-learning increased access to learning content significantly. This report highlights the finding, implications and recommendations on m-learning in Kenyan primary schools.

Keywords: primary school, learning content, mobile learning, mobile technology, mobile device

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Finally, I owe it all to God Almighty who gave me the strength to prevail through this challenging and educative experience.

Declaration

The material presented in this research project is the original work of the candidate except as acknowledged in text. It has not been previously submitted, either in part or whole, for a degree at this or any other University.

Sign _____   Date 6 | 7 | 2012

Jane Nyambura Kuria

P58/70767/2008

This research has been submitted for examinations with my approval as a university supervisor.

Sign _____   Date 6/7/12

Mr. Robert O. Oboko

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CHAPTER ONE

1.0   INTRODUCTION

M-learning according Partokopi et al (2007 p. 192) is "situated, collaborative and guided teaching, studying and learning, supported by mobile devices that utilise symmetric mobile communications channels by which the learners and the facilitator may use and mould specially designed learning objects for work, hobby or citizenship -related purposes or as an aid to traditional education". Another definition of mobile learning that I find appropriate for this project is by (Nestle et al 2010) "the intersection of mobile computing and e-learning accessible resources wherever you are, strong search capabilities, rich interaction, powerful support and effective learning and performance based assessment. E-learning is independent of time and space." The learner is supported by peers, teachers and digital material on the web. M-learning can also be defined as 'using mobile and wireless technologies to support students in blended learning environments (JISC, 2005, p7).

This project does not aim to look at the impact on pedagogy that m-learning can have, though it is generally accepted that the benefits of it will have a major influence on its sustainability. It will look at how m-learning can assist in making available learning materials. The assumption being that availability of learning materials will assist in the learning process. We will look at one aspect of m-learning, which is content development and access. Three perspectives can be looked at when coming up with these applications for the learning materials (Yau and Joy, 2010),

- *Pedagogy*: how materials should be designed in order to enhance the learning experience and meet the learning requirements of the students
- *Usability*: how the user interfaces of applications on mobile devices should be designed to improve human computer interaction.
- *Technological*: the physical layout of learning materials and how they can adapt to different mobile devices.

In m-learning literature we see words to describe it as 'personal, opportunistic, informal, pervasive, situated, private, context-aware, bite-sized etc. Providing learning materials for mobile learning is done to take advantage of the power of mobile devices. We should not limit learning due to time, travel or proximity constraints which are all preventable. M-learning will allow students to learn at their convenience, in location desired, time chosen and it is facilitated by devices that are continually falling in price.

Mobile telephone use in Kenya has been a success story just like everywhere else in Africa. It has been successfully used in banking for example. In education the use has been limited to examination registration and results through SMS. Mobile subscription in Kenya is 25 million which represents 64% of the population. Considering the population of 15-64 year olds is 55% it is safe to assume that most homes in Kenya have a mobile phone, even when we take into consideration the people who have more than one phone. Penetration is higher than the 64% overall. It is a pity that this powerful device has not been seen as a learning tool. In most schools it is seen as a distraction and is not allowed. Primary education in Kenya begins from the age of six to thirteen years. There are over 9 million primary school children in Kenya (Kenya 2009 Population and Housing Census). The government introduced the Free Primary Education (FPE) in 2003. One of the goals of FPE was to provide quality education through provision of textbooks and instructional materials (UWESS, 2011). Though on the large part the government has managed to provide the books, there has been a high rate of losses, wear and tear, theft, vandalism and natural disasters that has ensured a shortage.

Access to learning materials or content is key to supporting learning at any level of education. Content in this project will refer to learning materials specifically lecture notes and online tests (assessments). Most primary schools content in is in hardcopy. There is need to adapt the content to be delivered through mobile phones to avoid some of the problems identified by UWESS. Mobile learning has been identified by most authors as increasing access to resources where and when needed, while connecting learners and faculty (Nestle et al, 2010).

The trajectory for academic and life success is normally established in pre-school and primary years, where children are developing new habits of learning and social development (Shuler 2009). The natural attraction by children to mobile technology makes it perfect for promoting new habits of learning. This proposal proposes to create an m-learning prototype to promote access to learning content outside of the school environment. The prototype will provide content through class notes and online assessments, all accessible through mobile phones. The students will then be evaluated to see if they have increased access to content (learning materials).

1.1   PROBLEM STATEMENT

Most public primary schools in Kenya do not have adequate learning materials among other challenges due to limited resources on the government. Though the government is spending an average 25% of its GDP on education, most of it is recurrent expenditure like salaries and administrative tasks (UWESS, 2011). Little is left for provision of teaching and learning materials. Primary education is hampered by many challenges, like poverty, early marriages, child labour, crime, cultural practices, etc. The challenges identified by (Uwezo, 2011) are

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- Low basic skills in numeracy and literacy
- Rampant absenteeism at 13% for teachers and up to 40% for pupils in some areas
- Shortage of teachers with teachers having an average of 52 pupils in class.
- Shortage of supplementary learning materials and sharing of textbooks. Average of 3 pupils per book.

Access to learning content across locations, times, topics and technologies will solve some of these problems. Access should be from any location and transcend schools or regions. Pupils should access the content at any time in different contexts. Topics can vary e.g. through teachers and pupils, pupil and pupil and teacher and teacher collaborations. The content should be accessible from majority of mobile devices.

This ability for content delivery can be found by using mobile devices accessing content from an application hosted on the internet. The model application will allow students through mobile phones be able to;

- Read content e.g. class notes
- Self assessment by doing multiple choice quizzes or examinations on the phone.

The aim of the project is to design a model for m-learning and evaluate it to see if it can be used to increase access to learning content.

1.2   RESEARCH QUESTION

The project seeks to answer the following question:
- Can m-learning application improve accessibility to learning content in primary schools?

1.3 RESEARCH OBJECTIVES

(a)   Create a prototype for the students to use in accessing learning content
(b)   Evaluate the prototype. If it increases access to content.

1.4 MODEL DESCRIPTION

As shown in the figure below. The model contains four actors and three access channels. The actors are learners, devices, network and content kept within the database. The device access is between learner and device. Network access is between the device and the network. Service access is between the network and the application.. Access to content must be adaptive and seamless between the four channels.
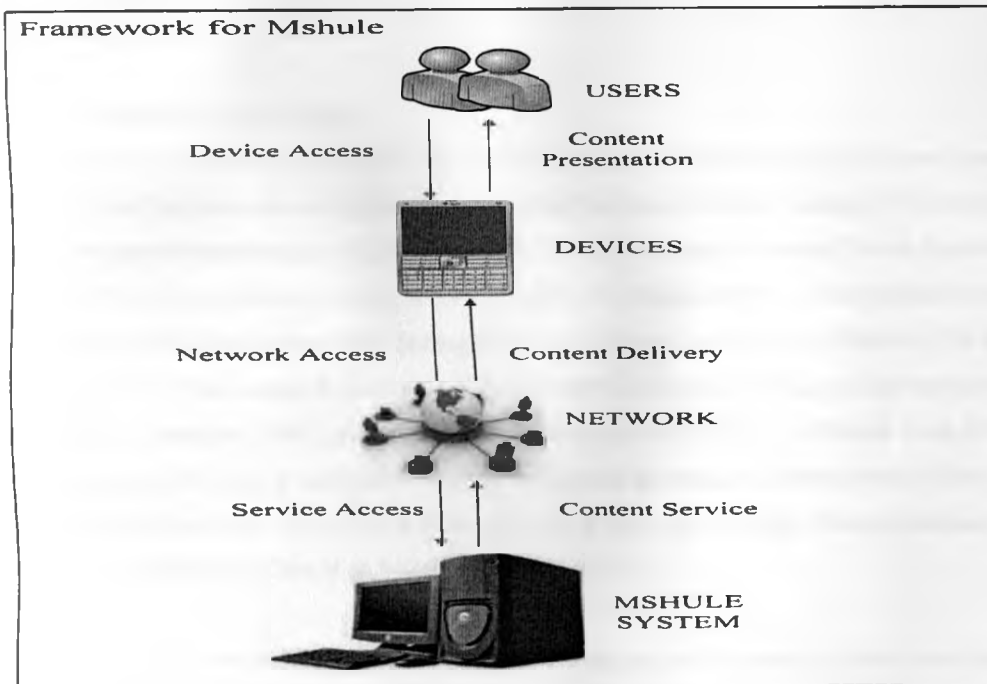

Figure 1: m-learning model

2.0   LITERATURE REVIEW

Introduction:

This chapter looks at the definition of mobile learning by the many different researchers. M-learning is still a relatively new field and researchers are yet to agree on a comprehensive definition. The chapter also looks at how to create content suitable for access from mobile phones. We will look at past projects as well as pro and cons of m-learning.

2.1   Definition of m-learning

One definition of m-learning is that it is any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies (MOBIlearn, 2003). That is learning in motion. This is the same definition given by (Park, 2011) who says that m-learning is use of mobile or wireless devices for the purpose of learning while on the move. The mobile devices they are referring to are smart phones, cell phones, iPods etc. The two definitions center on the mobility of the learner. It does not place the emphasis on the technology which earlier definitions did. (Vavauola and Sharples, 2007) looked at mobile learning as mobile in three different ways. It is mobile in terms of space, e.g. it can be done at workplace or home. It is mobile in terms of different areas of life e.g. leisure or work demands and its mobile with respect to time e.g. could be done day or night. These definitions focus on the mobility of the user and context of use in an increasing mobile lifestyle.

Some researchers have defined mobile learning as an extension of e-learning (Corbeil and Corbeil, 2007). It is described as an approach to e-learning that utilizes mobile devices. It is seen as the 'intersection of mobile computing (the application of small, portable, and wireless computing and communication devices) and elearning (Learning facilitated and supported through the use of information and communications technology)'. This definition is techno-centric and focuses on the devices and ignores the learning. They all do not look at the social aspects involved when using mobile devices for learning.

(Sharples et al, 2007) characterizes mobile learning as "the processes (both personal and public) of coming to know through exploration and conversation across multiple contexts amongst people and interactive technologies". He argues that conversation and context are essential in understanding how m-learning can be incorporated in

conventional learning. It gives the perspective of looking at mobile learning by considering the factors that influence it.

Mobile learning is a popular research area though it has been difficult to conceptualize. In attempts to conceptualize mobile learning there is need to understand that mobile learning is personal, contextual and situated which makes it hard to define. For the purpose of this research we will focus on the definition that m-Learning is defined as 'using mobile and wireless technologies to support students in a blended learning environment' (JISC, 2005,p.7). The use of mobile learning in this research project will be added on to what the teachers are already using. It will not change or take away the methods of learning that are being used now. It will also focus on the aspect of content that is key in any mobile learning implementation. Another appropriate definition for this project will be *"Mobile learning, or m-learning, can be any educational interaction delivered through mobile technology and accessed at a student's convenience from any location."*(EDUCAUSE, 2011).

2.2   Mobile learning content

Trendwatching.com (2005) an international relations watchdog identified a new generation C(c for 'content') as a successor to 'digital' and 'net-related' generation descriptions. They describe this as the generation that is responsible for open source software, music file sharing, flickr, youtube, Wikipedia and more recently facebook and twitter. This generation exhibits a preference for knowledge commons. They prefer to be contributors of information for the common good. It is not that they are anti-commercial but are not motivated primarily by profiteering. Content is big business on the internet. Generation c persons come from different social, economic and intellectual domains and are spread across the globe (Burns et al, 2006). Mobile learning is going to be targeting this generation of users who view content as a resource to be shared.

In designing content for mobile phones the key is to think differently (Brown and Haag, 2011). It is not elearning 'lite, as it is referred to in some texts. It has the capacity to do more like;

- Deliver Education/Learning
- Foster Communications/Collaboration
- Conduct Assessments/Evaluations
- Provide Access to Performance Support/Knowledge
- Capture Evidence of Learning Activity

The general principles for creating content for mobile learning are;

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- create quick and simple interactions,
- prepare flexible material, that can be accessed across contexts,
- consider special affordances of mobile devices that might add to the learner experience (for example, the use of audio; or employing anonymity of the user),
- use mobile technology not just to 'deliver' learning, but to facilitate it,
- make use of the features in the mobile devices for voice communication, note-taking, photography, and time management.

According to (MOBL 21, 2012), in designing content for mobile learning is suitable in the following forms;

Instant Information:
Material must be provided that enables users a quick access to information. Examples of instant information are definitions, formulae and equations etc.

Skill Assessment:
Quizzes and test help to improve memory. It should be easy for the learner to self assess.

Collaborative:
Mobile phones provide an easy way to get a group coordinated on a project. Quick and instant feedback, support through video, images and text from multiple sources, and real-time interaction can enable peer-to-peer learning, resulting in better task comprehension and performance.

Learning Bites:

Information provided in small chunks is more suitable for mobile learning. Example are short lessons, procedures etc. How to change a tire, 10 tips for passing exams and so on

Media Support:
Smart phones today have a lot of capabilities. Use multimedia like audio and video to enhance content.

According to (Yang and Cheng, 2006), they define universal access to content is the concept of facilitating accesses to content according to the varying capabilities and characteristics of users. The context in which the user is accessing the content is important. That is context awareness and content adaptation. Contextual information refers to the situation of an entity where entity is a person, place physical or computational project. It is where the users are

in terms of time and place and the content available nearby. They conclude that content adaptation is an optimization problem where minimum information is used to represent maximum content.

In adapting content for mobile phone (Gimenez et al 2009) says that you must take both technical and functional requirements into consideration. They identify the technical limitations of mobile phones as small screen, minimum mechanisms for data entry, limited bandwidth, limited battery capacity and slow transmission of data. Their project examines how existing online examinations for English can be adapted to be done on mobile phones. They suggest the reduction of images and changing design styles and use of style sheets. The types of questions will have to be close or open ended with matching and filling in exercises. They should avoid questions with indiscriminate use of text. The use of audio and video content should also be minimized because it reduces the number of devices that can be used.

According to (Sharples, Taylor and Vavoula 2005) theory of m-learning must firstly illuminate existing practices of learning from a new angle. Secondly it is import to consider learning that takes place outside the classrooms. Lastly m-learning should be based on practices that enable successful learning. It is important to understand how structured activities blend with other more social and informal activities (Taylor 2007).The gulf between what children do informally and in school is widening reducing the education opportunities for all (Shuler 2009).

Learning results from convergence of mobile technologies, human learning capacities and social interaction (Koole 2009). In this model we look at convergence of three aspects, learner aspect, technology aspect and social aspect. The convergence is the point at which mobile learning takes place. Here technology is seen on equal footing as learning and social processes.

According to (Serrano-Santago and Organista-Sardoval , 2009), the fourth generation mobile technology (4G), with its improved technical features and cost efficiency, could be the tools for future m-learning. 4G integrates many technologies to provide services and applications in a seamless and transparent manner. The wide coverage and roaming capabilities will have large implication on m-learning contexts. They look at integrated approach to m-learning where m-learning users, connected via 4G technology can access content.

2.3   Mobile learning compared to other modes of learning.

Distance learning is according to (Glen, 2007) is general term used to cover the broad range of teaching and learning events in which the student is separated (at a distance) from the instructor, or other fellow learners or,

the acquisition of knowledge and skills through mediated information and instruction, encompassing all technologies and other forms of learning at a distance (USDLA, 2007).

E-learning is distance learning using an electronic device e.g. television, computers, videos, video games and laptops. Mobile learning is an approach to e-learning that utilizes mobile phones it can be seen as the intersection between mobile computing (use of small portable devices) and e-learning by use of ICT(Corbey, 2007).

Face to face learning can be seen as the foundation to all this methods of learning. The hierarchy of the mode of delivery is best explained in the following diagram.
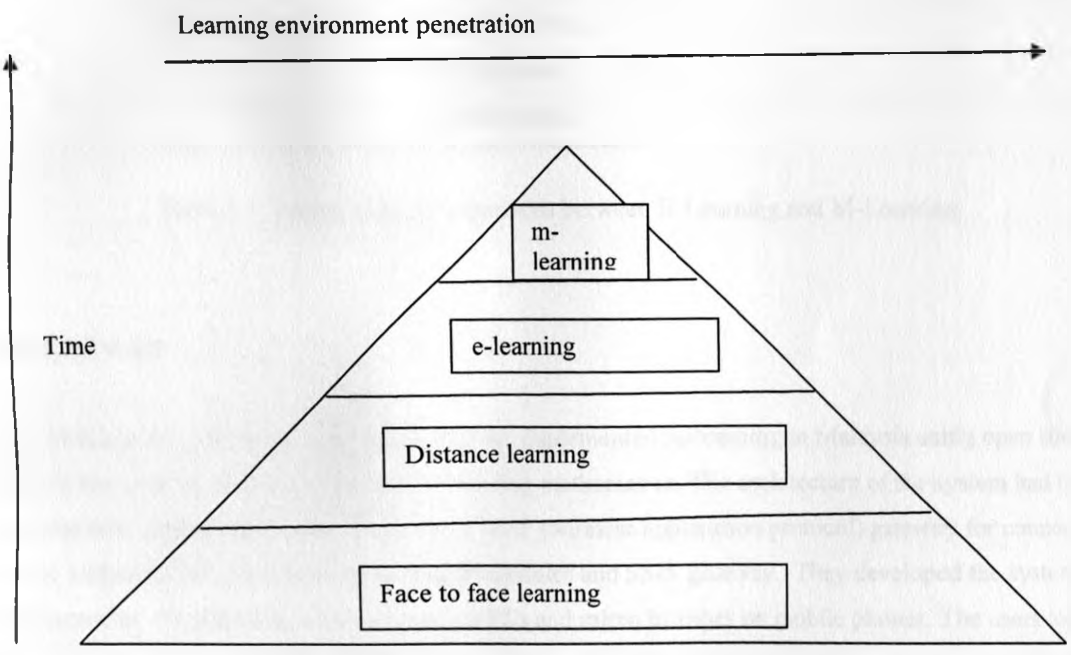

Figure 2: Hierarchy of learning methodologies

A major difference between the m-learning and e-learning is that e-learning takes you out of context. You have to go to a specific place to learn. (Laouris and Etokleous, 2005) differentiated e-learning and m-learning by the terminology used.

E-learning	M-learning
Computer	Mobile
Bandwidth	GPRS, Bluetooth
Multimedia	Objects
Interactive	Spontaneous
Hyperlinked	Connected
Collaborative	Networked
Media-rich	Lightweight
Distance learning	Situated learning
More formal	Informal
Simulated situation	Realistic situation
Hyper learning	Constructivism, Situationism, Collaborative

Table 2.1: Terminology Comparisons between E-Learning and M-Learning

2.4   Related work

Mahamad , Mohammad , Mohamad and Shakira(2008) implemented m-learning in Malaysia using open source technology. It was used by 11 and 12 year olds in learning mathematics. The architecture of the system had three parts, administrator, student and teacher. They use a WAP (wireless application protocol) gateway for connectivity. The software included PHP, MySQL database, agent modules and SMS gateway. They developed the system to run on two environments. Web browser runs on personal PCs and micro browser on mobile phones. The users logs on and can track their performance at the end. The learners were divided into two groups, those learning mathematics traditionally and those learning through mobile phones. They were tested on user satisfaction and performance. The learners using mobile phones scored higher in both cases. The project was limited in that it is not clear how pedagogical needs were met. The excitement of using mobile phone may have made satisfaction to be higher.

MobilED is a South African initiative aim at designing teaching and learning environments that can be implemented on mobile technologies and services (Ford and Leinonen 2009). One of the problems of many schools was access to reference material. The objective was to make sure that learner not only had access to information but also contributed to information. They developed an audio Wikipedia, using SMS and text to speech technologies to

enable access to information and contribute to information via audio. Primary school students learned about HIV/AIDS. The students were from both affluent and poor communities. The devices were low cost mobile phones and high end mobile phones. The learners reported to be energized and motivated and they clearly enjoyed the learning process.

2.5   A case for m-learning

The primary education is plagued by several challenges. Uwezo.net (2011) on Kenya sites some of them as low literacy and numeracy levels, rampant absenteeism by both teacher and pupils (both 13%), shortage of teachers and lack of supplementary materials. There is a large disparity in education quality between private and public schools. Private schools performing better. Similarly UNICEF (2008) reports there are many over age children, high dropout rates and mixed views on education, among others. Though these are diverse and complex issues, m-learning has been found to address some of them. For example on the issues of supplementary materials, if content is hosted then more pupils can access it. Teachers that miss school for one reason or another can give assignments and class notes through the mobile phone.

In an m-learning project (focused on disadvantaged youth) supported by European Union, (Attewell 2004) made key observations

- Mobile learning helped learner to improve their literacy and numeracy skills to recognize their existing their existing abilities.
- Mobile learning can support both independent and collaborative learning experience
- M-learning helps learners to identify areas where they need assistance and support.
- Mobile learning helps combat resistance to use of ICT and can help bridge gap between mobile literacy and ICT literacy.
- Mobile learning helps to remove formality from learning experiences and engage reluctant learners.
- Mobile learning helps learners to remain focused for longer periods.
- Mobile learning helps to raise self-esteem
- Mobile learning helps to raise self confidence.

Shuler (2009) identifies five key opportunities in mobile learning. These are

- Encourage anytime anywhere learning. Students can gather and access information outside the classroom
- Reach underserved children because of the accessibility and low costs. There can create digital equity.
- Improve 21st century interactions. They promote communication and collaboration.

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- They fit well in learning environment.
- They enable personalized learning environment.

2.6 Challenges to accessing m-learning content

The access to content can be brought about by both technical and functional issues. The mobile technologies are diverse and compatibility is an issue. Low battery life, limited memory and small screen size (Kulkuska-Hulme 2007). Mobile devices have difficult data entry mechanisms and navigation. Reliability and speed of connections can reduce usability (Parsons and Ryu 2005). It requires students and staff to develop their technological proficiencies.

(Brown and Haag, 2011) of Advanced Distributed Learning identified the following challenges

- Battery life - This can vary greatly depending upon use and connections. There are considerations to conserve battery life in development as well as optional charging options until battery life improves.
- Connectivity - See Connectivity & Bandwidth in Design Considerations for details.
- Cost - Device costs continue to drop, whereas capabilities increase.
- Data charges - These costs vary greatly among carriers and can rise significantly during international travel.
- Device ownership - Will devices be furnished to the users?
- Screen size - See Displays in Design Considerations for details.
- Security - Depending upon sensitivity of content, this may be the most difficult challenge. There are available solutions, but trainers need to work with their information systems team for the best solution.
- Technology changes - The global mobile industry is now the most "vibrant" and "fastest growing industry" on the planet. Expect improvements and changes.

2.7 Success factors for m-learning implementation

Naismith and Corlett (2006) identified five critical success factors mobile learning. These are

- Access to technology: the users must have the technology with them
- Ownership: learners must use the technology as if they own it.
- Connectivity: there should be mobile phone connectivity
- Integration: it should be integrated into the curriculum, daily activities and or a combination of both.
- Institutional support: it requires policy development and institutional support.

The proposed model application will be based on integrated framework (Serrano-Santago and Organista-Sardoval, 2009). The technology will not be limited to 4G though as proposed in their framework. The mobile service providers in Kenya use diverse technologies the latest are 3G and 4G. These technologies work with a multitude of mobile devices. The components of the system will be learning application, mobile user infrastructure (mini browser and handheld device), mobile protocol (Wireless network protocol) and network infrastructure (GPRS, 4G, 3G). The model aims to work even on low end mobile phones.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

Introduction:

This chapter discusses the research methodology used. It discusses in detail the method and experimental design used. It also views the prototype development used in the project. In order to accomplish the stated project objectives, the research method will be as follows.

3.1 RESEARCH METHOD

3.1.2 Prototype development

The prototype will is developed and will be hosted on Apache Tomcat server and accessed from PCs and Mobile phones. The PCs will be used by the administrator and teacher while the students will use phones. The application is accessed through www.mshule.org for those using PCs. The mobile phone users will need to download the application mshule app. from the website into their phones. This is a throw away prototype just to answer the research question.

3.1.2   Experimentation

The target group will be standard seven pupils. They will use m-learning to access content for the subject social studies. The students will be drawn from a public school. The sample will be about twenty students. The mobile phones will belong to the students or their parents. There will be close working relationship with parents who will supply the mobile phones. The pupils will be trained and allowed to access the system.

3.1.3   Interview

The pupils will be interviewed before using the mobile learning system. This is to get data on how often they accessed content before the mobile learning system.

3.2 GENERAL APPROACH

The project had the following general approach.
1. Develop the mobile learning system and host it in server.
2. Develop the mobile learning application to access the system.
3. Upload the content for online exams and notes for reading for social studies.

4. Interview the students to understand how they access content before the mobile learning system. record the data.
5. Train the pupils on how to use the system.
6. Allow the students to use the system for about two weeks
7. Determine whether using mobile learning increases access to learning content by looking at the system logs.

3.2.1 Experimental Design

The experiment had one group of students who were assessed before and after using the mobile learning system. The groups are BML(before mobile learning) and AML(after mobile learning). The pupils were picked based how whether they had mobile phones or not. Secondly the next to be picked were those who said that they had access to a phone. All in all we managed to get 23 pupils who had fitted these two categories. Twenty were selected.

BML group

The pupils were interviewed to help answer question on how they access content for social studies. The interview questions were explained and students given time to answer them. The answers were taken for pre-test data.

AML group

The same group of students used the mobile learning system. This time the system logs provided the data. The data shows when the student logged in and what they did. The data was taken for analysis.

3.2.2   Experimental variables

The experiment is a paired t-test where there is one measurable variable and two nominal variables. The nominal variables represent one, the individual students and two the 'before' (BML) and 'after' (AML) treatment. The approach is adopted from Wilder and Rypstra (2004). The independent variable (measurable variable) here is the mobile learning system and the dependent variable are access to content. The main objective of the experiment is to find the effect of independent variable (mobile learning system) on dependent variable (increased access to content).

3.2.3 Hypothesis

The hypothesis relates the independent variable mobile learning system to the dependent variable access to learning content. This was done by comparing the before and after mobile learning answers to the interview questions. The hypothesis states as follows:

'Mobile learning increases access to learning content'

The hypothesis has other sub hypotheses in order to determine this relationship before and after using the mobile phones on accessing content. The hypothesis is based on a number of concrete assumptions which produce the following sub-scales.

- Number of days per week quizzes/exam was done
- Number of quizzes/exams done in week
- Number of times class notes were accessed per week

Based on these assumptions the following hypotheses were developed. The data is obtained from system logs as well as interviews.

Sub-hypothesis 1.1: number of days per week quizzes or exams done

Pupils will attempt quizzes on more days per week when using mobile phones

Sub-hypothesis 1.2: number of quizzes/exams done in a week

Pupils will attempt more quizzes per week when using mobile phones.

Sub-hypothesis 1.3: number of times class notes were accessed per week

Pupils will access class notes more often when using mobile phones

3.2.4 Experimental subjects

In total 17 pupils from Crater primary school in Nakuru participated. The students were selected from their ability to get a mobile phone. 5 students had their own mobile phones while the other 12 said they could easily access one from their parents/guardians as well as brothers and sisters. Three students dropped out due to lack of phones. The learning content is for the subject of social studies. They worked with the help of their class teacher Mrs. Anne. She provided the material that meets the pedagogical needs of this particular subject.

3.2.5 Procedure

1. The students were asked to answer interview questions before they were told what the experiment was about. The data collected was used for pre-test data.
2. The pupils were then explained to on what the mobile learning system was about. After class and using five mobile phones the students were trained on how to download the mobile application in order to access the content.
3. They then used the system and familiarized themselves with it.

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4. A log tables were used to fill in the number of quizzes they had attempted and the size of notes that they had read.

5. This log tables were taken for analysis.

3.2.6 Project prototype

The prototype for this project is developed to hold content for social studies. The content is multiple choice questions as well as notes on the subject. The pupils can attempt the questions where they are able to get the results after submission. The notes can be read directly from the phone by selecting the desired topic. They do this after they log in to the system.

3.2.7 Multiple choice questions

Only multiple-choice questions were considered for inclusion in the quizzes and exams. This is the way exams and quizzes are set at primary school level. Multiple-choice questions according to (Davis, 1993):

- Can be effectively used to measure objectives ranging from simple memorization tasks to complex cognitive manipulations.
- Since students' writing is minimized, a substantial amount of course material can be covered.
- Scoring is relatively straightforward
- With three to five options (1 correct answer, and the remaining distracters or foils), this instrument [can] reduce the potential for guessing.

The following is a screen short from one of the exams that the students attempted.
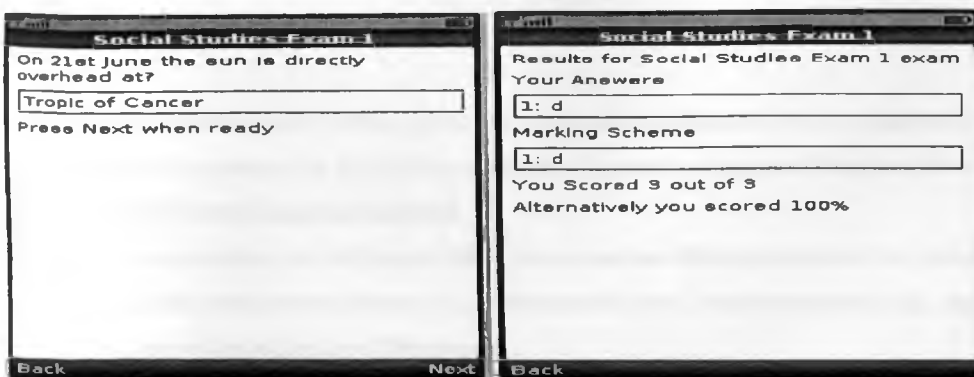
Figure 3: user screen shorts

At the end of the quiz/exam the pupils submit it. They are then told how they scored in percentage. They are view the answers that they got wrong.

The questions are derived from past papers, the course text and from their subject teacher.

3.2.7   Class notes

The notes can be read directly from the website. They are arranged in hierarchical form. The pupils can select the topic of choice. The screen shot are as follows.
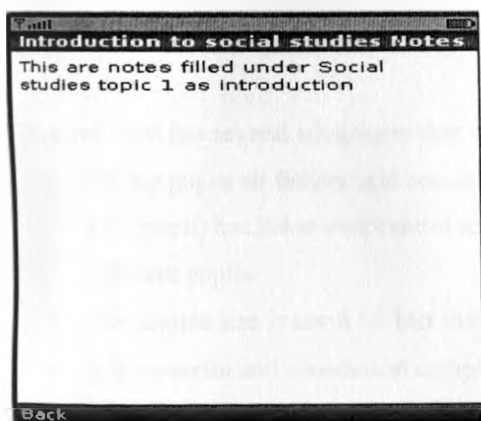
Figure 4: class notes

The logs record what the pupil is doing and how long they are on the system.

3.3 Data analysis approach:

The statistical procedure used for this experiment was a paired difference t-test. It compares the one set of measurements with a second set from the same sample. It is used to compare before and after scores in experiments to see if any significant change has occurred.

The paired t-test according to (McDonald, 2009) focuses on the difference between the paired data and reports the probability that the actual mean difference is consistent with zero. The comparison in this case is aided by reduction in variance achieved by taking the differences.

In this research the paired data is measuring access to content before m-learning and access to content after m-learning. The paired t-test assumes that the differences between the pairs are normally distributed. Microsoft excel spreadsheet was used to perform the calculations.

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The level of significance used is 0.05. The level of significance is the probability of incorrectly rejecting the null hypothesis in a test of hypothesis and is denoted by α. Traditional values used for α are 0.05, 0.01 and 0.001.

Thus,

If $P < 0.05$ result is statistically significant, and

If $P > 0.05$ result is not statistically significant.

3.4 Justification for using this data analysis approach

The paired t-test has several advantages that were specific to this project
- For the pupils all factors held constant except for whatever happened between the two measurements. Each pair (pupil) has is/her own control and overall variations in the samples is minimal instead of comparing different pupils.
- The sample size is small i.e. less than 30 subjects which makes t-test appropriate.
- It is powerful and economical compared to an unpaired t-test because there is more power to detect significance because there is less variability.
- Minor departures from normality does not affect the test.(the test assumes that the difference between pairs are normally distributed)

3.5 Limitations
There were several limitations to this methodology. Some of them could be overcome but not all.
- The data collection method (interviews) assumes that the subjects are telling the truth. This is overcome by using system logs to find out which pupils and when they accessed which content. The pupils were also young and may not have found the one on one interview easy and required a lot of explaining.
- Limitations of the statistical method also exist. Boredom, fatigue and practice effects may affect the pupils. There is also loss in degrees of freedom therefore requiring a trade-off between greater power and fewer degrees of freedom.
- Study is limited to one school with only 17 pupils participating. It is difficult to generalize the study to all pupils at this level.

- The excitement of using the mobile phones to learn may have had an effect on the pupils, i.e. they are willing to study more just because it is a new concept. How long they can sustain the interest is something we have been able to measure in this project due to time limits.

3.6 PROJECT SCHEDULE

This section provides a guidance or schedule on the time taken developing and implementing as well as writing of the report. The schedule includes all the activities undertaken during the entire project period.

Activity	Weeks																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Initial Study	■	■	■																
Analysis and specification				■	■														
System design & documentation							■	■											
Implementation and testing										■	■	■	■						
User training and Testing														■	■	■			
Final document preparation																	■	■	

Figure 5: Project schedule

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

This project uses a throwaway prototype. (Sommerville, 2000) describes it as 'A prototype which is usually practical implementation of the system is produced to help discover requirements problems and then discarded. The system is then developed using some other development process'.

The prototype is developed just for the purpose of this research. It just simulates a few aspects of what the complete system would do. It is appreciated that a final version of this type of system can be very different from this prototype. The stages of analysis, design and implementation are not in detail as would be expected in a complete system. The prototyping process used is the one by (Somerville 2000) as shown below.

4.0 ANALYSIS

Introduction

This chapter describes the analysis and system design for mshule.org, a mobile based learning software which is to be used in this project to access content. The scope of the system was to be able to provide access to a complete learning portal via a mobile phone whereby a learner can access educational content easily and conveniently via a WAP enabled device.

4.0.1 User analysis:

Analysis was done on the expected users of the system. The following user classes and characteristics were decided upon.

- **User/learner:** This is the regular user role. All registered and authenticated users within the Mshule system are assigned this role. The role allows for the basic functionality such as attempting exam questions and reading online notes.
- **Administrator/author:** This is the administrator or super user system role. Users with this role have the whole set of rights within mshule.org. In some workflows, users with this system role are treated differently from the rest of the users, giving them access to administrative functionality. They can upload data, create users and perform any other administrative duties.

4.0.2 Technical analysis

The system is requires a good knowledge of java and java servlets Eclipse IDE and java netbeans is used to run the code. And all the building is done by maven . All this is open source software and it's easily available. The application is to run on apache tomcat server on web server in order to be accessed by pupils. The databases to be used is MySQL .

Minimum hardware requirements are as follows:

- Intel Pentium 4
- 1 GB RAM
- 40GB free hard disk space

4.1 Design

The project implements a simple design that is explained in this sub-chapter.

4.1.1 Dataflow diagram

The system has two main users. We have the normal users who are the learners in this case and we have the administrator. The learner can log in and access learning materials i.e. class notes and exam questions. The data flow is as follows:

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Username password

| User | → | Authenticate User | → | Process user request for notes or exams |

User ID

User Table

Subject ID

Fetch Subjects → Subject table

Subject ID

Fetch Exams

Fetch Topics

Topic ID

Exam ID

Exams Table

Topics Table

Topic ID

Fetch Notes

Exam ID | Fetch Questions

Topic ID

Question Table | User Score

Exam ID

Note Table

Log Score | Log Activity

User Score | User ID

User ID

Exam ID | Topic ID

Log Table

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Figure 6: dataflow diagram

4.1.2 Overall Description

System Features

- Login interface

- Users

- Topics

- Exams

- Questions

- Logs

Login interfaces: There is login interface for the mobile application and for the website for system administrator. It requires a username and password.

Users: Two types of users use the system. The administrator and the user. The admin can perform all the functions i.e. manage users, upload learning materials and look at system logs. The user logs in and can read notes or do an exam.

Topics: the topic is the class notes available for pupils to read from their phones. For easy reading they are divided into small chunks of 10 minutes each.

Exams: the pupil is able to choose which exam to do. i.e. test 1 or test 2. The admin uses the same part to give names to the different tests and exams.

Questions: this is the section where the administrator can add, delete and other manage questions for the different exams.

Logs: they help to know who accessed the system and what they did while they were in the system. This allows in verifying the use of the content.

4.1.3 Entity relationship diagram:

The system features above all contain information in the database. Entity relationship diagram for mshule is as shown.
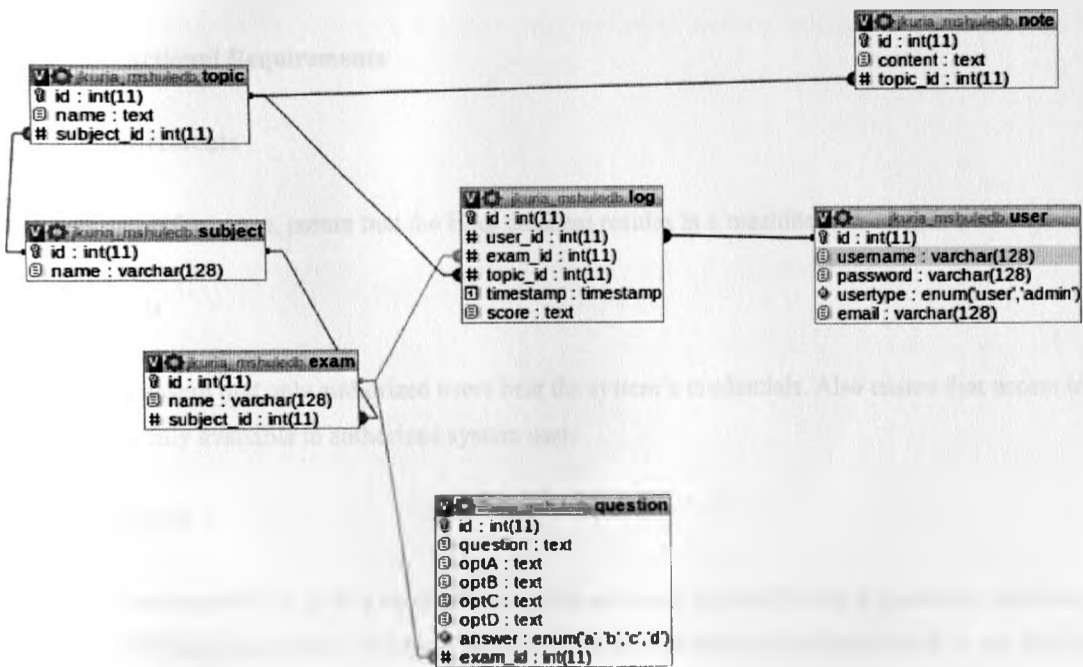
Figure 7: entity relationship diagram

4.1.4   Software Interfaces
- Database used:-MySQL

- OS: Windows 7.
- Tools used: , Apache Tomcat, Eclipse IDE,Java netbeans, PHP, J2SE
- Libraries Employed: , json (JavaScript object notation), j4me

4.1.5 Communications Interfaces

Communications between Mshule and users will be on port 8080.Communication between Mshule and the MySQL database will be on the port 3306. All communications are via HTTP protocol

4.1.6 Other Nonfunctional Requirements

Performance Requirements

For the best system performance, ensure that the Hsql database resides in a machine with adequate free space.

Safety Requirements

For safety purposes ensure that only authorized users bear the system's credentials. Also ensure that access to the MySQL database is only available to authorized system users

Security Requirements

Security has been implemented by giving users different roles and each of them having a password. Each user is required to have a different user name. Also each user is able to change his/her login credentials at any time as long as he/ she is logged into the system.

Software Quality Attributes

Since Mshule is done principally in java, It is expected to be portable to any platform as long as all the hardware and software requirements are met. The system is flexible such that it can be configured to be used also in secondary and even university and corporate use albeit with some minor configuration. The system flexibility is also attained by ensuring access either by phone or PC by the learner.

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Whilst designing the system, care was given to ensure a high and steep learning curve of the system. Once the administrator gets the overall feel of the system, consequent maintenance should be considerably eased

4.2 IMPLEMENTATION

Mshule is implemented using a modular design. There are three main modules. This are:

1. Model: this is basically the database. The one used here is MySQL
2. View: this is the mobile application.
3. Controller: this is the java servlettes that allow communication between the mobile application and the database.

4.2.1 Architecture

The mshule project uses the model-view-controller architecture.
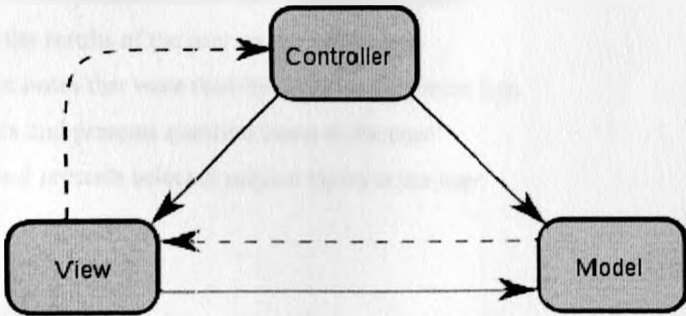
Figure 8: Architecture

Models
The database will contain data on the following
1. user – data about the users of mshule
2. subject – data about the subjects offered by mshule
3. topic – topics that have been created by the mshule administrator
4. question – question items
5. exam – exams on mshule

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6. note – notes available on mshule

Views

These are the features that a user can see from the mobile phone application.

1. login – the login screen
2. categories – the categories screen where one selects either to do an exam or read online notes
3. subject – the user selects a subject of interest to tackle
4. question – presents users with select question items
5. notes – the notes that users shall read

Controller

Mshule uses java servlets

1. Exam – formats and presents to the user an exam
2. Login – validates user logins
3. Note – formats and presents to the user notes
4. Subjects – formats and presents to the user available subjects
5. Log Exam – logs the results of the user on the server logs
6. Log Note – log the notes that were read by users on the server logs
7. Question – formats and presents question items to the user
8. Topic – formats and presents selected subject topics to the user

Libraries

Following libraries and frameworks are used by mshule

1. J4ME – a j2me UI framework.
2. JSON ME – a json framework for j2me

The following custom made packages are used

1. com.kuria.models – this package houses the models used by mshule
2. com.kuria.network – this package is used for network services.
3. com.kuria.mshule – this package contains the main mshule midlet. Midlet loads the application and responds to phone interruptions.
4. com.mshule.screens – this package holds the screens presented to the user from the mobile application

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Network communication

The mshule j2me application consumes a http request that is sent to the mshule servlets which fetch data from the mshule mysql database.Then the java servlet sends the requested information back to the application

This code segment is responsible for the network communication

```
private void doFetch() {

    //this method passes the information provided by the user and sends it to the server for processing
    DataInputStream is = null;

    try {

        System.out.println("******* HttpTransport *****");

        StringBuffer sb = new StringBuffer();

        is = (DataInputStream)con.openDataInputStream();

        int ch;

        sb = new StringBuffer();

        while ((ch = is.read()) != -1) {

            sb.append((char)ch);

        }

        this.serverData = sb.toString();
    // the generated string contains the server response
```

```java
            System.out.println("**** Transporting Data ****");

            System.out.println(this.serverData);

          response.onRequestComplete(serverData);

            // triger a request complete and pass the data back to the user
        } catch (IOException ex) {

            System.out.println("Error Problem with connection 1");

            ex.printStackTrace();

            response.onRequestError("Problem with Connection");

    } finally {

        try {

            is.close();

        } catch (IOException ex) {

            System.out.println("Error closing DataOutputStream 3");

            ex.printStackTrace();

        }

    }

}
```

4.3 Implementation Constraints

Most commercial hosting servers are geared towards and apache web servers. Therefore it might be challenging to get commercial hosting especially in the local scene.

Due to the time constraints, it was a bit difficult to simulate and test to get the maximum number of clients that the system can support when there is simultaneous and concurrent access.

Assumptions and Dependencies

- The user should have a MySQL or HSQL server.
- Browsers should be javascript and cookie enabled
- The system can support upto 100 concurrent and simultaneous users.

4.4 Testing

The system has been tested on windows and unix environments since its primarily written in java. Any operating system that runs the tomcat server should be able to successfully host the mshule war file.If on Windows, Cygwin should be installed so as to support Kannel wap and SMS gateway.It can run on either Mysql or Hsql database management systems.

It has been tested on Mozilla Firefox,Internet explorer and Google chrome web browsers. System testing took place if all the modules are working well. The modules have been working well.

Database testing

The database was also tested to see if it is working fine. Multiple sessions with the users was tested. It worked fine about ten users simultaneously.

User testing:

The system has been tested by students and their teacher. They have successfully logged on the system using mobile phones. Most of them have done the tests in the system using both mobile phones and on laptops and PCs.

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Overcoming the constraints

- The application is to be run on a server abroad where it can on windows to avoid the memory leaks
- Test the system with as many users as possible. Using the students as well as family and friend to log on at the same time and view the results.

4.5 Project results:

The statistical procedure used this project is paired t-test. It uses one sample whose data is collected at different times. In this case we have data about 17 students collected before the and after the use of mobile phones to access data. T-test compares the means of the two samples to see if there is significant difference.

4.5.1 Hypothesis

The hypothesis states as follows;

'Mobile learning increases access to learning content'
This hypothesis has a number of sub-hypotheses to show the relationship between the measurable variable (access to content) and the nominal variables, the individual pupils and the before and after treatment measurements.

Sub-Hypothesis 1.1 – Number of quizzes/exams done in a week

Pupils will attempt more quizzes/exams per week when using mobile learning

Number of quizzes/exams attempted in a week

t-Test: Paired Two Sample for Means

	Before mobile learning	After mobile learning
Mean	1.647058824	3.176471
Variance	0.492647059	1.029412
Observations	17	17
Pearson Correlation	0.005162601	
Hypothesized Mean Difference	0	
df	16	
t Stat	-5.123712246	
P(T<=t) one-tail	5.10296E-05	
t Critical one-tail	1.745883669	
P(T<=t) two-tail	0.000102059	
t Critical two-tail	2.119905285	

4.1 number of quizzes/exams attempted in a week

There was a significant difference between the BML and AML in terms of the number of 'number of quizzes/exams attempted in a week' - P (T<=t) two-tail = 0.000102059, t Stat = -5.123712246. The pupils significantly attempted more quizzes/exams when using m-learning than without- P(T<=t) one-tail = 5.10296E-05

Sub-hypothesis 1.1: number of days per week quizzes or exams done

Pupils will attempt quizzes on more days per week when using mobile learning.

Number of days per week quizzes or exams done

t-Test: Paired Two Sample for Means

	Before Mobile learning	After Mobile learning
Mean	2.058823529	3.941176471
Variance	0.808823529	1.058823529
Observations	17	17
Pearson Correlation	0.139046628	
Hypothesized Mean Difference	0	
df	16	
t Stat	-6.116076577	
P(T<=t) one-tail	7.44356E-06	
t Critical one-tail	1.745883669	
P(T<=t) two-tail	1.48871E-05	
t Critical two-tail	2.119905285	

4.2 Number of days per week quizzes/exams are done

There was a significant difference between the BML and AML in terms of the number of 'number of days per week that quizzes/exams attempted' - P(T<=t) two-tail 1.48871E-05, t Stat -6.116076577. The pupils significantly attempted quizzes/exams on more days per week when using m-learning than without- P(T<=t) one-tail = 7.44356E-06

Sub-hypothesis 1.3: number of times class notes were accessed per week

Pupils will access class notes more often when using mobile phones

Number of times class notes are accessed

t-Test: Paired Two Sample for Means

	Before Mobile learning	After Mobile learning
Mean	3.117647059	3.764705882
Variance	0.735294118	1.816176471
Observations	17	17
Pearson Correlation	0.187704005	
Hypothesized Mean Difference	0	
df	16	
t Stat	-1.833333333	
P(T<=t) one-tail	0.042712258	
t Critical one-tail	1.745883669	
P(T<=t) two-tail	0.085424516	
t Critical two-tail	2.119905285	

Figure 4.3 Number of times class notes are accessed

There was a significant difference between the BML and AML in terms of the number of 'number of days per week that class notes were accessed' - P(T<=t) two-tail 0.085424516, t Stat -1.833333333. The pupils significantly attempted quizzes/exams on more days per week when using m-learning than without- P(T<=t) one-tail = 0.042712258.

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4.6 Discussion:

The problem that this project tries to solve is to find out it mobile learning can increase access to content for primary school children. The approach was to develop a prototype that can be as the mobile learning system. The prototype was to consist of mobile application to be downloaded to the phone and the content to be in the server. Using the mobile phones, pupils were to attempt quizzes and read their class notes on social studies. The application is simple and can be used on most mobile phones. Before the use of the mshule system

The initial data (before mobile learning) was collected from the pupils in an interview of one by one. To get an idea of what pupils learn in a week, I had to interview the subject teacher. She provided information on how much they cover in a week on the syllabus and how many quizzes/ exams they do in week. These data was collected for analysis later.

The pupils did not need to answer the same questions the next time as the system provided the data. The system logs showed what the pupils were doing on the system and results were recorded for comparison.

The results from this research show considerable difference on how pupils access content before and after the introduction of the mobile learning system. For all three hypotheses the pupils significantly accessed more content after introduction of mobile learning.

In the hypothesis was to show the relationship between the mobile learning system (independent variable) on access to content (dependent variable). In sub hypothesis one where we look at the number of quizzes attempted in a week. Pupils accessed more quizzes when using mobile phones that when not.

In sub hypothesis for number of days per week that the pupils accessed quizzes, again there was significant difference between before and after mobile learning. Pupils using mobile learning system accessed quizzes on more days per week than when they did not use the system.

In sub hypothesis for how often notes are accessed in a week, there was significant difference between the BML and AML. The pupils accessed more content on more days per week from mobile phones than before using mobile phones.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

This project main objective was to find out if using mobile phones can increase access to learning materials. From the results we can conclusively say that it does increase access. The public school used in this research problem has limited resources even though it is in major town. Most public primary schools are underfunded and overstretched. For most subjects and this includes social studies, they had

- Limited text books that had to be shared among pupils. In social studies they had to two pupils per book.
- They could only do one quiz per week because of shortage of printing paper.
- Past papers were there for revision but there is no photocopying machine.
- Most classes averaged about 60 pupils which is a large number for any teacher.
- Study notes were limited to what was covered in class every day on the subject by the teacher.

This project has been able to show that;

1. Pupils are able to attempt more quizzes/exams per week when using mobile phones. this can be attributed to:
   - The quizzes did not require any paper from the school to be printed which is limited to one quiz in a week due to limited resources
   - No marking was required on the part of the teacher. The students could self evaluate anytime anywhere with their mobile phones.
   - The results/feedback on the performance of the pupil is immediate. They could easily see which questions they had gotten wrong.

2. Pupils were able to do quizzes on more days per week when using mobile learning than without. This can be attributed to the fact that they got immediate feedback and could do many quizzes in a short time. They accessed the mshule system regularly to see if there were new quizzes to be done. From informal discussion after the research, some of the reasons given by the pupils were;
   - They enjoyed doing the quizzes on the phones
   - They could attempt many quizzes in a relatively short time.
   - They were encouraged by their parents/guardians

3. Pupils were able to read their class notes on more days per week when using mobile phones. It is difficult to know why pupils preferred to read notes from their phones but from a informal discussion with the pupils ,some of the reasons given were;
   - They enjoyed using mobile phones
   - The notes are short and precise so they were good for revision.

- The notes were different from the teachers so they believed they learned more.

We can conclude that use of mobile phones for learning can increase access to learning materials especially in public schools with limited resources. The price of mobile phones is decreasing everyday and soon internet enabled mobile phones will be the norm even among children who are under 18 years old. Technology need not to be feared but to be seen as a useful tool in learning. Some of the problems associated with learning materials e.g. lack of text books, exercise books and printing paper can be reduced by use of mobile learning.

5.1 Limitations and assumptions

There are several limitations to this research. This include

- The research is carried in only one public primary school. Sample size is only 17 students. The subject is also just one. How general the results are across other schools is matter of further research.

- Use of interviews as a method of data collection has its weaknesses. The pupils are young and may not have been at ease with interviewer whom they saw as an authority figure. Interviews also assume the answers given are true which may not be the case.

- The students accessed the notes and did their quizzes, but where any learning took place it is difficult to say at this point. At the end of the day accessing learning materials is to aid in learning. Whether learning took place is beyond this project

- Mobile phones are used away from the school. It is difficult to know who accessed the system. The pupils may have had their quizzes done by others or notes accessed by others. They are difficult to monitor the use of the system beyond the system logs.

- Pupils are excited and enjoy using mobile phones. Maybe this excitement may have propelled them to attempt more quizzes or read more notes. This study may need to be done over a long period of time to see if the pupils can sustain the interest.

- This study measured the access to learning materials of, pupils over a two-week period. The study length was short relative to a traditional 12 week semester. The results of this study may have differed if the observation period was lengthened to include more learning materials.

5.2 Importance of findings

The findings are important to education, educators and the learners themselves.

Education has been left behind by other sectors when it comes to the use of mobile technology. Mobile phones are seen as disruptive and a hindrance to education. What we fail to see if that mobile phones are not going away, so the best we can do is harness the power that comes with them. Where best than in the education where

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students spent most of their time. Phones can help students' access content, have adaptive and collaborative learning. It might help stimulate interest in students who find traditional learning boring.

Educators can use mobile learning to assist them in content delivery. Most primary school notes are given in form of dictation or writing on the board which are time consuming and do not add value. Notes could be created and uploaded and student can read them easily. All quizzes and exams can easily be done online. All this will save scarce resources like textbooks, exercise book and printing paper.

The study can add value to literature as peak view of mobile learning in Kenya. Kenya has been a success story as far as mobile use is concerned. We get to see what impact it can have in education.

5.3 Recommendations

There is little research in the area of mobile learning in Kenya. More needs to be done in the following areas

- Future research can focus on the effects of mobile learning on education. E.g. on performance and overall improvement. This would be a long term project and would be able to answer questions on whether mobile learning improves learning. It can also answer questions on sustainability of such system in terms of cost and also student interest.
- Research can also be done on how to make the content deliverable on most phones. Interoperability of devices. Content to be able to use multimedia to improve the learners' experiences.

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Login interface
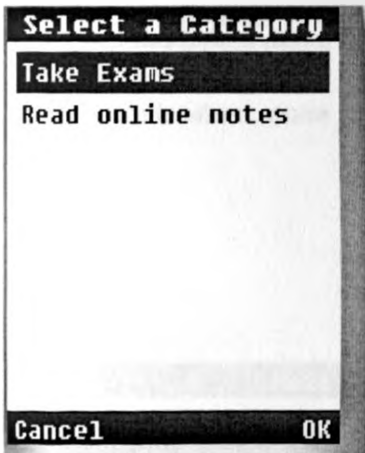
Selecting category

```
┌─────────────────────────┐
│      Take Exams         │
├─────────────────────────┤
│ Select a Category       │
│ ┌─────────────────────┐ │
│ │ Take Exams          │ │
│ └─────────────────────┘ │
│ Press send when done    │
│                         │
│                         │
│                         │
│                         │
│                         │
├─────────────────────────┤
│ Exit             Send   │
└─────────────────────────┘
```

User selects option to take exam

```
┌─────────────────────────┐
│   Mshule - Subjects     │
├─────────────────────────┤
│ Select a subject        │
│ ┌─────────────────────┐ │
│ │ mathematics         │ │
│ └─────────────────────┘ │
│ Press Next when done    │
│                         │
│                         │
│                         │
│                         │
│                         │
├─────────────────────────┤
│ Back             Next   │
└─────────────────────────┘
```

User selects a subject
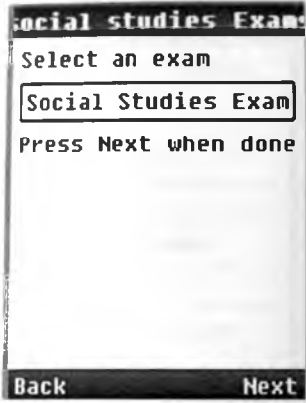
User selects the exam
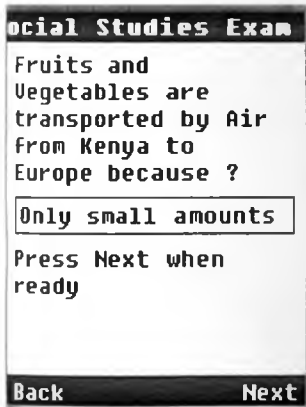
User answers questions

ocial Studies Exam

Results for Social
Studies Exam 1
exam

Your Answers

1: a

Marking Scheme

1: d

You Scored 0 out
of 3

Back

User gets feedback

mshule.org

| Home | About | Contact | Login |

Welcome to *mshule.org*

The home page

mshule.org

| Home | About | Contact | Login |

Home » Login

Login

Please fill out the following form with your login credentials.

*Fields with * are required.*

Username *

`admin`

Password *

`••••••••`

☐ Remember me next time

[Login]

Login page

mshule.org

Home ▪ Admin

Admin

This is the backend administration page where you can manage content

Please select a page below to manage mshule.org content

- Users
- Topics
- Subjects
- Notes
- Exams
- Questions
- Logs

Administrator's page

mshule.org

Home ▪ Users

Users

Displaying 1-5 of 5 result(s)

Operations

Create User

Manage User

ID: 1
Username: nick
Password: nick123
Usertype: admin
Email: nickaigi@gmail.com

ID: 2
Username: githu
Password: githu123
Usertype: admin
Email: patrick.githu@gmail.com

ID: 3
Username: jane
Password: jane123
Usertype: admin
Email: jane.kuria@gmail.com

Users page

mshule.org

Topics

Displaying 1-1 of 1 result(s)

Operations

Create Topic

Manage Topic

ID: 1
Name: Introduction to social studies
Subject: 5

Topics page

mshule.org

Subjects

Displaying 1-5 of 5 result(s)

Operations

Create Subject

Manage Subject

ID: 1
Name: mathematics

ID: 2
Name: english

ID: 3
Name: kiswahili

ID: 4
Name: science

ID: 5
Name: social studies

mshule.org

Home » Notes

Notes

Displaying 1-1 of 1 result(s)

Operations

Create Note

Manage Note

ID: 1
Content: This are notes filled under Social studies topic 1 as introduction
Topic: 1

Notes page

---

mshule.org

Home » Exams

Exams

Displaying 1-3 of 3 result(s)

Operations

Create Exam

Manage Exam

ID: 1
Name: Social Studies Exam 1
Subject: 5

ID: 2
Name: Test 2
Subject: 1

ID: 3
Name: test 2
Subject: 5

Exams page

mshule.org

Questions

Displaying 1-3 of 3 result(s).

Operations

Create Question

Manage Question

ID: 1
Question: On 21st June the sun is directly overhead at?
Opt A: Tropic of Cancer
Opt B: Arctic Circle
Opt C: Equator
Opt D: Tropic of capricorn
Answer: d

ID: 2
Question: Fruits and Vegetables are transported by Air from Kenya to Europe because ?
Opt A: Only small amounts are involved
Opt B: They occupy little weights
Opt C: They are highly perishable
Opt D: They are enough cargo planes
Answer: c

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Number of days per week that quizzes were attempted		
Student	Before mobile learning	After mobile learning
1	3	5
2	2	4
3	3	3
4	1	4
5	2	4
6	1	3
7	3	5
8	1	3
9	2	5
10	2	4
11	2	2
12	3	3
13	2	4
14	1	3
15	4	4
16	1	5
17	2	6
Mean	2.05882	3.941176

Number of times notes are accessed in a week		
Student	Before mobile learning	After mobile learning
1	3	5
2	4	5
3	3	4
4	2	3
5	3	6
6	4	3
7	2	5
8	3	4
9	3	4
10	4	5
11	2	3
12	3	2
13	3	2
14	2	1
15	5	3
16	4	4
17	3	5
Mean	3.117647	3.764706
SD	0.857493	1.347656

Number of quizzes attempted in a week		
Student	Before mobile learning	After mobile learning
1	1	3
2	2	2
3	1	3
4	2	4
5	2	1
6	1	3
7	3	3
8	1	3
9	3	4
10	2	2
11	2	5
12	1	5
13	2	4
14	1	3
15	1	3
16	1	3
17	2	3
Mean	1.647059	3.176471
SD	0.680932	0.984306

Appendix D- t-test analysis for raw data

Number of quizzes/exams attempted in a week

t-Test: Paired Two Sample for Means

	Before mobile learning	*After mobile learning*
Mean	1.647058824	3.176471
Variance	0.492647059	1.029412
Observations	17	17
Pearson Correlation	0.005162601	
Hypothesized Mean Difference	0	
df	16	
t Stat	-5.123712246	
P(T<=t) one-tail	5.10296E-05	
t Critical one-tail	1.745883669	
P(T<=t) two-tail	0.000102059	
t Critical two-tail	2.119905285	

Number of times class notes are accessed

t-Test: Paired Two Sample for Means

	Before Mobile learning	*After Mobile learning*
Mean	3.117647059	3.764705882
Variance	0.735294118	1.816176471
Observations	17	17
Pearson Correlation	0.187704005	
Hypothesized Mean Difference	0	
df	16	

t Stat	-1.833333333
P(T<=t) one-tail	0.042712258
t Critical one-tail	1.745883669
P(T<=t) two-tail	0.085424516
t Critical two-tail	2.119905285

Number of days per week quizzes or exams done

t-Test: Paired Two Sample for Means

	Before Mobile learning	After Mobile learning
Mean	2.058823529	3.941176471
Variance	0.808823529	1.058823529
Observations	17	17
Pearson Correlation	0.139046628	
Hypothesized Mean Difference	0	
df	16	
t Stat	-6.116076577	
P(T<=t) one-tail	7.44356E-06	
t Critical one-tail	1.745883669	
P(T<=t) two-tail	1.48871E-05	
t Critical two-tail	2.119905285	