INTEGRATION OF INFORMATION COMMUNICATION TECHNOLOGY (I.C.T) IN THE INSTRUCTION OF GEOGRAPHY IN SECONDARY SCHOOLS IN MATUNGU, KAKAMEGA-KENYA

BY

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DECLARATION

Declaration by Candidate

This thesis is my original work and has not been presented for a degree in any other university. No part of this work may be reproduced without the prior written permission of the author and/or Moi University**.**

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DEDICATION

This thesis is dedicated to the Almighty God for giving me life, power, knowledge, wisdom and understanding to write it and also to my beloved children Ashley Kimberly, Basil Brighton and Claydel Gift for their support and encouragement during the writing of this thesis.

Secondly, this academic work is dedicated to the precious memory of my late father Mr. Daniel Martin Musumba who bid me goodbye on 6/7/2018. Earlier on in my childhood, he had pointed to me the direction to education. I have never looked back. God rest his Great Soul in eternal peace.

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ABSTRACT

Kenyan government recognizes the importance of ICT integration in teaching in both secondary and primary schools as is envisaged in Kenya Vision 2030. Efforts to implement ICT integration was first initiated by publishing sessional paper No.1 of 2005 where ICT application was given prominence. The purpose of this study was to investigate the extent of ICT integration in teaching Geography in public secondary schools in Matungu Sub-county, Kakamega County. The research objectives were; To establish the status of ICT intergration in teaching Geography in secondary schools in Matungu sub-county. To find out the type of ICT tools available and their maintenance for intergration in teaching Geography in secondary schools in Matungu sub-county. To find out the impact of economic stimulus programmes in teaching Geography in secondary schools in Matungu sub-county and to establish the challenges in ICT intergration in teaching Geography in secondary schools in Matungu sub-county. Descriptive survey research design was used for the study. Stratified sampling technique was used to sample schools; purposive sampling technique was used to sample principals and teachers while simple random sampling technique was used to sample students for the study. 4 schools from among the ones which were not sampled for the study were used for piloting. A total of 132 respondents were targeted by the study (constituting 12 principals, 24 geography teachers and 96 students). The study adopted Technology Acceptance Model Theory (TAM). Questionnaires and interview schedules were used as instruments for data collection. Statistical Package for Social Sciences (SPSS) was used to analyze the data. Descriptive statistics such as frequencies, percentages and means were used to analyze the data .The study recommended that the government and other stakeholders should provide funds to facilitate ICT integration and teachers should embrace new technologies to improve their attitude towards ICT integration in teaching. The study recommended that another study be done in an urban setting to compare the difference of ICT integration in teaching with the rural setting. The study will assist the curriculum designer to come up with proper measures so that ICT integration is taught inclusively.

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ABBREVIATION AND ACRONYMS

2G   Second Generation Mobile Communications

3G   Third Generation Mobile Communications

ADSL   Asymmetric Digital Subscriber Line

CCK   Communications Commission of Kenya

CDMA   Code Division Multiple Access

EvDO   Evolution-Data Optimized

ESP-ICT   Economic Stimulus Programme- Information Communication

Technology

GIS   Geographic Information System

GSM   Global System for Mobile Communications

ICT   Information and Communication Technologies

KICA   Kenya Information and Communications Act

KNBS   Kenya National Bureau of Statistics

KPLC   Kenya Power & Lightning Corporation

PCK   Postal Corporation of Kenya

UA   Universal Access

UAF   Universal Access Fund

USF   Universal Service Fund

CHAPTER ONE

INTRODUCTION TO THE STUDY

1.0 Introduction

This chapter provides an overview of the background to the study, statement of the problem, purpose and objectives of the study, research questions and significance of the study. It also contains the scope of the study, limitation of the study and operational definition of terms.

1.1 Background to the Study

In Kenya, the secondary school curriculum is organized on the basis of the subject-centered curriculum design. According to Shiundu and Omulando (1992), this design involves the organization of the curriculum in terms of separate subjects. Consequently, in Kenyan secondary schools, the content of the curriculum is arranged according to specific subjects representing a specialized body of common knowledge. One of the subjects taught in secondary schools in Kenya is Geography. In recognition that the subject can play an important role in meeting national goals of education, the Ominde Commission (Republic of Kenya, 1964) in its report recommended that the geography syllabus should proceed from a study of the immediate environment of the schools to the rest of the country, to Africa and to the rest of the World.

Later, the Mackay Report (Republic of Kenya, 1981) stressed the important role of geography in the curriculum by declaring that one of the main aims of the proposed education system would be producing graduates well informed on issues about the environment. The importance of these two commissions is that Geography was given a lot of emphasis in the 8-4-4 system of education. Indeed from the time of the introduction the 8-4-4 system of education up to 1992, Geography was a compulsory (core) subject for all secondary school students in Kenya from Form One to Form Four.

However, the Kamunge Report (Republic of Kenya, 1988) noted that curriculum aims and objectives for secondary school were not fully attained because of a loaded curriculum.

The commission recommended reducing the number of subjects offered in primary and secondary school levels. This led to the first curriculum review of the new system of education which took place in 1992 (Ministry of Education, Science and Technology, 2001). After the review, Geography remained a core subject only in Forms One and Two. In Forms Three and Four it became an elective subject.

The current curriculum at the secondary school level includes a minimum of seven subjects selected from four groups of subjects Kinuthia (2009). Subjects in Group One are core to all students up to the Kenya Certificate of Secondary Education (KCSE) and include Kiswahili, English and Mathematics. Group Two are the sciences where students must choose at least two subjects. In Group Three we have the humanities, which include Geography. Students must choose at least one subject in this group. Group Four and Five are the Technical and Creative Arts subjects and students must choose at least one subject to sit for during KCSE examination Kinuthia, (2009). Geography is an important subject in one's life. The subject helps people to make sense of the fast changing, highly interconnected and interdependent world in which they live (Hampshire County Council, 2014). By its very nature, Geography is the subject that can help students unravel some of the mysteries that surround them and the environment in which they live Nchebere (2014). Its main focus is the Earth and it occupies a distinctive place in the world of learning Herbert, (2004). It integrates the study of human societies and the Earth's physical components. Geography aims at helping learners understand the world, and as such, the views of the National Council of

Geography Education (1994) are that the subject contributes to international understanding and helping learners understand their own country.

Through the study of Geography at secondary school, the learner acquires employable skills and is prepared for future careers. The subject prepares learners by equipping them with skills that they can utilize later as adults in building the nation. Geography is a requirement for one to work with agencies that deal with development or provision of aid, environmental work, Geographical Information Systems (GIS), as well as working in human population careers and in tourism and travels the subject is also a requirement for one to pursue a career in Agriculture, forestry, cartography and surveying. According to Mansell (2007), the close affinity that exists between Geography and the world of work is because geographers are exposed to a wide curriculum involving the transmission of many skills. Because of the importance of Geography in the curriculum and as a career subject, effort should be made to improve its teaching in secondary schools. Improving the teaching of Geography will in turn improve the performance of students who choose the subject for their KCSE Examination. Therefore the subject needs to be performed at par with other subjects in humanities department. To achieve this, the aspect of ICT integration in teaching Geography cannot be under looked.

According to White (2015), Information Communication Technologies (ICT) develops evermore rapidly and continues to profoundly influence our lives, the way teachers deliver the curriculum and how students learn. White; (2015) asserts that ICT can be heavily embedded into the curriculum or used as a tool to strengthen teaching points The Australian Curriculum, Assessment and Reporting Authority (ACARA) recognizes the rapid and constant growth and development that occurs in the sphere of ICT. They highlight that 'the nature and scope of ICT capability is not fixed, but is responsive to ongoing technological developments'. ICT is a domain in its own right but it is also a

tool for engaging students. ACARA categorizes ICT into three sets which include 'investigating, communicating and creating with ICT' (GOA 2015).

The Authority further emphasizes that in literacy blocks, teachers often use iPads and laptops in delivering their lessons. There are apps for specific learning areas student and schools often feature news or radio program as part of the English and ICT curriculum. It also recognizes the fact that the integration of ICT in teaching subjects like Geography among students has elicited excitement as it reports that ICT allows some students to access vital information on their own leading to expedition in learning. (ACARA 2015)

Ailsa Davidson, head of the physical education and health department at a high school in Melbourne, says teaching staff use GPS technology, pedometers, sport apps, foot pods, fit bits and heart rate monitors to track physical activity in their sport and health classes. She explains that the most successful programs she has seen include live streams that track on-field performance that are connected to a device. Students can participate in physical activity and then analyze the performance with the graphs and data that is produced. The VCE physical education study designs assessments including a practical laboratory report, case study analysis, a data analysis and a critically reflective folio/diary of participation in practical activities, all which could include the usage of Information Communication Technology. These ICT programmes equally help in simplifying complex Geography lessons which include field excursions among others.

According to the Malaysian government, the integration of ICT in the teaching of learning subjects such as Geography, makes learning learner-centred with a self-

learning environment that enables the student customize his/her own learning experiences.

In this respect, Malaysia initiated the concept of smart school, a learning institution with objectives to foster self-assessed, self-paced, and self-directed learning through the application of ICTs (UNDP 2004). The Sri Lankan Government also runs several key initiatives connecting 92 education centres across provinces, regions and sectors to the ministry, and developing computer-training centres at eight hundred selected schools. The main aim is to facilitate the uniform integration of ICT in the teaching across the country (UNDP 2004).

According to Volman (2005), the integration of ICT on curriculum is making major differences in the learning of students and teaching approaches. Schools in the Western World invested a lot on ICT infrastructures over the last 20 years, and students use computers more often and for a much larger range of applications. Several studies reveal that students using ICT facilities mostly show higher learning gains than those who do not use. For instance, Kulik's (2000) finding across 75 studies in the United States showed the following. Students who used computer tutorials in mathematics, natural science, and social science score significantly higher on tests in these subjects. Students who used simulation software in science also scored higher. The findings also indicated that primary school students who used tutorial software in reading scored significantly higher on reading scores. Very young students who used computers to write their own stories scored significantly higher on measures of reading skill. Moreover, students who used word processors or otherwise used the computer for writing scored higher on measures of writing skill.

In Watson's (2001) description, ICTs have revolutionized the way people work today and are now transforming education systems. As a result, if schools train children in yesterday's skills and technologies they may not be effective and fit in tomorrow's world. This is a sufficient reason for ICTs to win global recognition and attention. For instance, ICTs are dependable tools in facilitating the attainment of one of the Millennium Development Goals (MDGs), which is achievement of universal primary education by the year 2015. Kofi Anan, the former United Nations Secretary General, pointed out that in order to attain the goal of Universal Primary Education by the year 2015; we must ensure that information and communication technologies (ICTs) unlock the door of education systems. This indicates the growing demand and increasingly important place that (ICTs) could receive in education. Since ICTs provide greater opportunity for students and teachers to adjust learning and teaching to individual needs, society is, forcing schools to give appropriate response to this technical innovation.

In Kenya just like other countries, there is no doubt that ICT is the medium of today. It is the medium of young people, especially the secondary students who are always willing to go any length to embrace technology.

ICT is already playing a pivotal role in almost every aspect of their lives. Therefore, its use in a classroom/learning environment supports the delivery of Geography in a way that makes it highly engaging. The use of ICT in teaching Geography helps students learn by providing access to large quantities of information on people, places and environments. It also provides the framework for analyzing data to investigate patterns and relationships in a geographical context. Once learners have made their findings, ICT can then help them organize, edit and present information in many different ways.

According to Holocha (2002), ICT enables learners to work with live information through video conferencing, and very quick response times through the use of emails increases students' motivation. Holocha (2002) further asserts that when using ICT, teachers have also reported a greater understanding of Geographical patterns and processes. Storey (2002) also asserts that the use of digital photography allows learners to reflect on their work in the field after returning to the classroom. Photographs can be shared with learners in other localities to allow comparison of place. Digital photography has an advantage over conventional photography because it is cheaper, quicker and more flexible, allowing it to be an everyday aspect of teaching and learning.

The use of ICT programs such as Geographical Information Systems (GIS) simplify many geographical concepts and present large amounts of non-sequentially related data in simple and readily accessible formats, allowing students to concentrate on interpreting and analysing data West,(1999). Taylor (2003) emphasises that using GIS software to produce and manipulate maps at a range of scales can save lesson time and give better quality results. He says that using GIS software equally enhances spatial awareness and decision-making skills. Abbott (2003), report that using simulations and modelling tools associated with ICT can lead to enhanced understanding of geographical topics such as erosion and agriculture. Storey (2003) summarises the use of ICT in teaching Geography as follows.

Study Rainfall Types and Information Weather and Climate Information, Coastal Erosion, Drawings, Reviewing Maps and Diagrams, Word Processing, The Use of Publisher for Brochures, Research to find more, geographical information Search for Appropriate Illustrations

Geography performance in Kenya has been consistently poor especially physical Geography. The nature of the questions mostly requires students to explain the steps in the process leading to the formation of a feature which is far and wide from both the geography teacher and students. Since ICT can bring out the simulation of the reaction process for example you tube, when observed by students it can bring out the process more clearly than the two dimension diagrams in our course books. In comparison with other humanities the quality grades are fewer.

The importance of academic performance to a learner cannot be gainsaid. Aremu (2001), in emphasizing the significance of performance in education has the opinion that it is one of the basic criteria for measuring the acquisition of learning. He said that the use of standards of excellence and acquisition of examinations grades is a measure of the ability of a candidate's mastery of content's mastery and skills necessary to apply knowledge acquired in a particular situation Aremu, (2001). Going by this knowledge on the importance of academic performance therefore, it is only logical that effort should be made to promote learners" performance in examinations

Performance that is good for both internal and external examinations is an incentive in creating academic discipline, commitment and desire in pursuing various subject to higher level for career purposes Kojweke, (2013). However, the performance of geography in KCSE has not been very good. For example, while releasing the KCSE results for 2013, the Minister for Education noted that Geography, together with such subjects as English, mathematics, chemistry and Agriculture had recorded a drop in performance (Republic of Kenya, 2014). From the results released in that year, Geography posted a mean score of 42.41% and stood at position 19 out of 31 subjects (Kenya National Examinations Council, 2014). It dropped from the performance of the previous year where the mean score had been 46.58% and at position 19 out of 30

subjects done that year (Kenya National Examinations Council, 2013) (see appendices for KCSE subject performance in Kenya for years 2012 and 2013). This performance is weak, both in terms of percentage score and in improvement. Considering Matungu Sub County, a scrutiny of students' performance shows that performance in the subject has similarly not been good. This can be deduced in the table shown below.

Table1.1: Performance of Geography and other Humanities in Matungu sub-county

Subjects	C.R.E					HISTORY					GEOGRAPHY				
Grades	A	A-	B+	B	B-	A	A-	B+	B	B-	A	A-	B+	B	B-
2010	220	196	267	170	90	86	108	140	76	58	19	13	26	37	53
2011	196	213	189	166	97	123	102	132	96	48	23	09	18	51	62
2012	240	236	183	123	73	126	113	128	81	63	20	11	19	46	59

Source: Matungu District Education Office (2015)

As clearly stipulated in Kenya vision 2030, Kenya aims to turn into a globally competitive and prosperous nation with a high quality of life (vision 2030).To achieve this noble goal, it is expected that the education sector will help deliver this objective. It is expected that achievement of these goals in the three pillars (social, economic and political) envisaged in the vision, will be anchored on an all-round adoption of science, technology and innovation (STI) as an implementation tool (vision 2030).

There is no doubt that technology especially information communication technology has a critical role to play in helping education deliver its mandate. The sessional paper No. 1 of 2005 which is the current education policy captures stakeholder recommendations on how education needs to be transformed to be responsive for the 21st century needs for education and training. ICT in education is well articulated in this policy document. The sessional paper provides a policy framework within which integrations of modern tools in teaching and learning is to take place in Kenya.

Additionally, this will help the ministry bridge the digital divide where the most countries lag behind in the digital world and particularly in the use of internet. One vital step to bridging the digital gap is introducing computers and related infrastructure as medium of instruction in schools .This will equip the future labour force with skills to participate and compete in the 21st century education and at the same time attain Kenya's education goals.

In Kenya the transition from traditional learning (teacher centered learning) to learner centered learning is well on course. Teacher training institutions (preset and INSET) are already incorporating learner centeredness in their practice.

The use of ICT in the curriculum delivery is recognized as central to learner centered curriculum deliver at all levels of teacher training. However, challenges abound, teaching is pretty much conducted in the same old way by a percentage of teachers. This is as a result of the false believe that one needs a whole suite of ICT equipment to deliver the curriculum in a learner centered way. They fail to appreciate the fact that simple readily available equipment accords teachers and learner a perfect teaching and learning opportunity. Equipment such as video cameras, mobile phone, still cameras and the internet are a case in point. ICT can play a role in accelerating the paradigm shift as it can be used to actively engage students, make them collaborate and reflect on their learning and through simulations (of abstracts concepts) it can help contextualize content.

ICT is therefore a means for meeting these twin challenges as it improve access to and promote equity in education by providing educational opportunities to a greater number of people of all ages, including the traditionally underserved (e.g. those in rural and remote areas, women and girls and persons with disabilities). Secondly, ICT can

enhance the quality of teaching and learning by providing access to a great variety of educational resources and by enabling participatory pedagogies. Thirdly, ICT can improve the management of education through more efficient administrative processes, including human resource, management, monitoring and evaluation, and resource sharing.

In cognizance of the critical opportunities accorded by ICT in service delivery as well as in teaching and learning, the Government has over the years invested heavily in the requisite ICT infrastructure. Key among the infrastructure put in place in the recent years include the laying of the fiber optic cable across the country, facilitation of exponential growth of the telecommunication industry, provision of computers multimedia laboratories and related accessories to school a- a case in point is the current ESP-ICT project that aims at equipping 1050 schools with ICT infrastructure and most importantly, capacity building of teachers in the area of integration.

Learning Resources and the Teaching/Learning of Geography

Campbell, Flageolle, Griffith and Wojcik (2009) say that use of learning resources in teaching/learning process is called resource-based learning. These authors point out those learning resources are used to augment more instructivistic teaching approaches.

The authors add that resource-based learning is an educational model which is adopted in teaching and learning to enable learners to be actively engaged with a variety of resources in print as well as in non-print format. According to Farmer (1999), resource-based learning is anchored on the principle that each learner is attracted to the learning resource and content best suited to the information processing skills and styles they possess. The significance of learning 11 resources in teaching and learning has been aptly captured by Campbell et al. (2009). They say that in the use of resource, learners"

self-sufficiency in the learning process is enhanced. This is because they ask productive questions, they synthesize information, analyses issues as well as interpret and evaluate information at their disposal.

Simsek (2003) in Saglam (2011) sees learning resources as including educational materials and resources that are used for developing the desired knowledge, skills, attitudes and values in learners. Faize (2011) categorized learning resources into either print or non-print materials designed to pass content to learners in the learning process. They identified learning resources as including kits, textbooks, magazines, newspapers, pictures, recordings, slides, transparencies, videos, video discs, workbooks, and electronic media including music, movies, radio, software, CD-ROMs, and online services. On its part, USAID (2006) views learning resources as broadly comprising instructional guides, audio-visual materials, textbooks, workbooks, practice exercises, activities, tests, and supplementary readers. USAID (2006) identified the textbook as the classroom instruction input most commonly utilized, studied, and documented.

The significance of learning resources is firmly recognized in teaching and learning. For example, the UNESCO (2012) says apart from qualification of teachers and school facilities, quality education is determined by learning resources in teaching and learning. On his part, Oluoch (1982) points out that the formulation of a new curriculum project incorporates selecting and developing learning resources and equipment. Incorporation shows the important role that learning resources play in teaching and 12 learning. The UNESCO (2012) further strengthens this view by concluding that for effective support in teaching and learning, the much needed quality learning resources should be made available to teachers and students in adequate quantities. From a study conducted by Onsongo (2001) in Nairobi schools, it was established that instructional resources are critical in the learning process.

Saskatchewan Ministry of Education (2013) has provided the indicators of quality learning resources. The six indicators presented are as follows: physical quality (they are durable and thus have high physical and technical quality and appealing to users); content/format indicator (should be well organized and their artistic/literary quality should be high and with current and authenticated information); social considerations (should be fair and of equitable considerations on age of learners, their ability, their culture, their gender, their socio-economic status, their religion, and sexual orientation); design (they are user-friendly, for example extensive in-service training before use is not necessary and they are consistent with the philosophy of the curriculum); developer qualifications (it is imperative that they are developed and validated by people who are qualified and of high reputation; and finally there is an indicator on cost (they are reasonable on cost).

Given the wide range of available learning resources, Saglam (2011) holds that in the process of teaching and learning, teachers must use the required materials and methods. Saglam (2011) adds that instructional resources conveniently promote the ability of a teacher to pass a message to learners in a manner that is accurate, proper, clear and understandable. This is by making knowledge that is abstract to become concrete and also enable students to comprehend ideas that were complex by making them simple.

According to UNESCO (1997), training of teachers in the use of learning resources is important and this must not be ignored. This is because the effectiveness of available learning resources will depend on the ability of teachers to use them as intended. Therefore, any designed curriculum and textbook development programme should also involve development of teachers' manuals as well as additional teaching resources (UNESCO, 1997). These resources, According to UNESCO (1997) in-service training opportunities should be used to introduce learning resources to teachers. Adeyanju

(2003) conducted a study among 80 professionally trained teachers in Ghana from both primary and secondary schools. The study findings showed that although the participants had received professional training, only 12 of them had received specialized training on the production and use of learning resources for effective curriculum delivery.

Despite the importance of a diversity of learning materials in teaching and learning, in poor countries, with untrained teachers, the textbook becomes the most important, if not the only vehicle for delivering the curriculum (UNESCO, 1997). UNESCO (1997) further points out that because textbooks and other learning resources directly impact on what teachers teach and how it is taught, the process of curriculum development and curriculum materials are not only sensitive matters but significant for learning.

To raise education quality therefore, the government, school administrators, parents, and donors among other education stakeholders must ensure that teachers have appropriate working environment which has the relevant learning resources for use that enables curriculum delivery to the learner. This will ensure that the huge investments made by the government and donors alike do not go to waste. There is thus the need for a study aimed at examining the relationship between learning resources used in teaching and learning geography with regard to variety, availability, use, and teachers" training vis-à-vis students" academic performance.

Mundulia (2012) conducted a study in Eldoret Municipality on availability of teaching/learning resources and performance in science subjects in secondary schools. The study related the availability of human and non-human resources to performance in the sciences in KCSE. From the study findings, it was established that textbooks" availability, availability of revision books, availability of laboratory chemicals and

equipment in the high performing schools was higher than it was in those schools whose performance was low. It was also established that of the seven low performing schools, two lacked a laboratory. Five schools with low performance which possessed a laboratory in turn did not have laboratory technicians. Also, one laboratory in the low performing schools was fully equipped. Further, in the low performing schools, libraries were missing. Therefore, the availability of learning resources differed between high performing and low performing schools. From these differences in performance based on teaching/learning resources, the researcher in the current study felt that there was a need to examine the relationship between learning resources and learners" performance in KCSE in geography in Matungu sub- County.

1.2 Statement of the Problem

When children enroll at school, the aspiration of many of them, that of their parents/guardians as well as that of people in government is academic success. So far, one of the tools of measuring academic success is performance in examinations Rankin, (2015).

Performance of the geography subject in the KCSE examination both nationally and in Matungu Sub County has not been good. For example, nationally, while performance in the subject has been low at 46.58% and 42.41% for years 2012 and 2013 respectively (Kenya National Examinations Council, 2013; Kenya National Examinations Council, 2014) it has also been characterized by drop in performance at times (see appendices 8 and 9). In results presented in this study on KCSE performance in secondary schools in Matungu Sub County for the period between 2011 and 2013, geography attained an average score of 5.36 which is a score of Grade C-. The implication is that many candidates in the county performed poorly in geography between 2011 and 2013. Out

of 17 subjects offered to candidates in the county within that period, geography occupied position 12.

The poor performance in the subject calls for a concerted effort to ensure academic success among students who opt to pursue the subject in Forms Three and Four. Owing to possible challenges in the learning of geography including a wide syllabus as well as teaching of topics from all continents of the world, it is imperative that teachers must deliver the geography curriculum using the appropriate methodology. An important method could be the application of learning resources in delivering the geography curriculum to the learner. The teaching/learning of geography could be more successfully conducted if learning resources form part of the classroom experience. This could raise the academic performance of students. This is because learning resources can enable learners to interact with the content being taught, thus making the information being provided familiar to them. It was as a result of the poor performance in geography in KCSE in Matungu County that this study was conceived with a view to assessing the relationship between learning resources and students" academic performance in geography in KCSE in the county.

ICT tends to expand access to education. Through ICT, learning can occur anytime and anywhere. Online course materials, for example, can be accessible 24 hours a day, seven days a week. Teleconferencing classrooms allow both learner and teacher to interact simultaneously with ease and convenience. Based on ICT, learning and teaching no longer depends exclusively on printed materials. Multiple resources are abundant on the internet and knowledge can be acquired through video clips, audio sounds, and visual presentation and so on. Current research has indicated that ICT assists in transforming a teaching environment into a learner-centred one Aleman, (2011). Since learners are actively involved in the learning processes in ICT

classrooms, they are authorized by the teacher to make decisions, plans and so forth Huang, (2010). ICT therefore provides both learners and instructors with more educational affordances and possibilities.

The study of geography especially physical geography involves complex diagrams, cumbersome processes such weathering processes among others. To simplify and synthesize these complex processes for deeper understanding of students, ICT must be fully embraced in teaching. However, reports still show that majority of public secondary schools have not fully integrated ICT into teaching and learning. According to a report by Kavagi ,(2016) there are many schools which have not made any effort what so ever to integrate ICT into teaching despite the government's effort of connecting over 85% of public schools with electricity. The report emphasizes that there is serious shortage of ICT infrastructure among those schools which are in the process of integrating ICT in teaching and learning. This apparent inadequacy of ICT infrastructure among others has led to the undertaking of this study which is focusing on the extent of ICT integration in teaching Geography in Matungu Sub-county, Kakamega County.

1.3 Purpose of the Study

The purpose of the study was to investigate the extent of ICT integration in teaching Geography in public secondary schools in Matungu Sub-county, Kakamega County.

1.4 Objectives of the Study

The study was guided by the following objectives.

1. To establish extend of ICT integration in teaching Geography in secondary schools in Matungu Sub-county.

2. To find out the types of ICT tools available and their use for integration in teaching Geography in secondary schools in Matungu sub county.

3. To find out the impact of Information Communication and Technology (ICT) in teaching Geography in secondary schools in Matungu Sub-county, Kakamega County.

4. To establish the challenges in ICT integration in teaching Geography in secondary schools in Matungu Sub-county.

1.5 Research Questions

The study was guided by the following Research Questions.

1. What is the status of ICT integration in teaching Geography in secondary schools in Matungu Sub-county?

2. What are the types of ICT tools available for integration in teaching Geography in secondary schools in Matungu Sub-county?

3. What is the impact of ESP-ICT in teaching Geography in secondary schools in Matungu Sub-county?

4. What are the challenges in ICT integration in teaching Geography in secondary schools in Matungu Sub-county?

1.6 Assumptions of the Study

The study was guided by the following assumptions

1. All schools are aware that they should use ICT in teaching and learning

2. All the respondents will be willing to provide honest and clear responses.

3. All the respondents will be available and ready to respond to study instruments

1.7 Scope and Limitations of the Study

1.7.1 Scope of the Study

This study was carried out in Matungu Sub-county, Kakamega County in 2014. It investigated the extent of ICT integration in teaching Geography. The independent variables of the study included the status of ICT integration in teaching Geography, the types of ICT tools available in the schools, the impact of ESP in ICT in teaching Geography and the challenges in ICT integration in teaching Geography. The dependent variable of the study on the other hand referred to the quality teaching of Geography and its subsequent better performance due to ICT integration. The intervening variables were the measures to be taken to facilitate ICT integration in teaching Geography such as training of teachers and availing ICT resources. The study was conducted among 12 public secondary schools and it targeted principals, teachers and students.

1.7.2 Limitations of the Study

According to Orodho (2004) a limitation is an aspect of the study that the researcher knows may adversely affect the results or generalizability of the study, but over which he/she has no direct control over. The researcher could not control the attitude of the respondent and this could have affected the findings. This problem was avoided by the use of highly structured questionnaires .The researcher could have also wished to conduct the study on the pedagogical issues on the implementation of Geography revised curriculum in all secondary schools in the entire Kakamega county, but because of limited funds and time available, the current study only focused on selected secondary schools in Matungu Sub county

Another limitation was that some teachers would not give genuine and honest information on the extent of ICT integration in teaching various subjects. The

researcher attempted to counter this by informing them that the findings would be useful in improving the quality of geography performance. Similarly, the students would fail to divulge some information about their teachers and reveal information on the use of ICT tools in their classes for fear of being punished by their teachers. The researcher assured them that the information obtained would be confidential and would only be used for research geared to improving their education.

The data would be obtained at a point in time when it was difficult to determine how long the ICT tools had been available and frequency of use in the school. For instance, a school might have recently acquired the ICT tools; in that case the full impact would not have set in by the time of the survey.

1.8 Justification of the Study

Little research has been done especially in this area of ICT/ Geography, teachers are not well prepared to teach the new content of the revised curriculum (KCEC, 2012). This thus makes a study into the issue necessary .New instructional techniques that use ICTs provide a different modality of instruments. For the student, ICT use allows for increased individualization of learning in geography. In schools where new technologies are used, students have access to tools that adjust to their attention span and provide valuable and immediate feedback for literacy enhancement, which is currently not fully implemented in the Kenya secondary schools. Although efforts have been made to ensure that ICTs are available and used in Kenyan secondary schools, the level of uptake is still low. It has been observed by Goshit, (2006) that most schools, both private and government, do not offer ICT training programs

1.9 Significance of the Study

The study would be of significance to various people. First and foremost, the study would be of great significance to the government. It would help the government to gauge the extent of ICT integration in learning, a project they would wish to see succeed. The study would also reveal some of the challenges hindering ICT integration. This would enable the government to come up with appropriate mitigation measures.

Secondly, the findings of the study would help the teachers in identifying some of the areas of weaknesses in both teachers and learners. This would create room for improvement as both parties would have known what is expected and start working towards realizing the expectations. The findings would also be of significance to the secondary school principals as they would come to know their role in the integration of ICT in learning. The study would also inform the already promulgated policies in education. By highlighting on the extent to which ICT is being integrated in learning, policy makers can review their policies to ensure effective integration of ICT in learning.

Finally, the findings of the study would provide literature for further studies in the field of ICT integration in learning and other educational related matters and would also influence scholarly research that leads to an educational intervention in the use of ICT in learning in secondary schools.

1.10 Theoretical Framework

For the purpose of guiding the study the Classroom Instruction Theory that was advanced byBall (2003) was selected. Cohen, (2003) have advanced the theory for the purpose of presenting instruction and learning as a system of interactions. In these interactions, learners interact with fellow learners, learners interact with their teachers,

the teacher interacts with content, and learners interact with content. According to Kurdziolek ,(2011) this model therefore helps in conceptualizing learning resources not just as physical things, but as including systems composed of objects, relationships, actors, and environments. Cohen, (2003) conceptualization of the Classroom Instruction theory According to Cohen, (2003) educational resources include teachers' formal qualifications, books, libraries, and buildings among others and can be used as valid measures of educational quality. They point out that access to education itself does not cause learning. They say that research reports have shown that teachers and schools having similar resources are able to do different things with the resources, leading to different results in learning. They attribute this to different uses of learning resources. According to Cohen (2003) researchers have discerned what makes instruction work. Results of the studies have shown that resources that helped students learn were deployed by the more effective teachers. In this scheme of things, teaching is presented as activities aimed at enabling students use materials, tasks, and other resources well. Resources are significant in that, their access, use and teacher preparation create educational quality.

These proponents of the theory foresee instruction as consisting of teachers and students interacting among themselves and around the content in environments interaction refers to the connected work between teachers' and students' which may extend for days, weeks, and months. According to Lampert (2001), as tasks develop instruction evolves, in turn leading to other tasks, and as students take part in the learning process, their understanding waxes and wanes. In the designing of lessons, setting learning tasks, interpretation of students' work and in managing time and activity, learning resources are important. To accomplish their tasks, teachers and learners must therefore operate in several domains, including use of knowledge, coordination of instruction,

mobilization of incentives for performance, and management of learning environments (Cohen et al. 2003).

Coordination in instruction also determines the use of resources. Teachers' and students' work on content is one dimension of coordination concerns. Cohen et al. (2003) are of the view that because instruction consists of complex interactions among teachers, learners, and the content, then there are many opportunities for uncoordination. They say that the coordination of instruction is dependent on the making of connections of teachers' and learners' ideas, over time, and with elements in the environment. This coordination depends on the knowledge teachers have on content, how it should be presented, learners' understanding, agents in the environment, as well as having a will to make connections that are fruitful. Coordination also depends on applying social resources that build trust and support the collection and analysis of evidence. An equally important instruction domain involves managing elements of the learning environment. When teachers and students deal with problems of coordination, resource use, and incentives, they do so in and within learning environments (Cohen et al., 2003).

Cohen et al. (2003) in their analysis have offered a view of causality in the important role that learning resources contribute in learning. They point out that the crucial research question cannot be "Do resources matter"? They say that this is because no valid effort can be made in learning or teaching that can be conceived in the absence of resources. Further, they say that adequate evidence exists that resources are causally related to learning. Instead they say that the crucial question must be: "What resources matter, how, and under what circumstances?" they point out that one key circumstance is the desired result.

Cohen et al. (2003) have concluded that the desired result of learning resources should be school improvement. On her part, Kurdziolek (2011) has pointed out that the Classroom Instruction Theory is useful for understanding how learning is achieved through successful student-resource interactions. The author adds that the theory is also useful in understanding the impacts of learning resources on important factors such as student academic outcomes.

The study also adopted Technology Acceptance Model (TAM). This theory is associated with Davis (1989). He presented this theoretical model to predict and explain ICT usage behaviour, that is, what causes potential adopters to accept or reject the use of information technology. Theoretically, TAM is based on the Theory of Reasoned Action (TRA). In TAM, two theoretical constructs, perceived usefulness and perceived ease of use, are the fundamental determinants of system use, and predict attitudes toward the use of the system, that is, the user's willingness to use the system. Perceived usefulness refers to "the degree to which a person believes that using a particular system would enhance his or her job performance", and perceived ease of use refers to "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, 320).

In these articles TAM was used in three different ways, namely to compare different adoption models, develop extensions of TAM, or replicate the model. For example, Davis et al. (1989) empirically compared the ability of TRA and TAM to predict and explain the acceptance and rejection by users of the voluntary usage of computer-based technology; Venkatesh and Davis (2000) developed and tested a theoretical extension of TAM, referred to as TAM2, which explains perceived usefulness and usage intentions with the help of social influence and cognitive instrumental processes, and Adams et al. (1992) replicated Davis' (1989) study.

The study adopted Technology Acceptance Model because it sought to know the extent of usage of ICT on curriculum implementation and reasons as to why some people found it hard to use (reject) ICT on curriculum implementation. Davis (1989) argues that some people fail to adopt the use of ICT because of negative perception on its usefulness and intention.

This theory is associated with the emergence of geomatics, a branch where ICT tools such as computers are applied to the traditional spatial techniques in cartography and topography. According to Michel Paradis, a French-Canadian surveyor who introduced geomatics, he claimed that at the end of the 20th century, the needs for geographical information would reach a scope without precedent in history and in order to address these needs, it was necessary to integrate in a new discipline both the traditional disciplines of land surveying and the new tools and techniques of data capture, manipulation, storage and diffusion, ICT being at the fore front. Kavanagh Barry, (2003) agreed with Michael Paradis as he declared that the application of ICT in the study of geography in the 20th century has made it much easier and simpler. According to Kavanagh Barry (2003), geographical features which were initially hear says for students can today be brought before students in a class through the use of ICT. He terms this as one the biggest achievements in the integration of ICT in teaching and learning especially in physical geography. Kavanagh Barry (2003) summarizes the relevance of the theory to this study to be in the belief that the use of ICT in teaching geography is believed to have made teaching and learning of geography useful, easier and simpler.

The theory of Cognitive Flexibility (Spiro, et al, 1992), emphasized by Kirkpatrick's four levels of evaluation (Kirkpatrick, 1994). Kirkpatrick emphasizes reactions, learning, transfer and results. Level one is reactions and just as the word implies,

learning at this level measures how participants in a training program react to it. It attempts to answer questions regarding the participants' perceptions - did they like it? Was the material relevant to their work?. In addition, the participants' reactions have important consequences for learning (level two), although a positive reaction does not guarantee learning; a negative reaction almost certainly reduces its possibility (Winfrey, 1999). At level two, teaching moves beyond learner satisfaction and attempts to assess the extent to which students have advanced in skills, knowledge, and attitude to determine the amount of learning that has occurred. Level three is transfer; this level looks at the transfer that has occurred in learners' behavior due to the teaching program.

Teaching at this level attempts to answer the question - are the newly acquired skills, knowledge, or attitude ready to be used in the everyday environment of the learner? Cognitive Flexibility means the ability to spontaneously restructure one's knowledge in many ways, in adaptive response to radically changing situational the advantage of this is that the skills and knowledge are easier to train and transfer of learning is usually a success. Far transfer is being able to use learned knowledge or skills in very different environments (Allessi and Trollip, 2001).

With far transfer teachers need to design ICT instruction where learners are trained to adapt guidelines to changing situations or environments. Thus once the skills and knowledge are acquired, the learner is able to make judgments and adapt to different situations. This is most ideal for the dynamic ICT evolution in the world today. To support the degree of transfer of knowledge desired, it is important to understand that it is every learners wish to apply the trained skills acquired in doing their work. But this applies only when the learner acknowledges the relevancy of the skills to his/her nature of work expected of him in the field. Level four is results, frequently thought of as the bottom line, this level looks at the success of the program in terms that managers and

executives can understand -increased production, improved quality, reduced frequency of accidents, increased enrollment, and even higher profits or return on investment. According to Holton 1996 (in Yamnill and McLean, 2001), one cause of failure to transfer is that sometimes the training rarely provides for transfer of learning. That is, cognitive learning may well occur, but program participants may not have an opportunity to practice the training in a job context or may not be taught how to apply their knowledge on the job. So the training itself can have a direct influence on transfer of trained skills.

1.11 Conceptual Framework

According to Mutai (2000), conceptual framework is the relationship between variables in a study showing them graphically and diagrammatically and it helps in seeing quickly the proposed relationship of concepts.

The conceptual framework figure 1.1 presents the relationship between the independent and dependent variables of the study. In the framework, the independent variables are the status of ICT integration in teaching Geography, the types of ICT tools available in the schools, the impact of ESP in ICT in teaching Geography and Challenges in ICT integration in teaching Geography. The dependent variable of the study is quality teaching of Geography and its subsequent better performance due to ICT integration. The intervening variables are measures to facilitate ICT integration such as training of teachers and availability of resources.
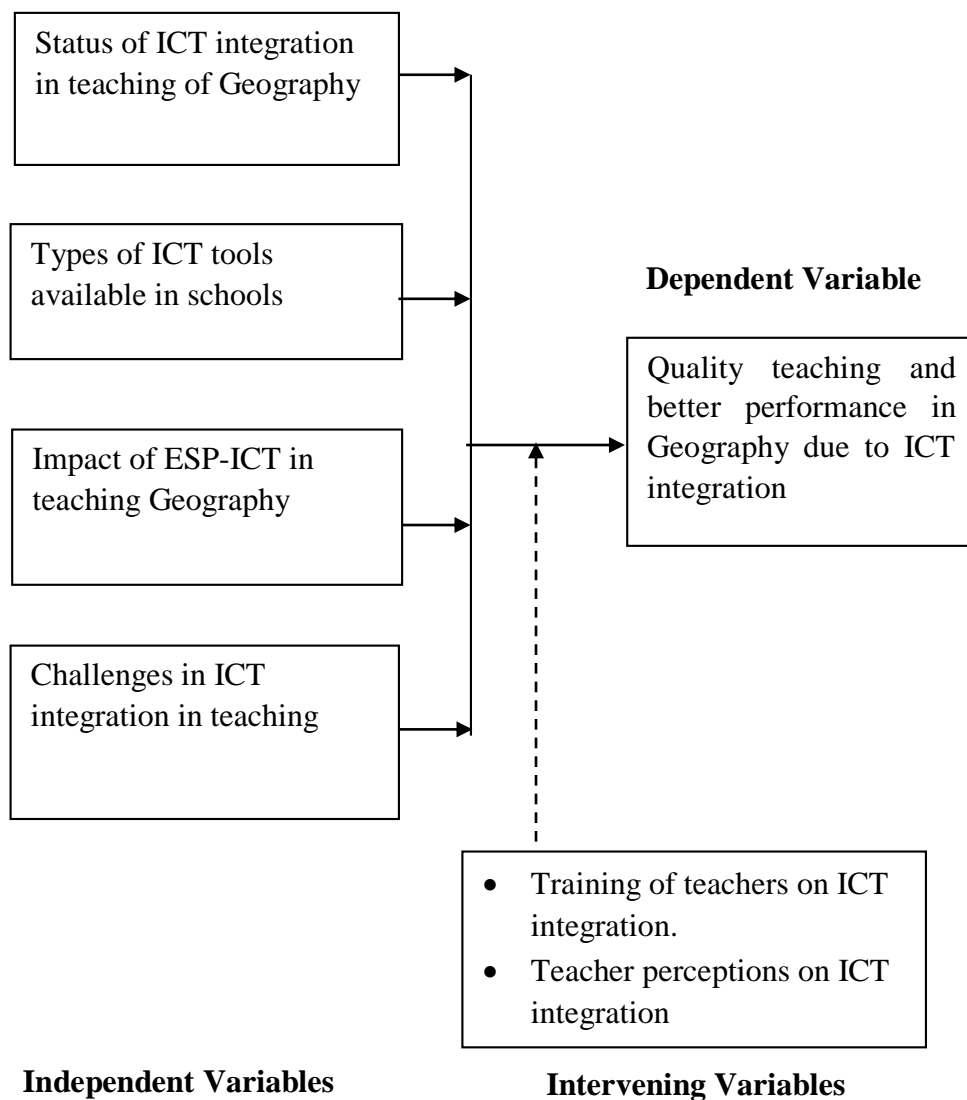
Figure 1.1: Conceptual Framework
Source: Researcher 2015

The research study is conceptualized in figure 1.1. It is assumed that the availability

and effective use of Teaching-Learning materials will enhance learners understanding

of concepts taught. This will translate into better academic performance. This case the

ICT tools are the resource materials.

1.12 Operational Definitions of Terms

Browser-is a software application that enables the ICT users to locate, retrieve, present

or display information or content on the web.

Computer literacy –Refers to individual knowledge and ability to use computers and related technology efficiently.

Computer–is a device that accepts information (in the form of digitalized data) and manipulates it for some result based on a program or sequence of instructions on how the data is to be processed, Complex computers also include the means for storing data (including the program, which is also a form of data)for necessary duration.

Education– is an experience that has a formative effect on the mind, character or physical ability of an individual.

ESP-ICT-Economic stimulus programme –information communication technology is a spending plan initiated by the government of Kenya to boost the economic growth and improve ICT in Education .

Geography-Is a field of science devoted to the study of the lands, the features ,the inhabitants and the phenomena of earth

ICT Integration in Education- refers to the seamless application or use of ICT in teaching,   learning   and management across all levels of education

ICT Policy- is a framework or guiding principle of the sequences or events a school will undertake to achieve ICT integration across the curriculum.

ICT-Tools-are digital infrastructures such as computers, laptops, data projectors, sopftwares, software programmes, printers and interactive white board.

Information Communication Technology (ICT)–As defined by the Information Technology Association of America (ITAA) is "the study, design, development, implementation, support or management and relay of computer-based information systems, particularly software applications and Computer hardware.

Learning–Is acquiring new knowledge, behaviors, skills, values, preferences or understanding, and may involve synthesizing different types of information.

Status-The position of an individual in relation to another or others

Training– Is the process of bringing a person to an agreed standard of proficiency by practice and instruction.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

Many reports on ICT in education among the world education system have been published. Due to high access and use of these ICT tools especially among the youthful population, ICT integrated offers new insights to learning avenues, especially for the marginalized and disadvantaged learners, through informal, personalized and situated learning and inclusivity in decision making for social equity. However, Geography integrated content is a recent field in education, although conceptual frameworks, evaluation and research methodologies related to it are incomplete and emergent (Traxler, 2009). Also, there is little evidence from research on the use of ICT tools learning Geography to expand access to basic education for students in schools (Valk, et al., 2010). This literature review focuses on the theory and practice behind ICT learning and identifies gaps within the existing literature, showing how it intends to address the disconnect in Geography performance especially physical geography.

2.1 Context of ICT Integration in Geography

During the late 1990s and early 2000s, ICT literacy interventions focused on setting up PC Labs in schools and universities to enhance learning that is affordable, scalable and sustainable (Isaacs, 2005). Rapid advancements in ICT capability continually opened up new insights into teaching and learning. This necessitated change from practitioners and policy makers in their approach to ICT integration into educational ventures. Such programs as One Laptop per Child (OLPC) project in Rwanda and teacher laptop programs in South Africa and Kenya (2013) is equally in the pipeline of adopting One Laptop per Child project

2.1.1 Education review in Kenya

Since independence, Kenya has undergone several reviews in its education system under appointed commissions, committees and taskforces. The key commissions were The Ominde Report (1964), The Gachathi Report (1976), Mackay Report (1981), Kamunge Report (1988) and The Koech Report (2000).

The Ominde and Gachathi reports narrowed on policies fostering national unity and creation of sufficient human capital. The next two commissions of 1980s addressed redefinition of national unity, socio-economic and cultural aspirations of citizens. The Koech Report focused on education financing, quality and relevance. It recommended the Totally Integrated Quality Education and Training (TIQET). Through TIQET, ways and means of enabling education to facilitate life-long learning, national unity, mutual social responsibility, accelerated industrial and technical development, while responding to changing circumstances (MOEST, 2005). However, TIQET was not adopted by the GoK, but some of its core tenets were implemented later, such as the curriculum rationalization.

2.1.2 Rationale for ICT integration in education in Kenya

Kenya aims to become a globally competitive and prosperous nation with high quality of life by 2030. Achievement of this Vision requires a multi-sectoral approach that includes education. An all – round adoption of Science, Technology and Innovation (STI) as an implementation tool within the three pillars (Social, Economic and Political) of Vision 2030 will accelerate the achievement of the realization of this goal.

Information and Communication Technologies (ICTs) are undisputable drivers of a knowledge-based economy. Through the social pillar, the Ministry of

Education, Science and Technology is obligated to provide quality education that prepares learners to competitively function within a highly integrated, technologically-oriented and information-based global economy. The use of ICT to expand access and equity in education is fundamental and conforms to the Constitutional provisions that education is the right of every Kenyan citizen.

The Sessional Paper No. 14 of 2012 underscores the Ministry's commitment to competency based teaching and learning. This type of education and training focuses on learners actively acquiring knowledge, skills and attitude that will enable them to be prepared for 21st Century labour market. The incorporation of ICT in education will enhance the quality of education, broaden access and provide the youth with skills required in the new and emerging economy.

ICT integration in the education sector is understood to mean the seamless integration of ICTs in teaching, learning and management across all levels of education. It is informed by the Ministry's philosophy which underscores the following key pillars as fundamental to effective ICT integration in education: Policy and strategy to guide implementation, Provision of appropriate ICT infrastructure.

Capacity development of curriculum implementers, including teachers and educational managers on ICT integration.

Development of quality, cost effective and appropriate digital content for all levels of education.

Effective use of ICT improves access and promotes equity in education by providing educational opportunities to a greater number of people of all ages, including the traditionally unserved or underserved. Secondly, ICT can enhance the quality of teaching and learning by providing access to a great variety of educational resources.

Thirdly, ICT can improve the management of education through more efficient administrative processes, including human resource management, monitoring and evaluation, and resource sharing. It is the expectation of the Ministry of Education, Science and Technology that the current and future interventions will inject the much needed infrastructure, skills and attitudes necessary to spur ICT integration in teaching and learning in our primary schools. Teachers are advised to do all within their means to acquire the requisite ICT skills, which will not only enhance their efficiency in service delivery but also empower them to play their rightful role in the envisaged knowledge economy.

There is dire need for teachers to understand the tools available and their application in teaching and learning. Some of the ICT tools discussed in this manual include: Computers, Mobile phones, the Internet, digital cameras and camcorders among others. It is equally necessary for teachers to be made aware of the fast changing role of the teacher for them to effectively play their role in the learning environment.

2.1.3 Factors influencing ICT integration in Geography Teaching

Several scholars outline four components that are fundamental to the growth of technology teaching

(a) Increased educational content that is accessible via the ICT tools (Isaacs, 2012).

(b) Variety of contexts, both in and out of formal school settings (Looi, et al., 2009; Sharples, 2007).

(c) Revised curriculum and assessment modules that reflect the dynamic ilk of education in an ICT tools-suffused milieu.

(d)   Professional development and training for teachers to effectively incorporate m-learning into pedagogical practice, education planning and management.

In the SSAR scholars have also demonstrated the drivers and hurdles that relate to the ICT tools. The drivers are noted as: systematic failures in traditional educational pedagogies subscription, their potential in enabling ODL (Mishra, 2011), and the new ways that the youth are using ICT tools (Shah & Jansen, 2011; UNICEF, 2011). On the other hand, several barriers come to play. There is poor awareness among the government's policy makers, education managers and curriculum developers since most technologies initiatives are not government-instituted, and that e-learning programs are exclusive of some ICT tools. In addition, the small-scale, experimental nature of existent ICT tools learning initiatives posits a challenge. Two, there are technical limitations. Connectivity is restricted by the cost of data and limited access to the High Speed 3G networks. Third is the limitation of ICT tools like m-phone based educational content and applications. Old and lower-ended m-phones with limited data capacity may cause little educationally rich content and applications to be developed for learning purposes. Lastly, there are anti-mobile phone sentiments expressed by teachers, school managers, policy makers and parents, leading to most institutions banning the use of m-phones by learners within the school premises.

2.2 New Pedagogies and Modes of ICT Integration.

The review of ICT integration initiatives indicates that technology is emergently contributing to a significant paradigm shift in education. Technology opens up new pedagogies and modes of learning that make education more authentic, contextual, personalized and self-directed, as well as more informal (outside parameters of formal curricula, assessments and classroom activities) and more flexible in place and time (Sharples, et. al., 2007).

ICT integration continues to create new modalities for peer-learning and mentorship, facilitating a learner-centered learning against the traditional teacher-dominated pedagogies. As well, technologies enables learners to access and manage information from a vast growing reservoir of the twenty-first century technologies catalyzed by integration of ICT, Web 2.0and social media into education in order to meet their individual learning needs. Examples of cases of m-learning in African states include the MoMath Project, and the Yoza Cellphone Stories Project, in 2007 in South Africa. In conjunction with Nokia, the president's office of South African Government, through the SA Department of Education (DoE) supports Mathematics education by supplementing formal classroom learning through m-learning. The same accesses education to people living in marginalized and excluded environments and who lack access to resources and teachers. The Yoza Cellphone Stories Project is based on a "book-poor" environment. It targeted the established m-infrastructure and the much time and attention the youth spend on their ICT tools to improve and promote their reading and writing skills. Further, the program recommended broader school curricula to include dialogue-driven genres familiar to the youth (Walton, 2009). By September 2011, Yoza had become an online library of m-novels, short stories, classic literature and poetry by local authors, as well as including genres of teen issues, romance, sports, adventure, drama and poetry (Vosloo& McCann, 2011).

ICT tools enhance access to learners who are mobile and are constrained to physically attend a classroom or a learning institution. Learners study according to their own schedule in time and place based on the portability of some ICT tools. However, learning is not limited to physical movement since "most people do not utilize their transit time for learning" (Sharples, Taylor & Vavoula, 2005; 3).

Access is also increased through technology where cost is a barrier to knowledge (Visser & West, 2005). Of particular concern are the rural and remote areas where environmental and infrastructural challenges hinder other learning modalities. Given the ubiquity of technology, educational services can be delivered within the learner's existing resources given its much less cost-prohibitive medium for learning. Economic gap and digital divide are effectively minimized among learners in a contemporary society where access to knowledge and information is increasingly important (VanWeert, 2005). Within the context of developing countries, such as Kenya, the benefit of increased access through technology with regard to costs is specifically relevant. Strategic to ICT integration is the fact that most of these countries are now investing ICT infrastructure (Motlik, 2008; Sharples, Taylor & Vavoula, 2007; Traxler & Dearden, 2005). Technology thus becomes the most potential medium of e-learning, providing continuous and improved ODL through high utility and applicability (Keegan, 2002) as well as efficient and effective education administration and policy.

In addition ICT integration supports new learning theories through alternative learning processes and instructional modalities. It facilitates situated learning that is responsive to difference and diversity in learning on real-world problems related to the learner's interest and relevance (Kukulska-Hume &Traxler, 2007).

ICT tools also facilitate life-long learning through everyday life activities that offer in impromptu settings spontaneous learning outside the classroom. Across time and place, learners apply what they learn in one environment to developments in another (Sharples, et al., 2005; 2-4; 2007; 222-223). Learners customize transfer of information and its access in order to build on their skills and knowledge, and to meet their own additional goals. Learners take greater responsibility for the learning process rather than being passive, a process of constructive learning and not mere instruction (Della Pena-

Bandalaria, 2007). According to Traxler, ICT integration is not 'just in case' learning, but 'just-in-time' learning (2007). As a stimulus for new learning, it goes beyond an emphasis on possession of information to enabling learners to find, identify, manipulate and evaluate existing information (Brown, 2003).

ICT integration is associated with knowledge-centred ventures through efficient and inventive methods by which learners apply understanding of a specific subject matter through integration and interconnection. It enables assessment-centred learning, continual feedback through the learning process which is a motivating factor (Geddes, 2004) diagnostic and formative guidance on what might be improved or learnt next.

Community-centered learning is also facilitated through ICT integration. The learners attach value to what they learn given its relevance to the immediate social milieu. This closely fulfills the goals that address the problems of the community (Sharples, et al., 2007; Wagner & Kozma, 2005). Through social interaction, communication in learning is facilitated. Through conversations across context and people, collaborative learning is enabled. As a result, common interpretations and shared understanding of the world is created (Nyiri, 2002; Sharples, 2007).

ICT integration is particularly befitting to those who do not achieve in traditional learning settings that are generalized and decontextualized in nature. It motivates learning through immediate feedback and presents something new and exciting for a great array of learners (Geddes, 2004). It alters the character of education and learning through new learning which is more personalized, learner-centered, situated, collaborative, ubiquitous and life-long. Technology in general is increasingly personal, user-centric mobile, networked, ubiquitous, cost-effective and durable (Sharples, et al., 2007).

However, imperative that further inquiry be developed on inducing e-citizenly education on learners in order to guide e-learning and check on cyber-crimes and moral decadence on the electronic media chat platform within the context of emergent educational technologies.

2.3 Impact of ICT Tools in Understanding the Content

Scientific findings from a variety of fields have demonstrated that teaching – learning materials at early learning yields rich benefits not only in immediate ways for the child, but also over time in terms of child's ability to perform better academically (Ministry of Education, 1994). According to Okot, Eron, and Kutosi (2000) effective use of teaching learning materials is enhance by the choice of the teaching methodology,

Subsequently, the ICT integrated allows the learners to use all their senses; arouses the learners interest; allows the learner to retained for a longer time as the learner can easily remember what they saw, heard, smelt, tasted or touched; makes the learning process learner-centred; makes the understanding easier because the learner interacts with the visual aids; allows the learner develop their power of imagination, observation, and reasoning; and improves learners participation during the lessons(Githaiga, et al 2008; Mwaniki, et al 2010; & Ministry of Education, 2008). From this background, ICT integrated lessons are effective in teaching learning process and make the learners understand the concepts, at the same time, enable the teacher to communicate effectively. However, there exist a gap from such theoretical explanations and what transpires in the class situation; hence the researcher will seek to determine the impact of the teaching learning materials.

2.4 Challenges to Effective Integration of ICT in Teaching

There are different challenges/barriers that face the effective integration of ICT in teaching and learning processes. The challenges are broadly divided into three categories: teacher-level barriers, i.e. those related to teachers' attitudes and approach to ICT, school-level barriers, i.e. those related to the institutional context and system-level barriers, i.e. those related to the wider educational framework. The factors that impede the successful implementation of ICT include:

2.4.1 Teacher-level challenges

Teachers' poor ICT competence, low motivation and lack of confidence in using new technologies in teaching are significant determinants of their levels of engagement in ICT.

2.4.2 Lack of motivation and confidence in using ICT

Their limited ICT knowledge makes teachers anxious about using ICT in the classroom and thus do not feel confident to embrace new pedagogical practices. Becta (2004) survey on the perceived barriers to the uptake of ICT by teachers also refers to the 'teachers' fear of admitting to their pupils their limited ICT knowledge.

2.4.3 Inappropriate teacher training

Unsuitable teacher training programmes fail to engage teachers in using ICT both during their lessons and also in the preparation of lessons beforehand. The most commonly mentioned cause of this is that training courses focus mainly on the development of ICT skills and not on the Pedagogical aspects of ICT. It is interesting to observe that although some teachers have good ICT skills in terms of their own personal use, they are unable to transfer these skills to using ICT in classroom (Becta, 2004). Developing the skills to engage effectively with the technology and creating

structures to enhance ICT use is as important as investing in ICT infrastructure. Therefore effective training is crucial if teachers are to implement ICT in an effective way in their teaching. On the contrary, when training is inadequate or inappropriate, teachers are not sufficiently prepared, and perhaps not sufficiently confident, to make full use of technology in the classroom.

Dawes (2001) found the major barriers to the use of ICT are: the availability of the technology, support and training, Leadership and time. More attention has been given to the availability of the technology in terms of quantity, type and reliability of computers, access arrangements and location of equipment. Computer access for teaching purposes is clearly important as this relates not just to sufficiency of computers but also to the location of equipment and access arrangements (Hepp et al., 2004). Computer reliability is also important, referred to by Global Campaign for Education (2004) as the most commonly cited 'significant problem' in the adoption of technology. The need for more training in ICT use has received recent attention having been neglected as a focus for Government intervention for a period between the early 1980s and mid 1990s. There is recognition that training needs to have a carefully planned structure and a focus on 'training outcomes' (Plomp et al., 2003), and now, particularly in the light of the New Opportunities Funded (NOF) training (Global Campaign for Education (2004)) and associated initiatives the emphasis is now firmly on the nature of training required and the effectiveness of different training strategies and models (Tubin et al., 2003).

It is also recognized that for teachers to start using ICT, they need various modes of support e.g. technical (Kozma, 2003); administration (Hoffman, 1996); the support of senior staff for practical needs such as time or resources, or recognition of new practices (Fullan, 1992); and that of peers for collaboration (Dawes, 2001). Issues around the

need for time have featured regularly over the years; it has been found that these issues are increasing as pressures on teachers continue to grow on training (Leach, 2003). Without undermining the requirement for additional 'time', time management is also a factor in this climate of new initiatives (Dawes, 2001).

2.4.4 School level challenges

Limited access to ICT (due to lack of proper organization of ICT resources), poor quality and inadequate and inadequate maintenance of hardware as well as unsuitable educational software are also defining elements in teachers' levels of ICT.

The lack of high quality hardware and suitable educational software is also considered by the majority of ICT coordinators as an important hindrance to further development of ICT in education. Poorly maintained computers are usually unreliable and likely to cause disruption to even the best planned lessons. Similarly, inappropriate software does not enhance a lesson in any way and rather disengages both teachers and students from the learning process.

Limited Access to ICT Equipment: The inability of teachers and students to access ICT resources is a result of a number of other factors and not only of the lack of ICT infrastructure. Sometimes a school may have high quality of ICT resources but these are inappropriately organized and thus not optimally used. In some schools for instance, prior booking of the ICT classroom is required, or the internal school network cannot be accessed from outside. As a result teachers and students do not have the opportunity to use ICT at any time according to their needs. For teachers and their students, the availability of modern computers, peripherals, networking and resources within an increasingly diverse range of technologies is an essential part of learning and teaching in the 21st century. ICT constitutes an input in the student learning process that should

help produce better learning output. The availability of ICT resources can enhance learning by making education less dependent on differing teacher quality and by making education available at home throughout the day (Mbwesa, 2002). Bonnet (1997) argues that the use of ICT can positively transmit knowledge to students. Furthermore, the availability and use of ICT can help students exploit enormous possibilities for acquiring information for schooling purposes and can increase learning through communication (Riel, 1998). For teachers and their students, the availability of modern computers, peripherals, networking and resources within an increasingly diverse range of technologies is an essential part of learning and teaching in the 21st century. ICT constitutes an input in the student learning process that should help produce better learning output. The availability of ICT resources can enhance learning by making education less dependent on differing teacher quality and by making education available at home throughout the day (Mbwesa, 2002). Bonnet (1997) argues that the use of ICT can positively transmit knowledge to students. Furthermore, the availability and use of ICT can help students exploit enormous possibilities for acquiring information for schooling purposes and can increase learning through communication (Riel, 1998). The classroom and teaching. Bonnet (1997) argues that the availability of visual digital technology (such as animation, simulation and moving images) involves students and reinforces conceptual understanding. ICT use also encourages development from a teacher-focused or teacher-led model to a more student-focused model in which students work together, make their own decisions and take an active role in learning (Swedish National Association for School Improvement, 2008).

Davis (2000) asserts that increased availability of ICT is especially useful for students who suffer from learning disabilities since ICT use allows teachers to prepare suitable

tasks for individual needs and each individual more effectively. However, authors like Cox (1999) believe that allowing certain students to use computers distracts them from focusing on the task at hand.

Central to the argument of availability are the issues of whether or not the teachers and students have ample and convenient access to computers and their accessories let alone the software that is necessitated in the context of their day-to-day research, collaboration, teaching and student evaluation (Fabry, et al., 1997). Furthermore, students and teachers should have confidence in these facilities, which is in turn reliant on the facilities" reliability or degree to which the teachers and students are sure that they will have access to them at all expected times and utilise them predictably to the betterment of their academic work, an issue on which consensus is enormous as is clear from ICT in education scholars like Russell (1997), Ross (1997), Guha (2000), Mumtaz (2000) and Pelgrum (2001).

The lesson here is that computers are but a subset of the information communication technology facilities necessitated in schools and that even then, they have to be furnished with quality accessories, installed with appropriate software and linked to necessary networks to allow access to rich resources beyond the school rather than serve as a resource for minor typesetting and other word processing activities. Whilst the above studies attempted generally to explain how the availability of ICT affects learning, it does not look at how particular ICT tools clearly affects students learning.

Absence of ICT Mainstreaming into Schools' Strategies: Schools face the problem of unsuccessful organizational implementation of ICT because ICT is not seen as a part of the general strategy at school level. Even if some schools have developed ICT strategies, these are not integrated into the school's overall strategies. Yet ICT is no

longer a goal itself, an isolated phenomenon requiring a special strategy. Instead, it should be used to support whole school development.

Individual Attitude towards the Use of ICT: With specific reference to use of ICT in schools, the collective viewpoint, such as whole school's culture and ethos is referenced as influential (Kozma, 2003). The nature of the comments made is in keeping with those noted when considering change management, though more tightly and specifically focused. There is a view that aspects of individual attitude and belief are the main factors influencing a teacher's use of ICT (Kaino, 2004). A key general point is the need for a teacher to be motivated to use the technology. In a study done by Hepp et al, (2004), they noted that teachers must believe that use of the technology can more effectively meet learning objectives or reach a higher level goal than could otherwise have been achieved and that they must have the confidence, ability and access to necessary resources to apply the technology in their teaching situation.

2.5 ESP-ICT in teaching Geography

The Kenya Economic Stimulus Program (ESP) was a spending plan initiated by the government of Kenya to boost economic growth and lead the Kenyan economy out of a recession at the end of the first decade of the 21st century. Some of the objectives of ESP on secondary study were to construct secondary schools including upgrading one secondary school as a center of excellence per constituency and equipping them with digital learning resources as well as recruiting additional 2,100 secondary school teachers on contract terms. This led to the purchase of ICT resources to some schools. The availability of these ICT resources such as computers, projectors among others together with the additional geography teachers has made it possible for some schools to effectively integrate ICT in teaching geography.

In 2010/2011, under the Economic Stimulus Programme, Kshs.980 million was allocated for equipping of 5 public secondary schools from each constituency with a comprehensive ICT infrastructure. A total of 1021 schools throughout the country benefited. The package included training of 10,500 teachers, 1021 head teachers and 210 ICT champions from the beneficiary schools (MoE, 2014). This led to better integration of ICT in teaching many subjects in secondary schools geography being one of them though it was important to note that only a few secondary schools benefited in every constituency.

The Ministry of Education (MoE 2014) also confirmed that ESP has partnered with the National ICT Integration and Innovation Centre (NI3C) to facilitate learning institutions on ICT integration and provide a national help desk on new innovations in schools. Integration of ICT in teaching has been of great help to Geography learning. The use of ICT in teaching geography provides teachers and students with immediate access to up-t-date, topical geographical information and our highly interconnected world. Those secondary schools which have benefited from ESP in Matungu sub-county today boast of a dynamic medium (ICT) that has significantly reinforced and deepened their geographical knowledge and understanding as never before.

Students in remote areas like Matungu sub-county appreciate ESP as they are able to sustain concentration levels more fully when given the opportunity to support their learning through the use of ICT.

2.6 Summary of the Literature Review

This chapter presented related literature on the integration of ICT in teaching geography in public secondary schools as one of the examinable subjects. It was found that ICT has played an important role in the delivery of subject contents and the implementation

of curriculum in general. It was also found that the integration of ICT in teaching most of the subjects in secondary schools has offered a new insight to learning avenues especially for marginalized and disadvantaged learners. The literature review found that ICT integration is one of the best new technologies in teaching that every secondary school strives to have but the extent of its application is still a challenge. It was found that those schools which have fully embraced ICT integration are enjoying its benefits such as accountability, efficiency and effectiveness in school activities as well as the use of power point presentation in handling bigger population of the students in secondary schools. Regarding the challenges of ICT integration in teaching, it was found that there are some serious challenges such as inadequacy of computers and other ICT tools, lack of ICT skills among teachers to operate ICT resources. To fill the knowledge gap that exists in literature, this study is therefore aimed at establishing the extent of ICT integration in teaching Geography in public secondary schools and the challenges that hinder its effectiveness.

2.7 Related Studies

According to Abolmaali, Rashedi, and Ajilchi (2014), academic performance among learners is considered as a criterion for deciding the effectiveness of educational programmes. They add that is why in the evaluation of an education system, researchers often consider academic achievement and search for factors affecting academic achievement. Abolmaali et al. (2014) point out that identified factors by researchers include: intelligence, processing of information, as well as the use of cognitive and meta-cognitive strategies, thinking styles and learning, and creativity; motivational factors (like goal orientation and motivational beliefs), and internal and external motivation; quality of instruction in schools, classroom structure, feeling of belonging and perceptions of classroom environment; family factors such as family environment

perception, family support, socio-economic status such as parent's education and their occupation; non-cognitive factors such as personality traits, identity styles, self-concept and self-esteem; and a combination of different factors including cognitive, emotional, behavioral, academic engagement and resiliency.

The relationship between learning and academic achievement among high school students is mediated by cognitive engagement (Pintrich and Garcia, 1991; Newman, Wehlage and Lamborn, 1992). Elliott, McGregor and Gable (1999) have argued that there is a positive relationship between deep cognitive engagement and academic performance.

2.7.1 Students' relationships with content, with teachers, and with each other

Goodman (2015) talks of the importance of teaching through relationships. He says that teaching through relationships is a complex social environment of conversing, sharing experiences, and participating in activities that make for engaged learning between students and teachers. On her part, Zimmerman (2012) has noted that interaction is critical in the learning process.

Ali and Ahmad (2011) and Alshare, Freeze, Lane and Wen (2011) say that to enhance learning, the concepts and objectives of the course need to be presented clearly and in a lively manner to enable learners to spend more time engaged with the content. On her part, Zimmerman (2012) has established that the amount of time spent by students in interacting with content determines their weekly quiz grades. She concluded that there was higher performance among students who spent more time interacting with course content than the lot that spent less. Factors influencing performance have been identified as including mode of delivering course materials (Abrami, Bernard, Bures, Borokhovski and Tamim, 2010). Another factor identified is time allocated to particular

tasks (Lam and Bordia, 2008). A final factor identified is relevant, up-to-date, and easy to understand information (Alshare et al., 2011).

Another important interaction that students have is with their teachers. Rimm-Kaufman and Sandilos (2016) say that improvement of the relationship between students and teachers is important and positively affects students" academic and social development. They say that where students and teachers have a close, positive and supportive relationship, students have better academic attainment. However, students with more conflict in their relationships with teachers have poor academic attainment. The main focus in classroom interactions centres on practices of teachers in the classroom. These practices include asking questions, correcting errors, teacher's speech, the explanations teachers give and the time teachers wait for students to make responses (Brown and Rodgers, 2002).

According to Cornelius-White (2007) and Thijs and Koomen (2008), when students have good relationships with their teachers, they benefit through motivation and academic achievement. Therefore, for meaningful learning to take place there has to be a positive relationship between students and their teachers. In those classes where knowledge is treated as something fixed and that is only for passing in one way traffic from teacher to the learner, teachers behaviour may become the primary activity. In such situations, learners may see their role as the passive memorisation of facts, algorithms and formulas (Cohen, et al., 2002). This is contrary to situations where students are allowed freehand in expressing ideas on their own terms. This fosters a culture of interpreting knowledge as something to discover and reinvent. This enables learners view their activities in the classroom as the discovery of relationships and application of knowledge to the real world Kurdziolek (2011)

On students interaction with each other, there are three basic ways that this happens as they learn. These involve competing among themselves to see who is "best," or they can work individually toward a goal without paying attention to fellow students, or they can work cooperatively with a vested interest in other students" learning as well as their own. Of the three interaction patterns, competition is the most dominant among learners (Roger and Johnson, 1994). From the above presentation, we can therefore see the relationship between learners and content, teachers, and with each other.

2.7.2 The learning environment and its role in promoting academic performance

The Glossary of Educational Reform (2014) points out that learning environment is the diverse physical locations, contexts and cultures in which learning by students take place. The publication says that learning may take place in a variety of settings which include outside-of-school locations, and outdoor environments. The publication further points out that the term also encompasses the ethos and characteristics of a school or class. This includes the interaction of individuals in the teaching/learning process and how they treat one another as well as the ways in which teachers may organize a learning session to facilitate learning.

Byoung-suk (2012) says that the educational process occurs in a physical, social, cultural and psychological environment and adds that it is necessary to provide a proper and adequate environment for children's' fruitful learning. stimulus for learning experiences is provided by a favourable school environment. This is because children spend a lot of time in school whose environment is capable of influencing performance through curricular activities, teaching techniques and relationships (Arul, 2012).

Bates (2015) has identified the components of an effective learning environment. The first is developing a total learning environment, which he has identified possibly the

most creative part in teaching. He says that there is an existing tendency in focusing on either physical institutional learning environments (such as classrooms, lecture theatres and laboratories) or on the technologies used to create online Personal Learning Environments (PLEs). But Bates (2015) says that learning environments are broader than just these identified physical components. This is because they also include the learner characteristics, goals that exist for teaching and learning, activities best supporting learning, and finally, the strategies for best measuring and driving learning.

The learning environment has been shown to promote learning (Parrett and Budge, 2012). This is because to learn, students need to feel safe and supported. Parrett and Budge (2012) say that in the absence of these conditions, the human mind reverts to focusing on survival. These authors add that educators in high-performing, high-poverty schools have long recognized that it is of critical importance to provide a healthy, safe, and supportive classroom and school environment. Schaps (2005) argues that a supportive school environment is important in promoting academic success as it broadly influences students" learning and growth, which includes a significant aspect of their development – socially, emotionally and ethical development. He concludes by saying that in school environments that are supportive and caring, students become more motivated and engage in learning.

2.7.3 Challenges inherent in the use of instructional resources

Although learning resources are critical to the learning process, the factors that raise difficulties in their use in teaching are many. However, some of them stand out as relevant to the current study. An important limiting factor as identified by Afolabi Adeyanju, Adedapo, and Falade (2006) is inadequacy of resources. Inadequacy of resources can seriously compromise the deployment of resources in teaching. These authors argue that effective teaching is only possible when learning resources that are

adequate and relevant are used. Afolabi (2008) indicates that the availability of learning resources and ability of teachers of mathematics to use them are vital determinants in the selection of the teaching methods to in teaching and consequently, mathematics achievements.

According to Zhao, Pugh, Sheldon and Byers (2002), factors that pose a challenge to computer use among others are related first, to the school environment or the context in which technology will be implemented, secondly, factors associated with the students and thirdly, the teacher who serves as the instructor. Groff and Mouza (2008) have identified such challenges as including organizational culture that does not support the effective use of technologies, lack of human support and infrastructure, and inadequate physical setup and structure for technologies. On factors associated with students who are the operators of technology, Groff and Mouza (2008) have identified challenges to technology use as including comfort level with technology, project distance from prior. Technology experiences and student attitudes, beliefs and engagement with the project scope. Finally on teachers who are the implementers, challenges identified in interfering with technology use include inadequate teacher training, insufficient technology skills and proficiency, attitudes and beliefs which are misaligned with educational technology pedagogy and inability to access/utilize school resources (Groff and Mouza, 2008).

2.7.4 Variety of Learning Resources Used in Teaching and Learning

For a long time the textbook has been the basic tool in curriculum delivery in our schools. But in this era of unprecedented advancement in technological development, an over-reliance on the textbook is unacceptable. O'Neill (1990) says that textbooks make it possible for students to review and prepare their lessons, are efficient in terms of time and money, and they can and should allow for adaptation and improvisation. However, from Allwright and Faize"s (1990) point of view, textbooks cannot be used

directly as instructional material for they are too inflexible. This therefore has made educationists to advocate for teachers to diversify on use of learning resources. Ozturk (2003) conducted an assessment of the implementation of the high school biology curriculum in the Anatolia region of Turkey. The study was designed as a survey and data collection was done by the use of a questionnaire. A sample of 600 teachers of biology was selected through random sampling. Both descriptive and inferential statistics were used to analyse the collected data. The study established that the use of ICT as well as the variety of sources of the learning resources influenced learning environment and curriculum implementation.

Ozturk (2003) made recommendations, among them being that for a successful curriculum implementation, schools should have all the necessary means, while resources in each school should be examined to see if they allow the curricula to be implemented in the ways intended, teachers should enrich their knowledge and learn new behaviours and be supported professionally, and finally that teachers should also be encouraged to read and to continue to learn about diverse approaches in their profession and to develop effective classroom strategies. Ozturk (2003) examined the role that learning resources play in curriculum implementation in the biology subject area. This was very relevant to the current study. However, the study did not assess the impact of curriculum implementation on academic performance. This gap was filled in the current study.

Ruthiri (2009) conducted a study on the availability, acquisition and utilization of ICT of English language. The study was conducted in Buuri Division of Imenti North District, Kenya.

The research mainly focused on whether ICT of English language were available, how they were acquired and whether they were actually utilized in the learning process.

To identify the study sample, the research employed stratified random sampling techniques. Six head teachers, 12 teachers and 120 pupils in Classes Seven and Eight were involved. For the purpose of collecting data, two sets of questionnaires – one for teachers and the other for pupils were used. To collect data for school heads, an interview was used while an observation checklist for schools was used. Data was analyzed by tallying, coding, tabulation and use of frequency tables and results reported in percentages. The study findings showed that textbooks were the major learning resource that was available in primary schools. Although other learning resources were available in the Kenya National Library Service and Teacher Advisory Centres, as well as the availability of Resource Persons, their use in the teaching and learning of English language in Buuri Division was rare Ruthiri (2009) also found out that acquisition of other ICT tools was a challenge to most schools. This was because of lack of finances, understaffing, limited time and heavy workload that hindered effective ICT integration. The researcher made the following recommendations: urgent measures to be taken to acquire varieties of ICT tools other than textbooks, all stakeholders to be involved in their acquisition, and finally, urgent steps be taken to create more awareness among teachers of English language on the importance of ICT integration in the teaching and learning process through regular workshops, seminars or in-service courses dealing with ICT integration. Ruthiri‟s (2009) study however did not investigate varieties of ICT tools used in teaching and learning. Instead the researcher made a recommendation that urgent measures should be taken to acquire varieties of ICT tools for use in teaching.

In 1992 Ogechi conducted a study in Nyamira District to determine the availability, utilization and management of teaching and learning resources in geography in secondary schools in the district. Three research instruments were used for data collection: questionnaires, checklists and classroom observation schedules. Data was procured from 31 teachers of geography through questionnaires and classroom observation schedules. The respondents of the study were drawn from twenty different secondary schools in the district – four government-maintained, four private and 12 government schools. 20 head teacher's questionnaires were filled. 400 Forms Two and Three students of geography participated in answering student's questionnaires. Responses were presented in table forms and repeated in descriptive form. The findings of the study indicated that there was no difference in the utilization of resources between trained teachers and the untrained ones as the majority were mildly enthusiastic about using the available resources; the most available resources for teaching and learning geography in the district were printed aids with few audio-visual resources available in few schools while projected and audio aids were non-existent; there was low utilization of the available resources in teaching and learning due to high enrolment in geography classes which inhibited their effective use; of the few resources used, a greater number were purchased of which decisions for their acquisition were made by the geography teachers and schools heads; whereas the major determining criteria for selection of resources for use by teachers were lesson objectives and nature of the topic and that teachers made much use of the chalkboards while teaching; most of the teaching and learning resources were provided by the parents with the government and the schools playing a minimal role. However, Ogechi (1992) did not relate ICT integration to performance in examinations which was done in the current study.

2.7.5 The Availability of ICT tools Used in Teaching and Learning

Killen (2006) has made the observation on the shortage of ICT tools in schools by indicating that: the issue of ICT may not be easy to resolve, but the important thing is that teachers should not use lack of resources as an excuse for not teaching well." (p.276) .According to Killen (2006), alternatives are out there and teachers need to desist from entirely depending on ready-made resources. They should thus reach out for local materials and improvise wherever possible. Onwu (1999) conducted a study on the availability and use of ICT tools in Grade 12 science classes in selected schools from Northern Province of South Africa. The three objectives of the study were aimed at: identifying representative schools in the Northern Province with Grade 12 science classes and select 10 schools with a range of performance pass rate (0-100%) in the matriculation physical science examination; undertaking a survey of ICT tools and materials checklist and finally, to infer the role ICT integration in student achievement in science. The study used a survey design. Questionnaire and observation schedule were used as instruments in data collection. To draw a sample, a multi-stage and purposive stratified sampling was adopted.

The study population comprised all Grade 12 science classes and involved ten sample schools representing high, medium and low performing schools. Data collection was done through the use of self-completed questionnaires by Grade 12 science teachers and head teachers, individual discussions, interview sessions and classroom observations of Grade 12 science lessons. Analysis of data involved determining the effects of the availability, quality and use of ICT tools on the processes of teaching and learning. Among the finding were that in general, in all the sampled ten schools in their Grade 12 classes, great variations in availability existed in the ICT tools for the teaching and learning of science. Secondly, the availability and quality of the ICT tools varied

according to the schools performance category. High performing schools had good/adequate availability of ICT tools while low performing schools had fair/poor/inadequate ICT tools.

Onwu (1999) recommended improvement in equity in the provision and distribution of ICT tools and educational facilities for the teaching and learning of science in South Africa. The study also recommended the formulation of a policy on the funding of science, mathematics and technical subjects in secondary schools in the country so that no one school could be unduly disadvantaged. Although the study reviewed the issue of availability and use of ICT tools in relation to student achievement, it nevertheless did not look at the issues of the variety of ICT tools used in teaching and learning as well as training of teachers on use, production and care of ICT tools. These are two gaps that the current study filled.

Andambi (2013) conducted a study on ICT tools used for teaching Humanities in secondary schools in Bungoma District, Kenya. The objectives of the study sought to find out the types of ICT tools available, their adequacy and the effects of their use in teaching. To carry out the research, a field survey design was used. Questionnaires, interview schedules and observation checklists were utilized in data collection. The respondents included the personnel in charge of the district learning resource centre, 1,920 History students in Forms Three and Four classes, 120 History teachers and 80 heads of Humanities Department. Descriptive statistics were used to analyze data. Results of the study showed that the types of ICT tools available in schools included: audio-visual aids like television, audio aids like radio, and computers. On adequacy, the study established that learning resources in the district were adequate. Finally, on effects of ICT use, more than half of the students (55%) agreed that the types of ICT tools used made knowledge in History more lifelike and interesting. Of the respondents

30% of them were undecided while 15% strongly believed that the ICT tools used made no impact on the learning of the subject.

In the light of the findings, Andambi (2013) made the following recommendations: Firstly, if carefully selected and used, ICT tools were important tools which, could be used to bring about achievements of objectives of any subject. Secondly, the researchers recommended provision of trained teachers with skills in ICT who could make use of the available ICT tools and if possible create others in order to have the realization of History objectives. Andambi (2013) study is very relevant to the current study because of its examination of types (variety) of ICT tools, their adequacy (availability) and their effectiveness. Nevertheless, the current study goes a step further to link the use of ICT tools in teaching and learning with effect on performance in KCSE. This was not done in Andambi (2013) study.

2.7.6 The use of learning resources in teaching and learning

Yara (2010) conducted a study on ICT tools and their influence on academic performance in mathematics in secondary schools in Bondo District, Kenya. The study sought to answer questions related to the effects of ICT integration and academic performance in mathematics, effects of teaching/learning resources and academic performance in mathematics. The study design adopted was the descriptive survey. Through random sampling, a total of 242 study respondents who were students were selected from nine schools in the three divisions of Bondo District. Data was collected using one student questionnaire. The analysis of collected data was done using multiple regression analysis. The main finding of the study was that students" academic performance in mathematics was positively influenced by ICT integration on the strength of the findings, Yara (2010) study recommended that in order to improve performance in mathematics,. Yara (2010) study was conducted on mathematics. The

current study in turn was concerned with geography. This is a gap that the current study filled.

2.7.7 The influence of teacher training on learning resources

According to Odhiambo (2005), teacher professional training is important because it enables some teachers to impart knowledge to learners more efficiently than teachers without such training. Odhiambo (2005) further points out that teacher quality in any school system is an important educational resources and determines school outcomes. The author adds that where ICT resources are limited, the teacher is required to carry extra responsibilities of supplementing the difficulties of the school system. This teacher has the double task of providing what home background and school system do not offer Odhiambo,(2005).

Kadzera (2006) conducted a study on use of instructional technologies in teacher training colleges in Malawi. Technologies studied in the study were chalkboards, flip charts, overhead projectors, videos, computers, and local resources from the environment. The study sought to answer five research questions which dealt with: tutors" frequency of use of instructional technologies in the teaching process; reasons tutors gave for either using or not using instructional technologies; tutors" perception of their own competence in using instructional technologies; tutors" attitudes to the use of instructional technologies; factors considered as important by college tutors that influenced their use of instructional technologies. The study sample consisted of tutors from Karonga, Lilongwe, St. Joseph's, Blantyre, and Montfort teacher training colleges.

All the 95 tutors in the five colleges were sampled to take part in the study. However, 80 tutors participated in the study, representing a participation rate of 84.2%. The

survey design was adopted for the study. Data was collected using questionnaires and an inventory sheet. Data analysis was done by calculating frequencies and percentages.

The results of Kadzera's study revealed that there was infrequent use of higher order instructional technologies which were overhead projectors, videos, and computers. Reasons given were lack of teacher training, unavailability of the technologies, and lack of maintenance. The failure to use the locally available resources by some of the tutors was attributed to lack of creative thinking as well as lack of initiative to use the local environment in their teaching. A conclusion relevant to this study was that the government and teacher training colleges could collaborate to maximize training on use of instructional technologies in the teaching and learning process for prospective teachers. However, Kadzera's study was conducted in teacher training colleges and not in secondary schools. This gap was filled in this study.

Blankenship (1998) conducted a study in the Virginia State of USA on factors related to computer use by teachers in classroom instruction. The study was conducted in grades pre–school to K-12 equivalent to the Kenyan pre-school to Form Four. The objectives of the study were: to determine the extent of teachers" attitudes toward computers in the classroom; accessibility of computers by teachers and students; teacher training in computer use, support of teachers support in computer use; teachers" age; grade level the teacher taught, curriculum area the teacher taught, teachers" gender, and number of years the teacher was from retirement and how these factors could predict the use of computers by teachers for classroom instruction. The study adopted the survey design. To identify the sample, stratified sampling technique was used. 241 teachers and 3,800 students were sampled for the study. The teachers taught using computers as a learning resource while the students were from pre-school through grade

12. Data was analysed using measures of central tendency (mean and median), standard deviations and multiple regression.

On teacher training, results of the study indicated that the total population of classroom teachers reported an average of 10.28 hours of computer-related in-service training and 2.69 computer-related college classes. Only 8% of the survey participants had not received this training. School based training to teachers appeared to bring out difference to teachers in both their self-perception and use of computers in classroom instruction. The researcher made three recommendations: a repeat of the study after an intervention of intensive training of teachers to determine if there was any increase in computer use, development of an accurate instrument to measure computer use, and finally, the development of a training model that could be duplicated in other school districts, regions, states, and the nation. However, Blankenship's (1998) study failed to examine the relationship between training of teachers on computer use and students" performance in examinations. This gap was filled in the current study.

2.7.8 Summary of the theoretical review

Academic performance as a measure of learning has been established in the theoretical review. This review has shown that in the field of education, we cannot do away with being concerned with students" academic performance. This is because academic achievement in examinations can be seen as evidence that learning has taken place (Ward, Stoker and Murray-Ward, 1996). Indeed, academic performance among learners is considered as a criterion for deciding the effectiveness of educational programmes (Abolmaali et al., 2014). And that is why researchers evaluating an education system often take notice of academic achievement and look for factors that affect academic achievement (Abolmaali et al., 2014). However, in order for students to do well academically, there is the need to involve learners in deep cognitive engagement (Elliott

et al., 1999). One way of doing this is to use proper teaching methods, including the use of ICT tools. Various factors and approaches to teaching have been shown to influence students" academic performance. They revolve around interactions. Learning is the interactions between what students know, the new information they encounter, and the activities they engage in as they learn (Center for innovation in teaching and learning, 2015). Interaction plays a critical role in the learning process (Zimmerman, 2012). To enhance learning, the concepts and objectives of the course need to be presented clearly and in a lively manner to enable learners to spend more time engaged with the content (Ali and Ahmad, 2011; Alshare et al., 2011). Indeed, there is a significant relationship between the amount of time students spend with the content and weekly quiz grades (Zimmerman, 2012). Factors influencing performance have been identified as: mode of delivering course materials, time allocated particular tasks, and relevant, up-to-date, and easy to understand information (Abrami, et al., 2010, Lam and Bordia, 2008) and Alshare et al., 2011). The content that students interact with is contained in ICT tools.

Students also learn by interacting with their teachers. Improving students' relationships with teachers is important and has positive and long-lasting implications for students' academic and social development (Rimm-Kaufman and Sandilos, 2016). Therefore, good relationships between teachers and students are beneficial to students for their motivation and academic achievement (Cornelius-White, 2007 and Thijs and Koomen, 2008). Consequently, good relationship between teachers and students is one way of enhancing the use of ICT tools in the teaching/learning process (Luz, 2015).

Finally, there are three basic ways that students interact among themselves. These involve competing among themselves, as they work individually toward a goal without paying attention to fellow students, or they can work cooperatively with a vested interest in other students" learning as well as their own (Roger and Johnson, 1994).

These interactions also promote learning. The learning environment includes how individuals in the teaching/learning process interact with and treat one as well as the ways in which teachers may organize a learning session to facilitate learning (The Glossary of Educational Reform, 2014). A favourable school environment provides the necessary stimulus for learning experiences (Arul, 2012). Learning environments are broad and include: the characteristics of the concerned learners, the goals that exist for teaching and learning, the activities that best supports learning, and finally, the assessment strategies that will best measure and drive learning (Bates, 2015).

In the teaching and learning process, there are challenges inherent in the use of ICT tools. An important factor is inadequacy of resources (Afolabi et al., 2006). For example, the availability of instructional materials and ability of mathematics teachers to use them are vital determinants in achievement in mathematics (Afolabi, 2008). On computers and technology, factors that pose a challenge to computer use among others are associated with firstly, the school environment or the context in which technology will be implemented, secondly, factors associated with the students and thirdly, the teacher who serves as the instructor (Zhao et al.; 2002, Groff and Mouza, 2008).

The identified gaps have revealed the need for further studies on how the use of learning resources affects academic performance among learners. The current study focused on the relationship between learning resources and students" performance in geography in the KCSE in Matungu sub County.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.0 Introduction

This chapter described the research design and methodology. The main sections that were discussed include: the geographical location of the study, research design, target population sample size and sampling techniques, research instruments, piloting, validity and reliability of the research instruments to be used, ethical considerations, data collection procedures and data analysis.

3.1 Geographical Location of the Study Area

This study was carried out in public secondary schools in Matungu sub-county in Kakamega County. Matungu sub-county is one of the eight administrative sub-counties in Kakamega County. It covers an area of about 203.67 km² and has a population of 97497 as per the 2009 National Population Census. The major economic activity in the area is agriculture especially sugarcane farming. The sub-county has 18 public secondary schools and 2 private ones with an estimated student population of 3,517 and 90 teachers of which about 3200 students and 78 teachers are in public section. The choice of the sub-county was determined by the introduction of Information Communication Technology (ICT) as one of the teaching subjects and the use of ICT in facilitating curriculum implementation and the familiarity of the researcher with the study area which made it easier to develop rapport with the respondents making data collection less cumbersome. In support of this, Singleton (1993) states that, the ideal setting is one that is related to the researcher's interest, easily accessible and that which allows the development of immediate rapport. The performance of Geography was dismal compared to C.R.E and History as shown on table 1:1

3.2 Research Design

Kothari (2004) defines a research design as a blueprint for fulfilling objectives and answer to research questions. The writer emphasizes that a research design is a plan and structure of investigation so conceived as to obtain answers to research questions. The research design expresses both the structure of the structure of the research problem and the plan for investigation used to obtain empirical evidence on the relations of the research problem. Research design is an outline of the research being carried out from the beginning to the end. It is a plan which the research will follow (Kahawa 2008)

The study adopted the descriptive survey design. The design allows for the use of descriptive statistics as a method of data analysis. Mugenda and Mugenda (1999) observe that descriptive statistics summarizes data and describe the sample. This research design was adopted as it is advantageous to and relevant for the study because it permits research to go beyond the statistical gathered.

According to Kothari (2004), such designs are efficient methods of collecting descriptive data regarding the characteristics of populations, the current practices and conditions or needs. This design was adopted in this study in order to capture descriptive data from the selected schools and generalize the findings to the population from which the sample was selected.

3.3 Target Population

According to Anyona (2009) and Otieno (2005), two categories of respondents are necessary in research and these are the informed specialists and the consumers or the users. The specialists tend to have ideas and usually have considerable experience to draw upon. Consumers on the other hand are in a position to express their needs and dissatisfaction that point to the difficulties or opportunities in using a good, services or

facilities. The target population for the study was all 20 public secondary schools in Matungu Sub-county. The study targeted 20 principals, 371 teachers and 4749 students. The study narrowed down to form 3s and 4s since it was not possible to involve all the forms in the study.

Table: 3.1 Target Population

Category	No. of schools	Principals	Teachers	Students
Mixed Day	14	14	258	2256
Mixed Day Boarding	02	02	33	506
Boys Boarding	01	01	19	544
Girls Boarding	02	02	42	1040
Boys Day	01	01	19	403
Total	**20**	**20**	**371**	**4749**

3.4 Sample Size and Sampling Procedure

Essentially, sampling consists of obtaining information from only a part of a large group or population so as to infer about the whole population. The objective of sampling is thus to secure a sample which will represent the population and reproduce the important characteristics of the population under study as closely as possible. In this particular study, a total of 12 public secondary schools were sampled for the study after stratified sampling in the following categories; Mixed Day, Mixed Day Boarding, Boys Boarding, Girls Boarding and Boys Day school. Then using simple random sampling various schools were selected in each stratum. principal from the selected schools and their relevant Heads of Department were identified. Through simple random sampling geography teachers from each school were picked.

The sample size was determined by a prior calculation of the sample size required to meet confidence limits for the population values. The sample size for schools used in the study was based on stratified random sampling.

Stratified random sampling ensured that the stratified sub-groups of the population were represented in the sample required by the researcher, Mulusa, (1988).In this study schools were stratified in terms of boys' secondary schools, girls' secondary schools, mixed day school, mixed day and boarding school.

Purposive sampling was used to get the respondents for this study, where principals and head of departments, form four and three geography students were selected. The coefficient of variation formula Nassiuma, (2000), was used to calculate the sample size. Purposive sampling selects a population, which can provide the information required by the researcher Mulusa, (1988). Coefficient of variations of at most 30% is usually acceptable, Nassiuma, (2000).

The sample of the study included principals, teachers of geography and students. The principals were involved in the study because they are the managers of schools and charged with the responsibility of overseeing the implementation of ICT integration in teaching in secondary schools. They directly supervise teachers' behaviours and activities towards ICT integration in teaching and learning In any sample survey, we must first decide on the type of data to be collected and determine how adequate the results should be. Secondly, we must formulate the sampling plan for each of the characters for which data are to be collected. We must also know how to combine the sampling procedures for the various characters so that no duplication of field work occurs. Thirdly, the field work must be efficiently organised with adequate provision for supervising the work of the field staff. Lastly, the analysis of the data collected should be carried out using appropriate statistical techniques and the report should be drafted giving full details of the basic assumptions made, the sampling plan and the results of the statistical analysis. The report should contain estimate of the margin of

the sampling errors of the results and may also include the possible effects of the non-sampling error.

Teachers of geography on the other hand were involved in the study mainly because they are the knowledge dispensers in this area. How they deliver this knowledge is of concern and ICT is expected to make it simpler and easier for students' understanding. Teachers of geography are expected to interact directly with the ICT infrastructure putting them in a better position to give an account of how the infrastructures work. Students are the recipient and beneficiaries of ICT integration in teaching. Their views would be termed reliable enough to help make informed decision.

Student selection was achieved through random sampling. The main advantage of simple random sampling technique is that it gives equal chance to every targeted respondent to be sampled for the study. The selection of students was done per class (form) where all the students in each class (form 3&4) were given equal opportunities. They were then randomly picked. In mixed schools, girls and boys were separated and equal numbers randomly picked

This thesis considered a coefficient variation of 7 percent for the selection of the number of schools, hence selection of the principals. The confidence level used was 99 percent and given the population of 20 schools the sample size translated to 12 schools. The form four geography teachers was each selected from schools sampled, which translated to a total of 24 teachers. The number of students was 4749 at the coefficient variation of 12 percent and confidence of 99 percent, the sample size was 96 students which translated to 3 students per school. The coefficient of variation formula is given as follows:

$$n = \frac{NC^2}{C + (N-1)e^2}$$

Where:

N= Population

C= Coefficient of variation

e= confidence

n= desired sample size

Table 3.2 shows how sampling was done per school.

Table 3.2 Sample Size

School Categories	Sampled schools	Sampled principals	Sampled teachers	Sampled students
Mixed Day	8	8	16	64
Mixed Day Boarding	1	1	2	8
Boys Boarding	1	1	2	8
Girls Boarding	1	1	2	8
Boys Day Boarding	1	1	2	8
Total	**12**	**12**	**24**	**96**

3.5 Nature of Data

The nature of data captured in the study was primary data. Primary data was collected from three units of analysis, which included principals, form four and three geography teachers and students .The instruments that were used in primary data collection in this study were questionnaires, interview and observation.

3.6 Data collection procedure.

The researcher sought authority from the ministry of Education science and technology through the Dean of School of Education, Moi University and county Education director Kakamega and Sub-county Education officers. The researcher contacted each

head of the selected schools to request for permission to carry out the research in their schools. Once permission was granted, the researcher distributed the questionnaires to form three and four geography students and teachers. Both the students and teachers selected were asked to respond to all the items contained in the questionnaire. The researcher also requested the Heads of Department for professional records. These records were availed to the researcher, who in turn, made copies of them. They were later used for analysis.

3.7 Data Collection Instruments and Tools

The study used questionnaires and interview schedules to obtain the necessary data from the respondents.

3.7.1 Questionnaires

Orodho (2004) defines a questionnaire as an instrument used to gather data, which allows a measurement for or against a particular viewpoint. He emphasizes that a questionnaire has the ability to collect a large amount of information in a reasonably quick space of time. Ary et al (2009) further states that a questionnaire is the basic way in which data is gathered in survey research. The researcher developed questionnaires to use for the study. The researcher chose questionnaire because of its ability to collect large amount of data very quickly and at ago and the fact that both teachers and students are considered literate, they could easily read and interpret the questions with a lot of ease. The researcher administered two questionnaires namely: Questionnaire for the Teachers of Geography (QFTG) (Appendix II), and Questionnaire for the Students (QFS) (Appendix III)

QFT (Appendix I) was administered to 24 teachers. It was divided into two sections A and B. Section A, dealt with the bio data of the teachers and B dwelt on the objectives

of the study. It was likert scale like questionnaire, open ended questionnaire and structured questionnaire with 15 items; it covered all the objectives of the study. QFTG was administered by the researcher himself.

QFS (Appendix II) consisted of two sections (A and B). Section A dealt with bio data of the students while section B dwelt on the objectives of the study. Just like the questionnaire for teachers, this questionnaire also had likert scale questions, open ended and structured questionnaire with 13 items. The questionnaires were administered to the students by the researcher through the help of class teachers.

3.7.2 Interview Schedules

Yin (2003) states that interview are one of the most important sources of data and define the interview as a two-way conversation that gives the interviewer the opportunity to participate actively in the interview. The researcher conducted an interview to the school principals, (Principals' In-depth Interview PII).

(PII) was used to collect data from 12 principals of public secondary schools in the sub-county. The researcher had a few guiding questions based on the specific objectives of the study. The researcher personally administered the interview schedule which was conducted in the principals' offices. It lasted between a half an hour and one hour. Gadgets were used to cover the conversation upon seeking consent from the head teachers. However, in cases where there was no consent, the researcher jotted down the short summarized notes which were transcribed immediately to avoid forgetting the key data provided.

3.7.3 Observation schedule

According to Cohen (1980) one way of obtaining information about the progress or outcome of an educational programme is to be observing directly selected aspects of its

development and implementation as they occur. Observation has the following advantages: the researcher is able to study behaviours as it occurs and it is possible to obtain data about people who are unable to give verbal reports. Observation has the following limitations: it cannot be applied to many aspects of social life, for instance one cannot observe attitude and beliefs, there are many biasness due to subjectivity of the observer and observation tells what happened but not why it happened. The limitations were avoided by remaining objective during the study.

Observation checklist was important for exploring aspects that were uncomfortable to discuss. The research made observations of lessons in randomly selected Geography classes in the sampled schools. This enabled the researcher to cross check the information given through the questionnaire and interviews on the ICT integration.

3.7.4 Piloting of the instruments

A pilot study is important in shaping the future research instruments. The purpose of carrying out a pilot study is to find out if the instruments are appropriate, and practical. From the pilot survey, improvement can be made on the research instruments. Pilot study was carried in eight randomly selected secondary schools in Butula sub-county because those schools shared similar conditions with the schools in the main study. Piloting helped to locate ambiguities' and reveal flaws in the questions so that the data collected can be relevant to the objectives of the study. It helped the researcher to improve on the skills of using the instruments before the main study.

3.8 Validity of the Research Instruments

The validity of an instrument is its ability to measure what is supposed to measure Wanami (2010). It is the degree to which results obtained from the questionnaire

actually represent the phenomenon under study Mugenda (2008) to be valid; the instrument must be relevant to the purpose to which it is used.

The validity of the data collection instrument was enhanced through a pilot test on a population similar to the target population Mulusa (1988).Questionnaires of this study were designed and developed through discussion with. Through the pilot study, the researcher was able to improve on the questions that were not able to meet the research objectives. To ensure the validity of the research instrument, the researcher consulted the supervisor who read and approved the items in the questionnaire and interview schedule as being suitable for collecting relevant data for the study.

3.9 Reliability of the research instruments

Reliability of the research instrument refers to repeatable of consistency , the degree to which an instrument measures the same each time it is put under the same field conditions with the same subject Mwanje (2001) . Reliability was established by use of the split – half test based on the coefficient of internal consistency of the questionnaire as research instrument. Using the test, the researcher divided the questionnaires in terms of even and odd numbers after they have been administered. Each half was scored independently of the other. The test posted a high positive correlation coefficient, then it was found to be reliable Orodho, (2005) Open ended questions were scored by giving a mark for a relevant response and a zero for irrelevant/blank responses. The questions were divided into two equal halves for both the teachers and the students. The sample was randomly divided into two equal parts.

The scores of the halves were then correlated using the split half measure of reliability. Pearson product moment correlation coefficient was used to calculate between the scores obtained for each person on the odd items and scores obtained on the even items.

The student questionnaire yielded a half-test coefficient while the teacher questionnaire yielded the other half. The Pearson correlations coefficient was used to calculate the reliability coefficient. The formula is presented below.

The spearman's correlation coefficient obtained was (0.7). The results were further subjected to spearman Brown formulae for actual reliability {2r/ (1+r}. the value obtained was 0.82 which was regarded as reasonable reliability index for the research instruments, since the value was above the minimum r-value which koul (1993) pegs at 0.5. therefore a high reliability value (0.7 and above) shows that the characteristics it was designed to measure is actually measured.

3.10 Ethical considerations

The researcher sought permission from the School of Education Moi University to be allowed to carry out the research. The researcher then visited sampled schools and sought permission from the principals and head of humanity departments to be allowed to collect data in their schools. The researcher sought voluntary consent of the respondents, ensure confidentiality of the data given, respect the interests of the participants and report their responses honestly to avoid biasness and misrepresentation.

The researcher arranged with the principals to confirm the dates for data collection and get the consent to carry the research in the sampled schools. This eliminated cases of surprising entry into schools without prior visit to clarify on the intention of the visit.

The researcher also ensured confidentiality of the information given by the respondents. This was done by using the information without mentioning the specific names or schools where the data was collected from. The researcher also promised to avail the findings of the study to the relevant authority and those participants who took part in the study and would be interested in knowing the results (Creswell, 2013).

3.11 Data Analysis and Analysis Procedures

After all data had been collected, the researcher conducted data cleaning, which involved identification of incomplete or inaccurate responses, which were corrected to improve the quality of the responses. After data cleaning, the data was coded and entered in the computer for analysis using the Microsoft Excel 2007 and SPSS. The research yielded both Qualitative and Quantitative data. Qualitative data was analyzed qualitatively using content analysis based on analysis of meaning and implications emanating from respondents information and documented data. As observed by Gray (2004) Qualitative data provides rich descriptions and explanations that demonstrate the chronological flow of events as well as often leading to chance findings. On the other hand Quantitative was analyzed using various statistical methods including measures of central tendency and dispersion. Simple description statistics was employed to analyze quantitative data. The statistics included frequency counts, means and percentages. Quantitative data analysis was done using computer spreadsheet. The results of data analysis were presented using frequency distribution tables and bar graphs.

Table 3.3: Data Analysis Presentation

Objectives	Independents Variable	Dependent Variable	Method for data Analysis	Presentations
To establish the extend of ICT integration in teaching Geography in secondary schools in Matungu Sub-county	Level of teacher integration	Instruction outcome	SPSS- means, percentages	Tables, frequency distribution tables.
To find out the types of ICT tools available and their use for integration in teaching Geography in secondary schools in Matungu sub county.	Availability of ICT Tools	Instruction of geography	SPSS- Means, percentages	Tables, frequency tables,
To find out the impact of Information Communication and Technology (ICT) in teaching Geography in secondary schools in Matungu Sub-county, Kakamega County	Types of ICT tools available	Outcome of instruction	SPSS- means, percentages	Pie charts, tables, frequency tables.
To establish the challenges in ICT integration in teaching Geography in secondary schools in Matungu Sub-county.	Teacher	Implement-ation of ICT in teaching	SPSS- Means, percentages	Tables, frequency tables

CHAPTER FOUR

DATA INTERPRETATION ANALYSIS AND DISCUSSION

4.0 Introduction

This chapter presents the findings of the study. The purpose of the study was to investigate the extent of ICT integration in teaching Geography in public secondary schools in Matungu Sub-county, Kakamega County. The findings of the study were presented in the following sections as per the objectives of the study. The following were the objectives of the study:

i. To establish the status of ICT integration in teaching Geography in secondary schools in Matungu Sub-county.

ii. To find out the types of ICT tools available for integration in teaching Geography in secondary schools in Matungu sub county.

iii. .To find out the impact of Information Communication and Technology (ICT) in teaching Geography in secondary schools in Matungu Sub-county, Kakamega County

iv. To establish the challenges of ICT integration in teaching Geography in secondary schools in Matungu Sub-county.

The following sub-section presents information on the return rates of instruments and the respondents' demographic data such as gender, level of education, age bracket, and teaching experience. The findings of the study were as presented in the following sub-sections.

4.1 Return Rates of Instruments

The researcher issued to 12 principals, 24 teachers of geography and 96 students questionnaires and interview schedules. Out of these, 11 principals (92%), 22 teachers

of geography (92%) and 92 students (96%) returned their questionnaires giving a return ratio of 95%. According to Kothari (2012), this can be used to make study conclusions and provide reliable findings. The findings were as distributed in table 4.1 below.

Table 4.1: Instruments Return Rate

Respondents Category	No. in the Sample Size	No. of Responses	Response by Percentage
Principals	12	11	92
Teachers of Geog	24	22	92
Students	96	92	96
Total	**132**	**125**	**94**

4.2 Demographic and Academic Characteristics of Respondents in the Study

Information in this section was based on selected personal and academic characteristics of the three categories of respondents. The characteristics included Gender of the students, Age of the teachers, Work experience of the Teachers, work experience of principals and in-service Training and Workshops. Data presented in this section was obtained from completed questionnaires for teachers and students, Interview schedules for principals. The participants in the study were drawn from 12 public secondary schools in Matungu sub-county.

4.2.1 Gender of the students

The gender of the respondent's category that constituted form three and four students is presented in figure 4.1. The results show that out of the total number of 96 of the student respondents, male students were the majority 58(60%) as compared to female students 3(40%).
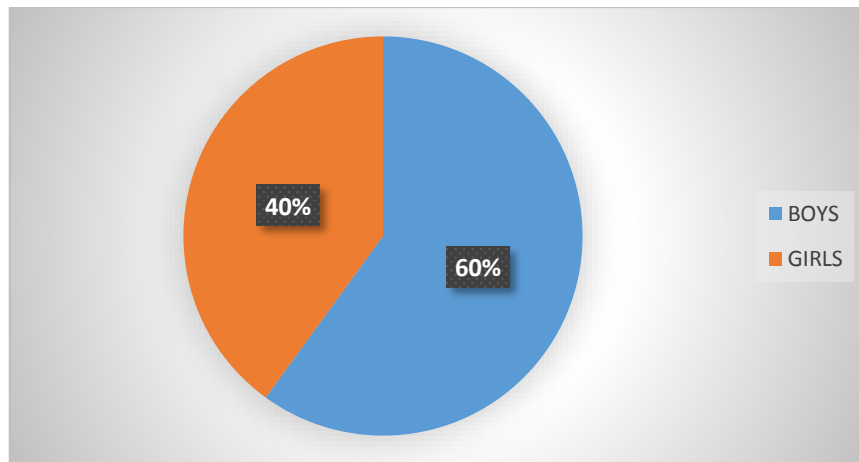
Figure 4.1: Gender of the students

4.2.2 Age of students

Table 4.2: Age of students

Age in years	Frequency	percentage
15 and below	3	3.2%
16-18	66	69.2%
19 and above	27	27.6%
Total	**96**	**100%**

The age category results of the students are presented in Table 4.3. The results showed that a majority, 66 (69.2%) of the student respondents were in the age category between 16 -18 years while 27(27.6%) were of ages of 19 and above. This suggests that most students start school at the ages of 6 or 7 years. The findings further indicate that most of the students were teenagers. This the age at which one grapples with identity problems and other developmental problems associated with adolescence and could benefit from values stressed in the teaching of the content of the supreme law. This will enable them to become good citizens especially at this time Kenya is faced with multiple challenges such as ethnicity, insecurity among others.

4.2.3 Teachers Age categories

Table 4.3: Teachers Age categories

Ages in years	Frequency	Percentage
20-30	9	38
31-35	8	28
36-45	4	18
Above 45	3	16
Total	**24**	**100**

The results presented in Table 4.3 show the age categories of Geography teachers. The age category of the teachers show that 9(38%) of the respondents were in the age category of 20 -30 years closely followed with those of 31-35 years at 8(28%) while those with above 45 were 3(16%). These results shows that most of the teachers were mature hence could mould the students' behaviour. On a good note, most Geography teachers are still in the age bracket of youth 66%. They are likely to get the best out of the learners.

4.2.4 Principals' Age categories

Table 4.4: Principals Age categories

Ages in years	Frequency	Percentage
31-35	0	0
36-40	1	14
41-45	3	30
46-50	5	38
Above 51	2	16
Total	**12**	**100**

The principals are expected to have taught for at least 6 years to qualify to be a principal. Generally these findings indicate that the principals are young and middle aged adults who are employed by the Teachers Service Commission (TSC)

4.3 Teachers integration of ICT when teaching Geography

4.3.1 Teachers Professional qualifications

Table 4.5: Teachers professional qualifications

Qualifications	Frequency	Percentage
Masters of Education(Arts)	2	10
Bachelor of Education (Arts)	14	58
Diploma in Education	3	14
Untrained teachers	6	18
Total	**24**	**100**

The results on the professional qualifications of Geography teachers indicate the majority, 14(58%) had attained Bachelor of Education (Arts) degree followed by untrained teachers,6 (18%),then Diploma,3 (14%) and master holders 2 (10%). The Education Act Cap 211 states that incase of secondary schools a substantial proportion must be university graduates or persons teaching technical subjects or commercial subjects must be in possession of adequate qualifications. The findings can be attributed to recruitment procedure by Teachers Service Commission (TSC). The degree holders have more marks when it comes to rating the candidates hence a majority secure the teaching positions. These findings confirm that most of the of the teachers qualify to teach in secondary schools.

4.3.2 Teaching Experience of Geography teachers

Table 4.6 Teaching Experience

Experience in terms of years	Frequency	Percentage
0-2	6	24
3-5	7	30
6-10	3	12
10 and above	8	34
Total	**24**	**100**

Results in the table 4.6 shows the form four History and Government teachers experience .The majority 8(34%) of Geography teachers had a teaching experience of 10 and above years, followed by a teaching experience of 3-5 years 7(30%).The age category of 6 - 10 years had the least frequency in terms of teaching experience 3(12%). The findings on the teaching experience of the Geography teachers indicate that most of them had reasonable teaching experience to apply their skills in the teaching and learning of Geography. The findings concur with the findings of Eshiwani (1983), in his study on factors affecting student performance in mathematics in Western province he found out that lack of teachers teaching experience could cause poor performance in mathematics owing to lack of mastery of content. These findings therefore confirm that teaching experience of teaching of Geography could contribute to good results.

4.3.3 Average number of lessons

Table 4.7: Number of lessons

Number of lessons	Frequency	Percentage
Less than 10	2	10
11-15	5	22
16-20	7	28
Over 20	10	40
Total	**24**	**100**

The results in table 4.7 indicate the majority, 10(40%) of Geography teachers in Matungu sub county teach over 20 lessons per week, followed by lesson between 16-20, 7(28%).Teachers with lessons below 10 were the least at 2 (10%).The findings of this study suggested that most of teachers of Geography are overworked. According to T.S.C regulations, a teacher is supposed to teach two subjects. The findings have revealed majority have more than 20 lessons of Geography alone. This hinders effective

delivery in class thus poor performance, as teachers do not adequately prepare for lessons.

4.3.4 In-service courses/workshops attendance on the Teaching of ICT integration in teaching Geography.

Table 4.8: In-service courses/workshops attendance

Number of times	Frequency	Percentage
0	10	42
1-2	9	36
3-4	4	18
5 and above	1	4
Total	24	100

Results in table 4.8 shows that majority of the teachers of Geography had not attended in-service courses or workshops on ICT integration in teaching Geography. The results showed that 10(42%) had not attended seminars, in-services or workshops. This was closely followed by those who attended between 1-2 at 9 (36%).The results also showed that those who had attended most times 5 and above was 1 (4%).This therefore means that there were few in-service courses and training programmes. This is in line with the finding of Olembo (1992) that programme development encompasses variation of subject content and modification of teaching techniques among other things. This low frequency of in-service courses and training programmes could result to poor experience and professional growth which affect the teaching and learning process leading to poor performance Geography. The findings concurs with the one carried by Wainaina (1994) on Christian Religious Education that established that there was inadequacy of in-service training to teachers which ended up killing their morale thus contributing to poor performance. This can be attributed to the perception towards the subject as compared to subject such as mathematics, sciences and languages. On the

other hand the study contradicts the findings of Obiero (2010), in her study, on factors affecting the teaching and learning of Kiswahili oral literature she found that most teachers had attended in-service courses on Kiswahili oral literature. She attributed the high attendance to the fact that Kiswahili is highly rated in schools for being a compulsory subject. It logically follows that the non-attendance or less attendance of ICT integration in teaching of Geography was because of its value as far as the mean of the school is concerned. Nasike (2011) on teachers' knowledge and skills in teaching the integrated English curriculum in public secondary schools in Kenya, she found that most teachers had attended in-service courses on integrated English curriculum. She attributed that high attendance to school managers' perception towards the subject, thus sponsored the in-service attendance.

4.3.5 Reasons for not attending the seminars and in-service courses on ICT integration in teaching Geography

The results on the reasons why Geography teachers do not attend in-service courses are discussed in terms of the views of the Principals' and teachers.

4.3.5.1 Principals'

Table: 4.9 Reasons why Geography teachers do not attend seminars - Principals'

Statement	Frequency	Percentage
Funds are not available	7	56
Education office has not organized them	2	16
No time to attend	1	4
Seminars/workshops are few	2	24
Total	**12**	**100**

Results in table 4.9 shows the reasons for Geography teachers not attending in-service courses according to school principals. The reasons were mainly lack of funds (56%)

and seminars/workshops are few at (24%). These results indicate that the major reason for none attendance is lack of funds and this could affect the use of professionals in organizing these programmes as there would not be funds to pay them for the training. On the hand due to lack of funds and professionals to organize the courses, teachers will also not find time to organize them as there is nothing to motivate them.

4.3.5.2 Geography Teachers

Results in table 4.9 show the reasons as reported by the Geography teachers as to why they do not attend ICT integration in teaching Geography in-service/courses/seminars.

Table 4.10: Reasons for Geography Teachers not attending ICT integration in teaching Geography in-service courses

Reasons	Frequency	Percentage
Rare opportunities	11	48
Lack of funds	3	12
School does not take us	6	26
Education office has not organized	4	14
Total	24	100

The results show that the reasons attributed to the Geography teachers not attending seminars were mainly 11 (48%) due to lack of opportunities. These results indicate that the rare opportunities could be as result of lack of funds as indicated by the principals.

4.4 ICT Tools Used In Teaching Geography

Table 4.11: ICT tools used in teaching Geography

Method	Frequently used (%)	Occasionally used (%)	Never used (%)
Laptop	94	6	0
Desktop computer	40	56	4
Digital camera	24	52	24
Projector	0	14	86
Printer	32	54	14
Interactive white board	6	34	60
Smart phone	8	32	60
Internet	32	22	46

The study sought to establish the issues associated with the use of ICT tools as perceived by Geography teachers in Secondary schools. The ICT tools included Laptop, Desktop computer, Digital camera, Projector, Printer, Interactive white board, Smart phone, Internet.   The laptop was frequently used by 94% of the respondents followed by desktop computers at 40%. printer was occasionally used at (54%). Digital camera was occasionally used at (52%) while desktop computer was occasionally used at (56%). projector was never used at (86%) followed by interactive whiteboard at (60%).

Status of ICT Integration in Teaching Geography in Public Secondary Schools.

Likert Scale Rating for Various ICT Integration Status

This research question was responded to by 18 teachers of geography. It was aimed at establishing the attitude of teachers towards ICT integration, maintenance of the available ICT tools, whether the school managements support ICT integration among other things.

The teachers of Geography respondents were asked to rate the factors on a scale of 1 to 5; (1: Strongly Disagree, 2. Disagree, 3: Neutral, 4: Agree, 5: Strongly Agree) to determine the extent at which they agreed or disagreed with statements relating to ICT integration in schools. Means for the factors were established in order to provide a generalized feeling of all the respondents. Means less than 1.5 implied that the respondents strongly disagreed with the statements; means greater than 1.5 and less than 2.5 implied that the respondents disagreed with the statements. Means greater than 2.5 and less than 3.5 implied that the respondents were neutral with the statements. Means greater than 3.5 and less than 4.5 implied that the respondents agreed with the statements while means greater than 4.5 implied that the respondents strongly agreed with the statements.

The teachers of geography were asked to score on a likert scale their responses on ICT integration in their respective schools. The following were their responses.

Classification of individual scores:

Likert scale

SA (Strongly Agree)=5, A(Agree) =4,N(Neutral)=3, D(Disagree)= 2,SD(Strongly Disagree)= 1

From the above table, it can be concluded that on the attitude of teachers towards ICT integration in secondary schools, the attitude is neither positive nor negative as shown by 2.8 points on the likert scale (56%). This means that teachers are undecided. On the well maintenance of ICT tools in schools, the teacher respondents scored 2.7 points on the likert scale (54%). This again showed that teachers were undecided whether the ICT tools were being maintained well or not.

Regarding most teachers having ICT skills, the teacher respondents scored 1.9 points on the likert scale (38%). This indicated that the respondents disagreed that most teachers have ICT skills. Concerning the school management highly supporting ICT integration in school, the teacher respondents scored 2.8 points on the likert scale (56%). This again means that the respondents were undecided and could not tell whether their schools were highly supporting ICT integration in teaching or not.

Basing on the availability of a designed tame table to use computer laboratory for ICT integration lessons, the teachers of geography sampled for the study scored 2.3 points on the likert scale (46%). This showed that the teacher respondents disagreed that there were timetables to that effect.

Finally on the adequacy of connection to internet, the teacher respondents scored 1.3 points on the likert scale (26%). This showed that the teachers of geography sampled for the study strongly disagreed that there was adequate connection to internet in their respective schools.

Table 4.12: Likert scale showing responses of Teachers of Geography on ICT integration status in their respective schools (TOG (n=18)

Statement	Frequency						Total F	Total S	Averg S	% S
	TOG	SA	A	N	D	SD				
Teachers have positive attitude towards ICT integration		2	3	6	4	3	18	51	2.8	56
ICT tools in the school are well maintained		2	2	5	7	2	18	49	2.7	54
Most of the teachers have ICT skills		-	1	2	10	5	18	35	1.9	38
The school management highly supports ICT integration		2	3	5	6	2	18	51	2.8	56
There is a designed timetable to use computer laboratory for ICT integration		-	2	3	11	2	18	41	2.3	46
There is adequate connection to internet		-	-	-	15	3	18	33	1.8	36

4.4.1 Compliance of ICT in schools

This question was responded to by 9 principals and 18 teachers of geography. It sought to establish whether the sampled schools were ICT compliant.

When asked about ICT compliance in their schools, the principals and teachers of geography gave data that was summarized in figure 4.2 below.

ICT Compliance by Principals and Geography teachers

No, 24%

Fully , 20%
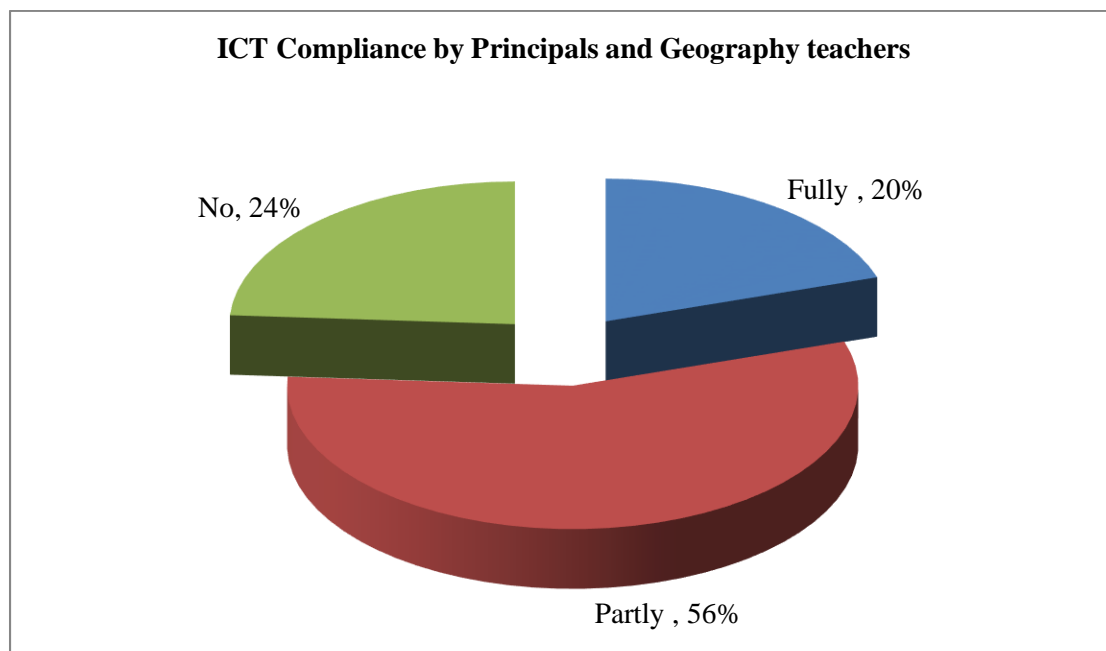
Partly , 56%

Figure 4.2: ICT Compliance

The figure 4.2 shows different levels of ICT compliance as was indicated by the respondents. The respondents were required to show whether their schools did not comply at all, whether they fully complied or partly complied. The majority at 56% indicated that they partly complied; meaning the integration of ICT in teaching geography was partly done. Only 20% of the respondents in this category showed that they fully complied, meaning ICT integration was always done at the right time with the right contents. Unfortunately, 24% of these respondents indicated that there was no integration of ICT tools in teaching at all. Majority of these respondents cited reasons

such as inadequate ICT tools, lack of stable power supply among others as the cause of poor compliance.

4.4.2 Frequency of ICT Integration in Teaching

This subsection aimed at establishing the frequency of integration among the schools sampled for the study. The question was responded to by all the respondents sampled for the study. The findings were as summarized in figure 4.3 below.
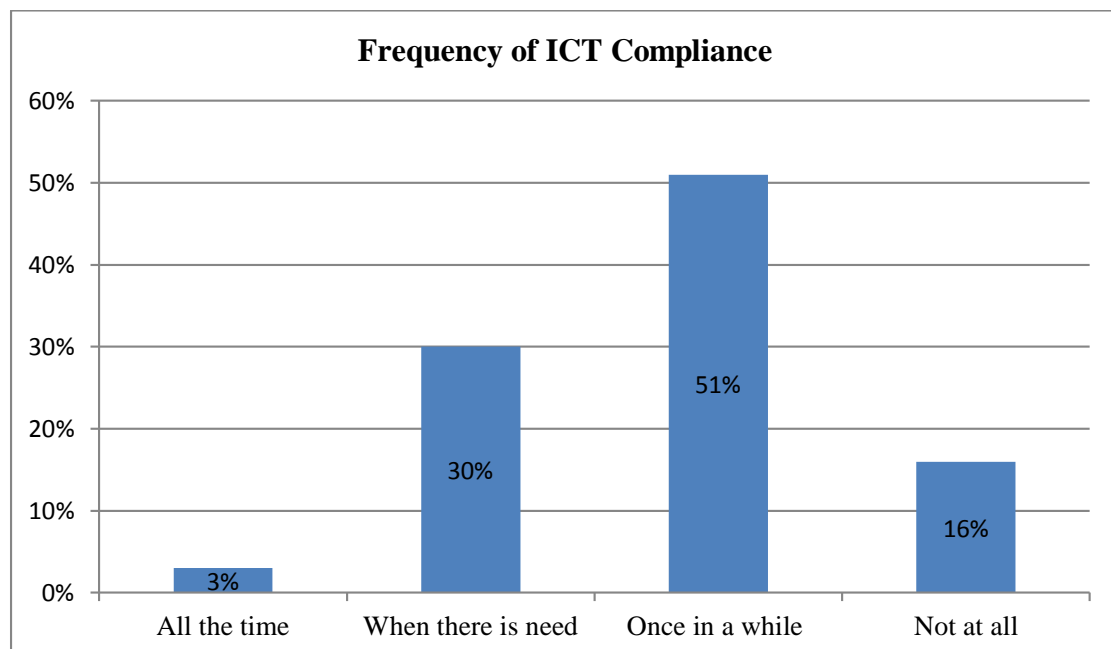
Figure 4.3: Frequency of ICT Integration in Teaching

From the above figure, it is clear that majority of schools are not integrating ICT in teaching as expected. This has been evidenced by 51% of the respondents who indicated that the integration only happens once in a while contrary to the policy requirement which demands that ICT integration should go with needs which are often there.

4.4.3 Computer Literacy of Teachers of Geography

In establishing the computer literacy of teachers of geography, the researcher asked the respondents to indicate whether the teachers had ICT skills or not. The findings were as shown as below.
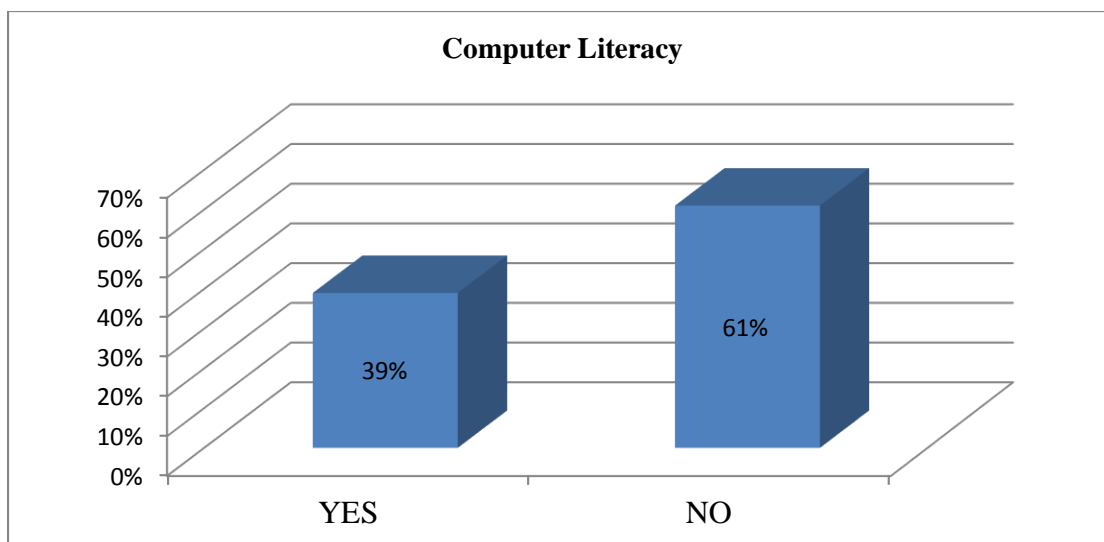
Figure 4.4: Computer Literacy of Teachers of Geography

From figure 4.4, it can be reported that majority (61%) respondents indicated that teachers of geography were computer illiterate rendering them ICT illiterate as well. Only 39% of the respondents indicated that those teachers were computer literate meaning they had the necessary ICT skills to facilitate integration of ICT in teaching geography.

4.4 Results and Discussions on the Types of ICT Tools Available for Integration in Teaching Geography in Secondary schools in Matungu Sub-county.

This subsection aimed at establishing whether there were ICT tools available for ICT integration in teaching and learning and their types.

Types of ICT Tools Available for Integration

The study sought to know the types of ICT tools available in the sampled schools and the responses were as shown in table 4.9.

Table 4.13: Types of ICT Tools Available for Integration

Type of ICT tools	Available and in use (Geography)		Available but not in use (Geography)		Not Available	
	F	%	F	%	F	%
Laptop	17	17	61	59	25	24
Desktop computer	47	46	50	48	6	6
Digital camera	9	9	15	14	79	77
Projector	14	14	17	16	72	70
Printer	78	76	20	19	5	5
Interactive white board	-	-	5	5	98	95
Smart phone	6	6	14	14	83	80
Internet	7	7	11	11	85	82
Radio	21	20	70	68	12	12
Television	35	34	56	54	12	12

From table 4.13, it can be reported that ICT tools such lap tops, radios and televisions were available as indicated by 59%, 68% and 54% but not being used for ICT integration in teaching geography. This could mean that they were being used for other purposes as listening and watching programs such as news. The table also reveals that ICT tools such as digital cameras, projectors, interactive white boards, smart phones and internet were indicated by majority of the respondents as not being available in the schools sampled for the study. This in essence meant that ICT integration in teaching geography was hampered in many ways and could not be counted as very effective. However, majority (78%) indicated that there were printers in use in their schools with significant number 47 respondents (46%) indicating that there were desktops in use in the schools while 48% said that there were indeed desktops but they were not being used to facilitate ICT integration in teaching geography.

4.5 Results and Discussions on the impact of ESP-ICT on teaching Geography in secondary schools in Matungu Sub-county, Kakamega County.

This subsection was aimed at finding out whether there ICT support from ESP and their impact on the ICT integration in teaching and learning in the sampled schools.

4.5.1 Whether ESP has donated ICT tools to the school

This research question was responded to by 9 principals and 18 teachers of geography.

To know whether ESP had donated any ICT tools to the school, both teacher and principal respondents were asked to indicate accordingly. Figure 4.5 gives the summary of the findings.
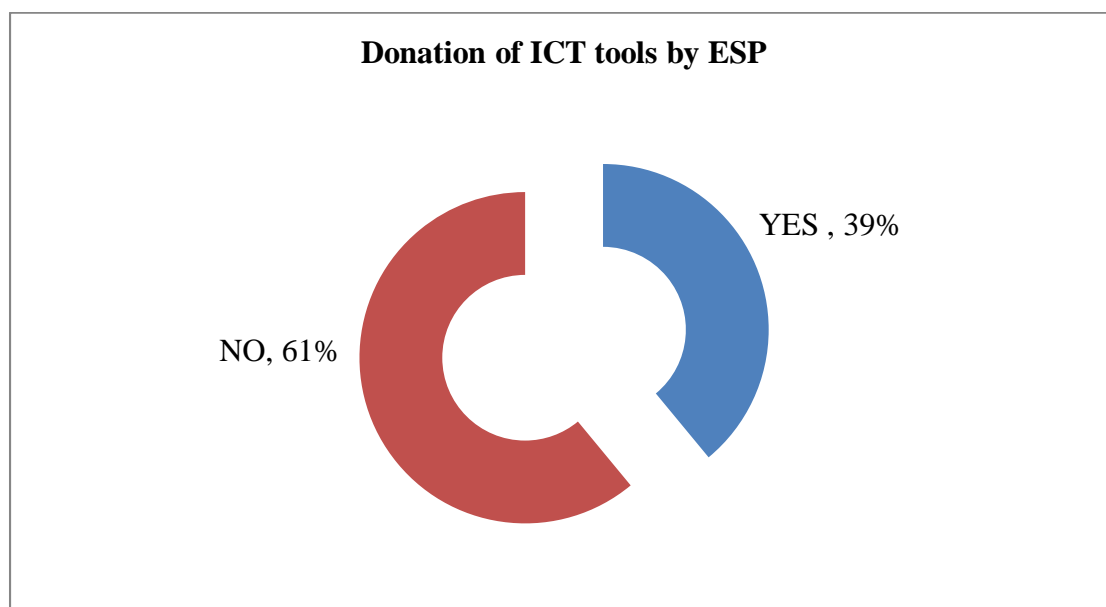
Figure 4.5: Donation of ICT tools by ESP

From figure 4.5, it shows that majority (61%) of the teacher and principal respondents indicated that their schools had not received any ICT donation from ESP. However, 39% of those respondents indicated that their schools had indeed received ICT tools donations majorly desktop computers and free installation of those equipment. This showed that in Matungu sub-county, there were schools which had benefited from

Economic Stimulus Program (ESP) while others did not benefit at all or were yet to benefit.

4.5.2 Benefits of ESP on ICT to schools

In order to establish some of the benefits of ESP on ICT integration in various public secondary schools in Matungu sub-county, again the principal and teacher respondents were asked to tick appropriately the following statements. The findings were as shown in table 4.10

Table 4.14: Benefits of ESP on ICT to schools

Benefits of ESP on ICT integration in teaching	Yes		No	
	F	**%**	**F**	**%**
Free donation of ICT tools e.g. desktops, laptops etc	20	74	7	26
Free installation of ICT tools e.g. desktops	20	74	7	26
Provision of free internet	10	37	17	63
Construction of computer laboratories	7	26	20	74
Training of teachers on ICT skills	5	17	22	83

Table 4.14 reveals that majority (74%) of the teacher and principal respondents indicated that ESP was of great benefit to different schools especially the ones they had identified as they donated ICT tools such as desktops and also offered free installation of those ICT tools to those schools. However, majority of the same respondents (63%, 74% and 83%) denied that ESP was providing free internet, constructing computer laboratories and training teachers on ICT skills respectively.

4.6 Results and Discussions on the Challenges Facing ICT Integration in Teaching

Geography in Secondary Schools in Matungu Sub-County, Kakamega County

The study finally sought to know the challenges facing ICT integration in teaching geography in the sampled secondary schools. Respondents were asked to tick appropriately on the statements provided and the findings were as shown in table 4.11

Table 4.15: Challenges facing ICT integration

Challenges facing ICT integration	Yes		No	
	F	**%**	**F**	**%**
Shortage of teachers trained on ICT skills and staff	87	84	16	16
High initial capital outlay	89	86	14	14
Resistance to change	50	49	53	51
Lack of stable power supply	47	46	56	54
Staff and students attitude	49	46	54	54
Lack of ICT resources/materials	81	79	22	21

From table 4.15, it can be reported that there are serious challenges facing ICT integration in teaching. On shortage of teachers trained on ICT skills and staff, 87% of the respondents confirmed that there was indeed a shortage. They argued that majority of teachers were lacking ICT skills making it difficult to integrate. The study also found that high initial capital outlay was also acute challenge as indicated by 89% of the respondents. In response to this challenge, they reported that the cost of purchasing, installing and maintain the ICT tools was way far their reach. However, majority (54%) denied that lack of stable power supply was a challenge citing that the government had connected a bigger percent of secondary schools to electricity though they mentioned frequent interruptions of electricity. On the attitude of staff and students, the study also found that majority (54%) affirmed that there were elements of negative attitude

towards ICT integration. Majority of respondents (81%) also reported that lack of ICT resources was another serious challenge that was hampering ICT integration in schools.

4.7 Mitigation Measures

The respondents were requested to give some of the mitigation measures against challenges for ICT integration in teaching geography. Their responses were as presented in table 4.12

Table 4.16: Mitigation Measures

Mitigation measures	Frequency	Percentage
Availing ICT resources	97	94
Embrace computer use and ICT skills	73	71
Training of staff and administration personnel	81	79
Improvement of computer and other ICT infrastructure	88	85
Change of attitude towards ICT use	56	54
Availing funds from government and other well-wishers.	59	57
Provision of stable power supply	67	65

Table 4.16 shows that ICT resources such as desktops, projectors among others should be availed for effective integration of ICT in teaching. This was supported by 94% of the respondents who answered this question. On embrace of computer use and ICT skills, majority (71%) reported that it should be done. Related to embrace of computer use is training of staff and administration personnel where 79% indicated that training of staff should be given a priority to ensure that all teachers acquire ICT skills necessary for ICT integration in teaching. There was also 85% score on improvement of computer and other ICT infrastructure. 54% and 57% of the respondents indicated that teachers and students should change their attitude towards ICT use and availing of funds by the

government and other well wishers respectively. A majority (65%) of the respondents also indicated that there should be stable and reliable supply of power to cut down on frequent interruptions of electricity. Majority of them suggested an alternative source of power such as automatic generators to be used in the events where electricity goes off.

4.8 Concluding Summary

This chapter presented findings of the study based on four research questions that sought to determine the extent of ICT integration in teaching Geography in public secondary schools. The study found out that there was profound evidence of lack of ICT integration among majority of schools as was supported by the statistics. The study further found out that majority of schools as statistically shown did not have sufficient ICT tools needed for effective ICT integration in teaching Geography in secondary schools. The study also found out that ESP on ICT integration had not benefited majority of schools. According to the statistics generated by the study, only a few secondary schools had received ICT donations which were equally noted as insufficient. The study finally found out that there were profound challenges facing ICT integration in teaching ranging from lack of ICT facilities to poor attitude of teachers towards its integration. The above findings suggest that ICT integration in secondary schools has not effectively picked up. This can be attributed to massive challenges addressed by the study.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

The purpose of this study was to investigate the extent of ICT integration in teaching Geography in public secondary schools in Matungu Sub-county, Kakamega County. The study was guided by the following objectives: to establish the status of ICT integration in teaching Geography in secondary schools in Matungu Sub-county, to find out the types of ICT tools available for integration in teaching Geography in secondary schools in Matungu sub county, to find out the impact ESP-ICT in teaching Geography in secondary schools in Matungu Sub-county, Kakamega County and to establish the challenges facing ICT integration in teaching Geography in secondary schools in Matungu Sub-county.

5.1 Summary of Findings

This section presents the summary of the findings of the study according to the objectives

5.1.1 Status of ICT integration in teaching Geography in secondary schools in Matungu Sub-county.

On the status of ICT integration in teaching geography in secondary schools, the study found that majority of teachers remained neutral on attitude towards ICT integration in teaching geography. The study revealed that ICT tools in the schools were not being well maintained as was revealed by majority of the teacher respondents where some of the respondents indicated that some of the ICT tools in their schools had broken down and they were not being repaired despite the long periods they had taken. Still on the status of ICT integration in teaching geography, the study found that majority of

teachers did not have ICT skills as was proved by overwhelming majority of the respondents who disagreed to the statement to that effect. This confirmed why the ICT compliance in the sampled schools was low as was revealed by only 20% of the respondents who indicated that they were fully integrating ICT in teaching.

The study also established that school managements did not highly support ICT integration in teaching. This was attributed to lack of essential ICT tools and failure by the schools to facilitate the training of teachers on ICT skills. Similarly, the study also established that there were no designed timetables to use computer laboratory for ICT integration in schools as was evidenced by majority of respondents who indicated so by disagreeing to the statement. Finally on the status ICT integration in teaching geography, the study found that there was no adequate connection to internet, a point that majority of the respondents strongly indicated.

5.1.2 Types of ICT tools available for integration in teaching Geography in secondary schools in Matungu Sub County

The study found that the availability of ICT tools for integration in teaching geography varied with respondents depending on what was available at the time of research. The study established that various ICT tools were available but far from being sufficient. Desktop computers were established to be the most available as was evidenced by 57% of the respondents who indicated that they were available but not in use and 17% indicated that they were available and being used in ICT integration in teaching. Interactive whiteboards were established to be the most missing among the ICT tools for ICT integration. This was supported by 98% of the respondents who indicated so. Smart phones bought by schools for ICT integration and internet were also found by the study to be missing at a very high rate. This was evidenced by 85% and 83% of the respondents respectively who indicated that the tools were not available in their schools

for ICT integration in teaching of geography. The study also found that even the ICT tools which were available in various schools were minimally used in ICT integration in teaching.

5.1.3 Impact of ESP-ICT in teaching Geography in secondary schools in Matungu Sub-county, Kakamega County.

On the impact of ESP-ICT in teaching geography, the study found that ESP had donated ICT tools such as desktop computers and their installation to some schools as was supported by 39% who indicated so. However, majority of the respondents 61% indicated that ESP had not benefited them in any way. Those respondents who acknowledged assistance from ESP cited benefits such as free donation of desktop computers and free installation as was supported by 74% of the respondents in each case.

5.1.4 Challenges of ICT integration in teaching Geography in secondary schools in Matungu Sub-county.

Most of the secondary schools sampled for the study had many common challenges. The challenges varied from insufficient number or lack of computers to lack of support from the management committee. Establishing adequate number of computers in one school requires sufficient funding that cannot be met by the school only. School management and other stakeholders are expected to play a vital role of ensuring that such funds are made available.

Shortage of teachers trained on ICT skills and staff, high initial capital outlay and lack of ICT resources/materials topped the list as was evidenced by 87%, 89% and 81%. The study further found out that even though majority of sampled schools were connected to electricity, lack of reliable power supply was a big challenge too. Many

principals indicated that frequent power interruption was making it quite difficult to operate ICT tools which majorly rely on power. Automatic generator power standby was recommended. However, that equally calls for funds.

On the mitigation of the above challenges, the study found that as much as there were serious challenges to the effective ICT integration in teaching, the good news is that these challenges can be eradicated.

First and foremost, the study found that there are equally very serious mitigation measures that if fully implemented, then ICT integration in teaching will be a success. The study established that if funds are allocated to schools and ICT integration in teaching becomes a priority, then the question of inadequacy of resources will be no more.

The study also established that the most effective way of keeping the staff with the ever developing new versions of software applications in the field of ICT operations is to offer constant and consistent training. This will boost the confidence of the staff and eventually encourage them to fully embrace integration of ICT in their teaching and learning activities.

In conclusion, the study found out that another serious way of containing challenges to effective integration of ICT in teaching is to introduce an ICT training syllabus in both teacher training colleges and universities. This will ensure that teachers who leave these training centers are adequately prepared and armed with both software and hardware skills that are required to integrate ICT in teaching. Becta (2010) is in agreement with this as he says that developing the skills to engage effectively with the technology and creating structures to enhance the use of ICT in schools is as important as investing in technology infrastructure. Therefore effective training is crucial if teachers are to

integrate ICT in teaching and learning processes. On the contrary, when training is inadequate or inappropriate, teachers are not sufficiently prepared, and perhaps not sufficiently confident, to make full use of ICT tools in their daily lessons.

5.2 Conclusions

i. On status of ICT integration in teaching Geography in secondary schools, the study concluded that teachers did not have positive attitude towards ICT integration in teaching and learning processes. The study also concluded that poor maintenance of the available ICT tools was eminent leading to frequent break down and eventually hampering their essence. The analysis in chapter four also revealed that majority of teachers lacked ICT skills and this hampered their ability to use ICT tools effectively in teaching and learning processes hence low compliance in ICT integration in teaching. The study also revealed that there was lack of financial support from the stakeholders. This therefore limited the purchase and proper installation of ICT tools

ii. Concerning the types of ICT tools available for integration in teaching Geography in secondary schools, the study concluded that most of the essential ICT tools were not available. Majority of schools indicated that they had desktop computers. However, these ICT tools were not being used effectively to achieve their goals.

iii. On the impact of ESP-ICT in teaching Geography in secondary schools, the study revealed that majority of the schools sampled for the study had not benefited from the Economic Stimulus Programme either through direct funding or donation of ICT tools. However, some schools reported that ESP had had positive impact on them by donating ICT tools such as desktop computers and even funding the installation of such tools. These tools were seen to be impacting positively on the

learners as they were being used to improve their learning processes through ICT integration in teaching.

iv. Regarding the challenges of ICT integration in teaching Geography in secondary schools, the study concluded that most of the schools in Matungu sub-county did not have adequate ICT tools for effective ICT integration in teaching and learning. This was attributed to the challenges which most of the schools cited as the biggest threat to effective ICT integration in teaching especially in rural settings like the case in hand. However, the study also revealed that these challenges are not permanent and that if initiative steps to mitigate them are undertaken, permanent solutions can be reached.

v. Concerning the mitigation measures, the study concluded that funds should be allocated by the government and other stakeholders to improve the adequacy of ICT resources. This would eventually improve ICT integration in teaching and learning.

vi. The study also concluded that sponsoring of training on ICT skills among the staff members will equally mitigate some of the challenges. It was also concluded by the study that schools should lay down infrastructure for effective ICT integration in teaching and learning. This would ensure that all the necessary ICT resources fall into place and are always ready for use by the teachers in integration processes. Another suggested mitigation measure was to set up alternative power supply to deal with the frequent power interruption. This in a way would ensure that ICT tools that rely on power remain operational.

5.3 Recommendations

i. In light of the findings about status of ICT integration in teaching in secondary schools, the study recommended teachers should be trained on ICT skills to allow them develop positive attitude towards ICT integration. This would go a long way to ensure effective integration of ICT in teaching since teachers are the core facilitators. The study also recommended that the available ICT tools should be properly maintained to enable them perform their functions effectively and to make them last longer since some of them are too expensive to be acquired often.

ii. In light of the findings about types of ICT tools available in teaching in secondary schools, the study recommended the provision of ICT tools should be adequate to allow staff and students to access the ICT resources without difficulties. The government and other stakeholders should provide funds for the purchase of adequate ICT tools.

iii. Regarding the findings about the impact of ESP on ICT integration in secondary schools, the study recommended that ESP projects should be intensified especially in the village schools to caution schools in the purchase of ICT tools which cannot be easily acquired single handedly without support from other stakeholders.

iv. Finally the study recommended that for effective ICT integration in teaching, the mitigation measures must be implemented. The study therefore recommends that the government should allocate funds to aid the implementation of the mitigation measures as suggested by the study and to develop a policy framework to provide the structures for such implementation and integration of ICT in teaching. The study also recommends that alternative reliable power supply such as solar panels

and automatic generators should be installed in schools to counter the frequent power interruptions from the mains.

5.4 Suggestions for Further Research

This study was carried out in rural schools; therefore a similar study also needs to be carried out in an urban setting to compare the difference of ICT integration in teaching with the rural setting.

Further study can also be carried out to determine the Effect of ICT integration in teaching on academic performance of students.

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APPENDICES

Appendix 1: Introductory Letter

May, 2014.

Dear Sir/Madam,

<u>RE: PERMISSION TO CARRY OUT RESEARCH IN YOUR SCHOOL.</u>

I am a master student at Moi University. I am carrying out a research on "**INTEGRATION OF ICT IN THE INSTRUCTION OF GEOGRAPHY IN PUBLIC SECONDARY SCHOOLS IN MATUNGU SUB-COUNTY, KAKAMEGA-KENYA"** To achieve this, you have been selected to participate in the study. I kindly request you to fill the attached questionnaire to generate data required for this study. This information will be used purely for academic purposes and will be treated with a lot of confidentiality and will not be used for publicity. Neither your name nor the name of your institution will be mentioned in the report.

Your assistance and cooperation will be highly appreciated.

Thank you in advance.

Yours faithfully,

_____

Margaret Akinyi Musumba

Appendix II: Questionnaire for Teachers of Geography (QFTOG)

SECTION A: BIO-DATA

1. Gender: Female [   ] Male [   ]
2. What is your highest academic qualification?

   Diploma [   ]   Bachelors Degree [   ]   Masters Degree   [   ]

   Any other (specify)_____

3. How long have you been in the teaching profession?

   Less than 2 years [   ]   2-5 yrs   [   ]   6-10 yrs [   ]

   11-15 years   [   ]   Over 15 years [   ]

4. Indicate the category to which your school belongs

a) Mixed Day school [   ]   b) Mixed Day Boarding school   [   ]

c) Boys Day school   [   ]   d) Boys Boarding school   [   ]

e) Girls Day School   [   ]   f) Girls Boarding school   [   ]

SECTION B: QUESTIONS BASED ON THE OBJECTIVES OF THE STUDY

i) Status of ICT integration in teaching of geography.

5. Using the scale shown below, kindly rate the statements on ICT integration in teaching geography.

STATEMENT	SD	D	U	A	SA
I enjoy intergrating ICT in the teaching of Geography.					
ICT tools in my school school are well maintained					
I have the required skills in ICT intergration in the teaching of Geography					
The school management highly supports ICT integration					
There is a designed timetable to use computer laboratory for ICT integration					
There is adequate connection to internet					

7. How often do you integrate ICT in teaching your geography lessons?

All the time   [   ]

When there is need   [   ]

Once in a while   [   ]

Not at all   [   ]

8. What are some of the topics you teach with the help of ICT?_____

_____

_____

9. Indicate whether your school has computer lab or not.

      Available   [   ]

      Not available   [   ]

10. Comment on the connectivity of the computers to the internet in your school.

      Full time connection to the internet   [   ]

      Connected only when in use   [   ]

      No internet connection at all   [   ]

11. How do you cope if your school does not have electricity or when there is power blackout?

      Use of backup generator   [   ]

      ICT integration lessons stop until power resumes   [   ]

      Go to neighboring schools with electricity   [   ]

ii) Types of ICT tools available and their use for integration in teaching Geography in   secondary schools in Matungu.

12. Below are some of the needed ICT tools for effective teaching and learning. Tick where appropriate.

Type of ICT tools	Available and in use (Geography)	Available but not in use (geography)	Not Available
Laptop			
Desktop computer			
Digital camera			
Projector			
Printer			
Interactive white board			
Smart phone			
Internet			
Radio			
Television			

iii) The impact of ESP-ICT in teaching geography in secondary schools Matungu sub county.

13. State some of the impact of ESP (Economic Stimulus Program), particularly ICT in your school?

_____
_____
_____
_____
_____

iv) The challenges in ICT integration in teaching Geography in secondary schools in Matungu Sub-county

14. The following are some of the challenges facing the effective ICT integration in the teaching of Geography. Please indicate (using a tick) whether each is a challenge in your school.

Challenges	Seriously affecting my school	Moderately affecting my school	Not affecting my school
Shortage of skills in ICT amongst teachers			
Lack of funds to acquire ICT tools			
Resistance to change			
Lack of stable power supply			
Negative attitudes by teachers			
Negative attitude by students			

15. Give some of the ways the above mentioned challenges can be solved.

_____
_____
_____
_____
_____
_____
_____
_____
_____

Appendix III: Questionnaire for the Students (QFS)

SECTION A: BACKGROUND INFORMATION

1. What is you gender? Male [   ]   Female [   ]

2. Indicate your form/class. Form I [   ]   Form II [   ]   Form III [   ]   Form IV [   ]

3. Indicate the category to which your school belongs.

    a) Mixed Day school [   ]   b) Mixed Day Boarding school   [   ]

    c) Boys Day school   [   ]   d) Boys Boarding school   [   ]

    e) Girls Day School   [   ]   f) Girls Boarding school   [   ]

SECTION B: QUESTIONS BASED ON THE OBJECTIVES OF THE STUDY

i) Status of ICT integration in teaching of geography.

4. Using the scale shown below, kindly rate the statements appropriately

STATEMENT	SD	D	N	A	SA
Students have positive attitude towards ICT integrated lessons					
ICT tools in the school are well maintained					

5. How often do your geography teachers integrate ICT when teaching you geography lessons?

        All the time   [   ]

        When there is need   [   ]

        Once in a while   [   ]

        Not at all   [   ]

6. What are some of the topics you are taught using ICT tools?

_____

_____

ii) Types of ICT tools available and their use for itegration in teaching Geography in secondary schools in Matungu.

7. Below are some of the needed ICT tools for effective teaching and learning. Tick where appropriate.

Type of ICT tools	Available and in use (Geography)	Available but not in use (geography)	Not Available
Laptop			
Desktop computer			
Digital camera			
Projector			
Printer			
Interactive white board			
Smart phone			
Internet			
Radio			
Television			

iii) The impact of ESP-ICT in teaching geography in secondary schools Matungu sub county.

8. Indicate whether your school has computer lab or not.

     Available   [   ]

     Not available [   ]

9. Comment on the connectivity of the computers to the internet in your school.

     Full time connection to the internet   [   ]

     Connected only when in use   [   ]

     No internet connection at all   [   ]

iv) The challenges in ICT integration in teaching Geography in secondary schools in Matungu Sub-county

10. How do you cope if your school does not have electricity or when there is power blackout?

     Use of backup generator   [   ]

     ICT integration lessons stop until power resumes   [   ]

     Go to neighboring schools with electricity   [   ]

11. The following are some of the challenges facing the effective ICT integration in the teaching of Geography. Please indicate (using a tick) whether each is a challenge in your school

Challenges	Seriously affecting my school	Moderately affecting my school	Not affecting my school
Shortage of skills amongst students			
High initial capital outlay			
Resistance to change			
Lack of stable power supply			
Negative attitude by students			
Lack of ICT resources/materials			

13. Give some of the ways the above mentioned challenges can be solved.

_____
_____
_____
_____
_____
_____

Appendix IV Observation Schedules

This observation checklist is for use in a 40 minute geography lesson. It is for use whether ICT tools are in use or not and will be used by the researcher

1. Class being taught _____
2. Topic being covered _____
3. (a)Are ICT tools being used during the lesson [ ] Yes [ ] No

   (b) If ICT tools are in use which ones are they?

   ❖ Laptop
   ❖ Desktop computer
   ❖ Digital camera
   ❖ Projector
   ❖ Printer
   ❖ Interactive white board
   ❖ Smart phone
   ❖ Internet
   ❖ Radio
   ❖ Television

ICT tools	Available and in use	Available but not in use	Not available
Dvd machines			
Laptop			
Desktop computer			
Digital camera			
Projector			
Printer			
Interactive white board			
Smart phone			
Internet			
Radio			
Television			

Appendix V Interview Schedule for Heads of Geography Department.

1. Gender: Female [ ] Male [ ]
2. What is your highest academic qualification?
3. How long have you been in the teaching profession?

Indicate the category to which your school belongs

SECTION B: QUESTIONS BASED ON THE OBJECTIVES OF THE STUDY

i) Status of ICT integration in teaching of geography.

5 Using the scale shown below, kindly rate the statements on ICT integration in teaching geography.

STATEMENT	SD	D	U	A	SA
Do you enjoy integrating ICT in the teaching of Geography?					
Are ICT tools in your school well maintained?					
Do you have the required skills in ICT integration in the teaching of Geography?					
Do the school management highly supports ICT integration?					
Is there a designed timetable to use computer laboratory for ICT integration?					
Is there adequate connection to internet?					

6. How often do you integrate ICT in teaching your geography lessons?

7. What are some of the topics you teach with the help of ICT?_____

_____
_____

8. How do you cope if your school does not have electricity or when there is power blackout?

ii) Types of ICT tools available and their use for integration in teaching Geography in secondary schools in Matungu.

11. Below are some of the needed ICT tools for effective teaching and learning. which ones are available in your department? Tick where appropriate.

Type of ICT tools	Available and in use (Geography)	Available but not in use (geography)	Not Available
Laptop			
Desktop computer			
Digital camera			
Projector			
Printer			
Interactive white board			
Smart phone			
Internet			
Radio			
Television			

iii) The impact of ESP-ICT in teaching geography in secondary schools Matungu sub county.

12. What are some of the impact of ESP (Economic Stimulus Program), particularly ICT in your department?

_____
_____
_____
_____
_____

iv) The challenges in ICT integration in teaching Geography in secondary schools in Matungu Sub-county

13. The following are some of the challenges facing the effective ICT integration in the teaching of Geography. Which ones are affecting your department?

Challenges	Seriously affecting my department	Moderately affecting my department	Not affecting my department
Shortage of skills in ICT amongst teachers			
Lack of funds to acquire ICT tools			
Resistance to change			
Lack of stable power supply			
Negative attitudes by teachers			
Negative attitude by students			

14. Give some of the ways the above mentioned challenges can be solved.

_____
_____
_____
_____
_____
_____
_____
_____
_____

Appendix VI: The Map of Matungu Sub-County

matungu township

khalaba zone

bumula subcounty

mumias sub county

namulungu zone

munami

busia sub county
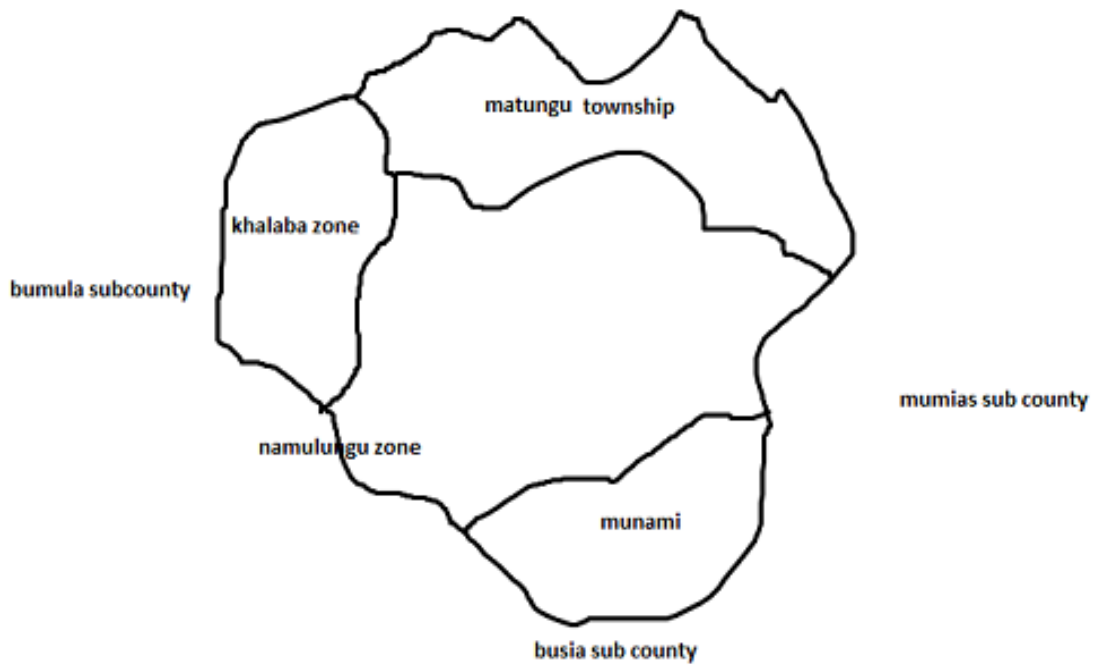
Appendix VII: Letter of Authorization Kakamega County

REPUBLIC OF KENYA

THE PRESIDENCY
MINISTRY OF INTERIOR & CO-ORDINATION OF
NATIONAL GOVERNMENT

Telegrams "DISTRICTER", Kakamega
Telephone 056 31131
Fax 056 31133
Email-cckakamega12@yahoo.com
When replying please quote

Ref : ED/12/1/VOL.II/184

and date

COUNTY COMMISSIONER
KAKAMEGA COUNTY
P O BOX 43-50100
KAKAMEGA.

DATE: 28ᵗʰ Nov, 2016

MARGARET AKINYI MUSUMBA
MOI UNIVERSITY
P.O Box 3900-30100
ELDORET

RE: RESEARCH AUTHORIZATION

Following your authorization vide letter Ref: NACOSTI/P/16/24788/13442 dated
27ᵗʰ October, 2016 by NASCOTI to undertake research on *"Investigation into
extent of ICT integration in teaching geography in public secondary schools in
Matungu sub-county, Kakamega County, Kenya"*

Iam pleased to inform you that you have been authorized to carry out the research
on the same.

E. ATEMI
FOR: COUNTY COMMISSIONER
KAKAMEGA COUNTY

Appendix VIII: Letter of Authorization (NACOSTI)

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone:+254-20-2213471,
2241349,3310571,2219420
Fax:+254-20-318245,318249
Email:dg@nacosti.go.ke
Website: www.nacosti.go.ke
when replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No.

Date:

NACOSTI/P/16/24788/13442

27th October, 2016

Margaret Akinyi Musumba
Moi University
P.O. Box 3900-30100
ELDORET.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on *"Investigation into extent of ICT integration in teaching geography in public secondary schools, Matungu Sub-County, Kenya,"* I am pleased to inform you that you have been authorized to undertake research in **Kakamega County** for the period ending **24th October, 2017.**

You are advised to report to **the County Commissioner and the County Director of Education, Kakamega County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.
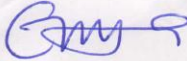
BONIFACE WANYAMA
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Kakamega County.

The County Director of Education
Kakamega County.

Appendix IX: Letter of Authorization (County Director of Education)

MINISTRY OF EDUCATION SCIENCE & TECHNOLOGY

Telephone: 056 - 30411
FAX   : 056 – 31307
E-mail   : wespropde@yahoo.com
When replying please quote.

COUNTY DIRECTOR OF EDUCATION
KAKAMEGA COUNTY
P. O. BOX 137 - 50100
KAKAMEGA

STATE DEPARTMENT OF EDUCATION

REF:WP/GA/29/17/VOL.I1I/   29th November, 2016

Margaret Akinyi Musumba
Moi University
P. O. Box 3900 – 30100
ELDORET

RE: RESEARCH AUTHORIZATION

The above has been granted permission by National Council for Science & Technology vide letter Ref. NACOSTI/P/16/24788/13442 to carry out research on "**Investigation into extent of ICT integration in teaching Geography in Public Secondary Schools, Matungu Sub County, in Kakamega County, Kenya**" " for a period ending, 24th October, 2017.

Please accord her any necessary assistance she may require.

A. K. LANGAT
COUNTY DIRECTOR OF EDUCATION
KAKAMEGA COUNTY

Appendix X: Research Permit