FACTORS INFLUENCING INFORMATION COMMUNICATION AND TECHNOLOGY INTEGRATION IN TEACHING AND LEARNING OF GEOGRAPHY IN SECONDARY SCHOOLS IN RACHUONYO SOUTH SUB-COUNTY, KENYA

BY

ANYANGO FLORENCE MITA

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DEDICATION

To my loving husband Dennis Ochieng. Thank you for your financial and moral support.

ABSTRACT

Information and Communication Technologies (ICTs) are essential aspect of teaching and learning because their use impact positively on students' achievements. However in Rachuonyo South Sub- County secondary schools, students have continued to attain poor results in geography in the Kenya Certificate of Secondary Education (K.C.S.E) examination with average score of D+ between 2006 and 2010 despite formulation of ICT policy by the government in 2006 which aimed at reforming education system. It is not clear which factors influence ICT integration as far as students' performance in Geography is concerned. The purpose of this study was to establish factors influencing ICT integration in teaching and learning geography in secondary schools in Rachuonyo South Sub-County, Homa Bay County. Objectives of the study were to establish: Frequency of ICT use, geography teachers' and students' competencies and attitudes in ICT use, availability of ICT policies, facilities and infrastructures in secondary schools in this Sub-County. The study was grounded on a conceptual frame work and adopted a descriptive survey design. 63 head teachers, 189 form four geography teachers, 1427 form four geography students and 1 Quality Assurance and Standards Officer for me the study population. Simple random sampling procedure was used to select 63 geography teachers and 471 geography students. Saturated sampling technique was used to select head teachers and Quality Assurance and Standards Officer. Questionnaires, interview guide and documents analysis guides enabled the researcher to collect data. 10% of the population was used for piloting to ascertain reliability of research instruments and the results yielded reliability coefficient alpha levels of 0.76 (students' questionnaires) and 0.81 (teachers' questionnaires). Content and face validity were established by scrutiny and advice by experts from the Department of Education Communication and Curriculum Studies of Maseno University. Descriptive statistics such as frequency counts, percentages and means were used to analyze quantitative. Qualitative data were organized, categorized and reported in emergent themes. The study revealed that teachers had average while students had low ICT competencies, teachers and students had neutral attitudes on ICT integration, there were no clear ICT policies, schools lacked adequate ICT facilities and infrastructures. The study recommended facilitation of teachers' and students' acquisition of ICT skills by school managers, investment in ICT infrastructure and facilities to facilitate development of effective ICT policies to regulate ICTs use in geography lessons. This study may be significant to education stake holders in understanding challenges to ICT integration in secondary schools.

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ABBREVIATIONS AND ACRONYMS

BECTA   British Education Communications and Technology Agency

GOK   Government of Kenya

ICT   Information and Communication Technologies

KCSE   Kenya Certificate of Secondary Education

K.I.E   Kenya Institute of Education

KESSP   Kenya Education Sector Support Program

NEPAD   New Partnership for Africa Development

QUASO   Quality Assurance and Standards Officer

SPSS   Statistical Package for Social Sciences

TEL   Technology Enhanced Learning

UNESCO   United Nations Educational Scientific and Cultural Organization

GIS   Geographic information Systems

INSET   In Service Education of Teachers

VSAT   Very Small Aperture Terminals

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Geography has been defined as the study of the earth and its features. It involves studying the distribution of life on earth and the effects of human activities on the earth (Mishras, 2005). Geography is derived from Greek word '*geographia*' literally translated as to 'describe earth'. It involves the study of the features, the inhabitants, the phenomena of the earth as well as spatial analysis of the natural and human phenomena. It is an all encompassing discipline that seeks to understand the earth and all its human and natural complexities and considered as a bridge between human and physical science (Mishras, 2005).

Geography is a subject of which its scope integrates subjects from other branches of social sciences. Teaching this subject calls for creativity of the teacher whose artistry lies with the teachers' ability to make the subject lucid and intelligible to learners. Use of ICTs such as radio, television, video tapes ,CDs and computers in teaching and learning geography helps students learn by providing access to large quantities of information on people, places and environments (Mishras, 2005).Constructivists base their arguments on the notion that learning is an active process which involve constructing knowledge rather than just acquiring it. This active process can aptly be supported by integrating ICTs in teaching and learning the subject. Other importance of ICTs in teaching and learning geography includes organization, editing, presentation of information, analysis and investigation of patterns and relationships in geographical contexts. Use of ICT in geography classrooms also supports the delivery of contents in a way that makes it highly engaging and provides teachers and students with immediate access to up to date topical geographical information. Wanner and

Keski (1999) opine that ICT is a dynamic medium which when used appropriately, can significantly reinforce and deepen geographical knowledge and understanding as never before. Moreover it has been shown that students often sustain concentration levels more fully when given the opportunity to support their learning through the use of ICT.

Geography students may therefore benefit from the analytical, creative, collaborative and interactive power of ICTs to present ideas. This bring a paradigm shift from teacher centred pedagogy to learner centred one emphasizing the value of constructivists' epistemology which encourages independent knowledge acquisition (Kummar,2010).

The impact of Information and Communication Technologies (ICTs) has been significantly felt on all areas of human activity since the mid 20[th]Century as pointed out by Nwagwu (2006). Due to ICTs' convergence and pervasiveness it has had a potent role in development and globalization. Governments have been reforming their education systems so that education becomes the vehicle for national development (Abagi and Odipo, 1997) and ICT integration in teaching and learning is at the centre of this reform effort.

Williams (2003) described ICT integration as the means of using any ICT tool (Internet, e-learning technologies, CD ROMs, Radios Televisions etc.) to assist teaching and learning. For the purpose of this study, Williams' definition of ICT integration is adopted. There are a range of ICTs which may be used in educational institutions for teaching and learning geography such as computers, CDs, DVDs, electronic communication and web resources, television, radio, Video tapes & Audio tapes as well as telephone. Nwagwu (2006) accentuated that these ICTs have the capacity to provide a range of exciting and rich media which can be exploited by

educators and learners for teaching and learning of geography. Ellington (1997) also opines that the networked computers and the internet are ICTs that enable interactive and collaborative learning and encourage independent learning in students. Geography provides a rich and varied context for the use of ICT to enhance both teaching and learning in the subject and to reinforce ICT skills. Variety of ICTs such as Digital Video Discs (DVDs), Satellite communications and the internet have the ability to transform teaching environment demanding a shift from the traditional teaching methods. The use of simulations is quite important in understanding difficult concepts in physical geography. According to Farrel (2007) educationists are of the opinion that educational problems relating to quality and quantity could be tackled by fproper utilization of ICTs in the teaching and learning environment and geography education is no exception to this end.

However much the benefits of ICTs in teaching and learning are attractive, all educators agree that they can never replace the teacher but rather be used for enhancement of teaching activities (Patel and Mukwa 1993).Hennesy, Harrison and Leonard (2010) opines that there is substantial evidence that in the right hands and used appropriately for specific purposes in specific contexts, ICT can be an effective tool in supporting teaching and learning.

Frequent use of ICT in the classroom by teachers and learners also has positive implications on students' achievements. This is because ICTs enhances students' participation in the learning process making geography lively and motivating. Muntaz (2000) stated that many scholars proposed that lack of funds to obtain the necessary hardware and software is one of the reasons why teachers do not make regular use of technology in their classrooms. However, these programs may be affected by challenges such as unavailability or inadequate infrastructures.

Although there are other factors which influence ICT integration in teaching and learning geography in secondary schools, teachers and students' ICT Competencies and their attitudes are crucial in order for these programs to be effective in schools. Other important factors such as ICT policies, ICT facilities and infrastructures also influence ICT integration in teaching and learning of the subject.

Several researchers have held different perspectives on ICT integration in teaching and learning as observed by Jacob et al (2006).For instance, Oloo (2009) explained that teachers are developers of the curriculum and it is expected that they have sound knowledge of ICT and how to infuse it in teaching their subjects to achieve the goal of improving education standards. UNESCO (2008) pointed out that competency of teachers in ICT would result in better education and highly skilled students to enable a country's economic and social development. Encouragingly, there is growing and widespread awareness that the pedagogical and technical expertise of the teacher is absolutely critical here. Hennesy, Harrison and Leonard (2010) emphasize that the next generation of students are expecting ICT integration into their learning and teaching programs to open them to the world of knowledge. Tinio (2002) also emphasized that there is need for schools to ensure that learners posses ICT competencies to enable them wield these new information and communication technology tools productively in their learning environments and to help them fit and flourish in information saturated society. Students who are competent in ICT use can easily utilize the available tools in the classroom to enhance learning. Watts (1980) as quoted in Cuban (2000) observe that alteration of mindset of key players in ICT integration in teaching and learning such as teachers and learners is necessary to ensure that the benefits of ICTs are effectively reaped.

Cuban (2000) points out that beliefs and attitudes play a fundamental role in the way teachers use ICT tools in their classrooms. Teachers who have positive attitude towards ICTs and perceive them to be useful in promoting learning will evidently integrate it in their lessons more easily than those who have negative attitudes. Likewise, learners whose attitudes are positive towards ICT use would also integrate the technology in learning their subjects. The author (2000) opines that teachers' role in integration of ICTs in schools is obviously important and their knowledge, skills, beliefs and attitudes need to be taken into consideration in all educational reform effort.

Apart from attitudes and competencies of teachers and learners, ICT policies in education are also critical in enhancing and reforming education, there is need for clear and specific objectives in various educational institutions regarding ICT use in teaching and learning all the subjects including geography. Farrel (2007) indicates that ICT policies provide guidelines, time bound targets, mobilization of required resources and political commitments at all levels to enable implementation of ICT projects. Kozma and Anderson (2002) also accentuated that ICT policies in educational institutions are beneficial and need to be put in place in order for quality of teaching and learning to be achieved.

Plomp, Anderson, Law and Quale (2009) also observed that access to ICT infrastructure and resources in schools is very essential for the integration of ICT in education. Effective adoption and integration of ICT into teaching in schools therefore depends also on the availability and accessibility of ICT resources and tools. A study by Yildrim (2007) revealed that access to technological resources is one of the effective ways to teachers' pedagogical use of ICT in teaching. Largely, effective

introduction of technology into schools depends upon the availability and accessibility of ICT resources.

Ainley et al (2009) pointed out that there was little understanding on the ways in which ICTs are used in teaching and learning in schools around the world and the factors which influence their use in specific subject areas. BECTA (2008) therefore suggested that researchers need to focus on factors which influence particular practitioners in use of ICTs in schools. Indeed many institutions have realized the importance of ICTs in work places and everyday life and the educational sector is trying to bridge the gap in teaching and learning process using existing technology.

ICT integration in teaching and learning has been embraced by many countries in the world and studies show that in developed countries, ICT integration in teaching in the classroom is at 41% as compared to the developing countries where these programs are still at infancy stages (Farrel, 2007).For example, Wanner and Keski(1999) established that the evidences from experiments carried out in geography and special education in causes in high schools in Colorado revealed that implementing GIS (Geographic Information Systems) technology in curricular improved teaching and learning. Ajayi (2008) also reports that Malaysia education sector launched the 'smart schools' program in 1999 where students were able to interact with ICT tools and resources in learning all subjects making them become active participants in their classrooms. It is therefore clear that teaching has gone beyond traditional chalk and talk ad students' adequate participation in the classroom is quite important.

According to Farrel (2007), Africa still lag behind in implementation of ICT in the curriculum and in most cases, many African countries were still at the initial stages of ICT integration in teaching and learning in education. For example, Egbedokun and Sofowora (2010) reveal that technology application in teaching and learning in many

secondary schools in Nigeria was still at demonstration stage. This meant that effective ICT integration in teaching and learning in secondary schools could still not be realized. (UNESCO, 1995-2011) reveal that in South Africa, there were some evidences that secondary schools' used ICTs in teaching and learning but this practice was uneven with VSAT technology used in selected secondary schools to enhance learning.

It is worth pointing out that East African countries are at the basic level of technology integration in teaching and learning and still place emphasis on acquisition of ICT facilities and still grapples with problems of underutilization of such facilities (Farrel, 2007). For example, in Uganda, Ndide (2000) revealed that many secondary schools seemed to have started using ICTs but not directly on classroom activities. In Kenya, the level of investment in education reflects the recognition of ICT in education as reflected in national ICT policy formulated in 2005.Kenya places emphasis on new dimensions, pedagogical approaches in teaching and learning that would enhance knowledge in interactive and self directed ways. This was an indication that the country was ready to roll out ICT programs in institutions. The government realized that key development challenges in the country needed to be addressed by embracing ICTs in all sectors and the program could only be effective if learning institutions were taken on board in this reform effort. ICT unit has been established at the ministry of Education head office to ensure systematic efforts are made towards strengthening adoption and use of ICT in education sector in general.

 Based on research finding across the country, Oloo (2009) revealed that some ICT facilities and tools such as radios, televisions, computers and computer laboratories among others exist in secondary schools in the country which are lying unused or are

gathering dust on the tables and shelves. Their utilization in teaching and learning in specific subject areas have been sporadic thereby resulting in limited ICT integration in teaching and learning. Failure to take full advantage of opportunities offered by ICTs in teaching and learning hinders students from reaping benefits provided by technology use in the classrooms. In geography the problem was critical as the attempt to integrate ICT remained far inadequate or completely absent in majority of the schools. One of the objectives of the Geography in secondary school syllabus is to provide students with the necessary skills and attitudes for technological and industrial needs (Republic of Kenya, 2006).The attainment of these skills can aptly be supported by use of technology in learning to enhance students' understanding of concepts which were expected to translate into improved exam which further should also be reflected in good K.C.S.E examination performance.

The report by Kenya National council in 2010 indicated that paper one geography was not performed to expectation due to inability by the students to score marks in topics such *internal structure of the earth, solar system* and *vulcanicity* .These topics are set every year yet students continues to perform dismally in them at KCSE. The council attributed this to poor and ineffective teaching methods and lack of instructional materials amenable to the study and proper understanding of complex areas such as *solar system* and vulanicity, among others (KNEC, 2010). As a result, the examiners have recommended that teachers use effective methods of teaching such complex and abstract topics if they want their students to do well in this paper and suggested use of ICT in teaching and learning. Use of ICTs in teaching and learning has been established to have the potential of improving learners' comprehension and examination outcomes hence need to establish factors influencing its integration in teaching and learning geography in secondary schools. Failure to take full advantage

of opportunities offered by ICTs in teaching and learning therefore hinders students from reaping benefits provided by technology use in the classrooms.

The researchers above have only investigated factors which influence ICT integration in teaching and learning geography generally. However, they have not explored factors influencing ICT integration in teaching and learning in specific subject areas such as geography. It is against this background that the study sought to find out factors influencing ICT integration in teaching and learning geography in secondary schools in Rachuonyo South Sub- County where students have continued to perform dismally in KCSE examination (KNEC 2006-2009). For example, the Homa Bay County Education Report indicated poor performance in geography between 2006 to 2010 i.e., out of the possible mean target in Kenya Certificate of Secondary Education (KCSE) of 12.00 points, most secondary schools in this Sub County had posted mean scores ranging between 2.56 and 7.11 with the five years overall average grade of D+ between 2006 and 2010. Compared to the other Sub Counties in Homa Bay County, the district lags behind in students' achievement in geography having least mean scores as revealed in Table 1.

Table 1: Geography K.C.S.E Examination Performance in Homa Bay County, 2006-2010

Year /Sub County	2006	2007	2008	2009	2010
Suba	5.22	5.30	5.84	5.79	4.93
Homa Bay	5.27	5.41	5.52	5.79	5.27
Rachuonyo North	5.25	5.33	4.57	5.77	4.97
Rachuonyo South	5.01	5.11	4.17	4.29	4.31

(Source: Homa Bay County Educational Statistics, 2011)

From Table 1, it clear that in overall, mean scores in geography have poor over the years and majority of students scored mean scores of C- and below. This implied that many students were unable to pursue geography at higher institutions of learning. It is against this background that this study addressed factors influencing ICT integration in teaching and learning of geography in secondary schools in Rachuonyo South Sub County.

1.2 Statement of the Problem

Rachuonyo South Sub-County lags behind in students' achievement in Geography compared to other neighboring Sub Counties in Homa –Bay County such Rachuonyo North,Homa Bay and Suba. For example, between 2006 to 2010 overall mean score posted in geography in KNEC in this Sub-County ranged between 4.7 to 5.1.According to KNEC, (2010), the dismal performance in this subject was attributed by teachers' inability to use innovative methods of teaching such as use of ICTs which have been known to enhance students' performance influencing their achievements.

The Most researchers have only investigated the availability of ICT facilities in secondary schools, they do not explore factors influencing ICT integration in teaching and learning in specific subject areas. In Rachuonyo South Sub –County, there is no known study done to find out factors influencing ICT integration in teaching and learning geography in secondary schools. This study thus sought to find out factors influencing ICT integration in teaching and learning geography in secondary schools in this Sub-County.

1.3 Purpose of the Study

The purpose of this study was to determine factors which influence ICT integration in teaching and learning geography in secondary schools in Rachuonyo South Sub-County.

1.4 Objectives of the Study

The specific objectives of this study are to establish:

    i.   Frequency of ICT use in teaching and learning geography

    ii.   Teachers' and students' competencies in ICT integration in teaching and learning geography in secondary schools in Rachuonyo South Sub-County.

    iii.   Geography teachers' and students' attitudes on ICT integration in teaching and learning geography in secondary schools in Rachuonyo South Sub-County.

    iv.   Availability of ICT policies in secondary school in Rachuonyo South Sub-County.

    v.   Availability of ICT facilities and infrastructures in secondary schools in Rachuonyo South Sub-County.

1.5 Research Questions

This research was guided by the following questions:

    i.   How frequent do geography teachers and students use ICTs in their lessons?

    ii.   Are geography teachers and students competent in ICT integration in teaching and learning geography in secondary schools in Rachuonyo South Sub-County?

iii. What are the attitudes of geography teachers and students on ICT integration in teaching and learning geography in secondary schools in Rachuonyo South Sub-County?

iv. Do schools in Rachuonyo South Sub-County have ICT policies?

v. Are ICT facilities and infrastructures in secondary schools in Rachuonyo South-Sub-County adequate for ICT integration in teaching and learning geography?

1.6 Scope of the Study

The study focused on factors influencing ICT integration in teaching and learning geography in 63 secondary schools in Rachuonyo South Sub-County, Kenya.

1.7 Limitations of the Study

The limitations of the study were:

i. Rachuonyo South Sub-County secondary schools had fairly large geography Students' population but the researcher sampled only 471 in form four for this study. This limited the extent to which the findings were generalized for all the students.

ii. The use of questionnaire in data collection may have had ceiling effect and may limit the amount of data collected. This limitation was addressed by employing triangulation where interview and document analysis were also used to collect data.

1.8 Assumptions of the Study

The study was based on the following assumptions:-

i. That all geography teachers and students gave objective views regarding frequent use of ICT in teaching and learning geography in secondary schools in Rachuonyo South Sub-County.

ii. That all geography teachers and students in Rachuonyo South-Sub County gave objective views regarding their competencies in ICT integration in teaching and learning geography.

iii. That all geography teachers and students gave objective views regarding their attitudes on ICT use in teaching and learning geography.

iv. That all respondents gave objective views on availability of ICT policies in secondary schools in Rachuonyo South Sub-County.

v. That all respondents gave their honest views on availability of ICT facilities and infrastructures in secondary schools in Rachuonyo South Sub-County.

vi. That evaluation done South Sub-County was an accurate measure of factors influencing ICT integration in teaching and learning geography in secondary schools

1.9 Conceptual Frame work

This study is based on the conceptual frame work of interaction between the variables influencing ICT integration in teaching and learning in secondary schools in Rachonyo South Sub-County. Figure 1 illustrates these factors.

Fig 1: Conceptual Framework of ICT Integration in Teaching and Learning Geography

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┌──────────────────────────────────────────────────────────────────────┐
│  ┌─────────────────────┐                                               │
│  │ Teachers and Students│     ┌──────────────┐                         │
│  │ ICT Competency       │────▶│ -School      │    ┌──────────────────┐ │
│  └─────────────────────┘      │  Administration│   │ Information and   │ │
│           ▲▼                  │  Support     │   │ Communication    │ │
│  ┌─────────────────────┐      │ - Technical  │   │ Technology (ICT) │ │
│  │ Students' and        │────▶│   Support    │──▶│ Integration in   │ │
│  │ Teachers 'Attitudes  │      │ -Time        │   │ Teaching and     │ │
│  └─────────────────────┘      │              │   │ Learning         │ │
│           ▲▼                  │              │   └──────────────────┘ │
│  ┌─────────────────────┐      │              │                         │
│  │ ICT Policies         │────▶│              │                         │
│  └─────────────────────┘      │              │                         │
│           ▲▼                  │              │                         │
│  ┌─────────────────────┐      │              │                         │
│  │ ICT Facilities  and  │────▶│              │                         │
│  │ Infrastructures      │     └──────────────┘                         │
│  └─────────────────────┘                                               │
│   Independent Variables    Intervening Variables   Dependent Variable  │
└──────────────────────────────────────────────────────────────────────┘
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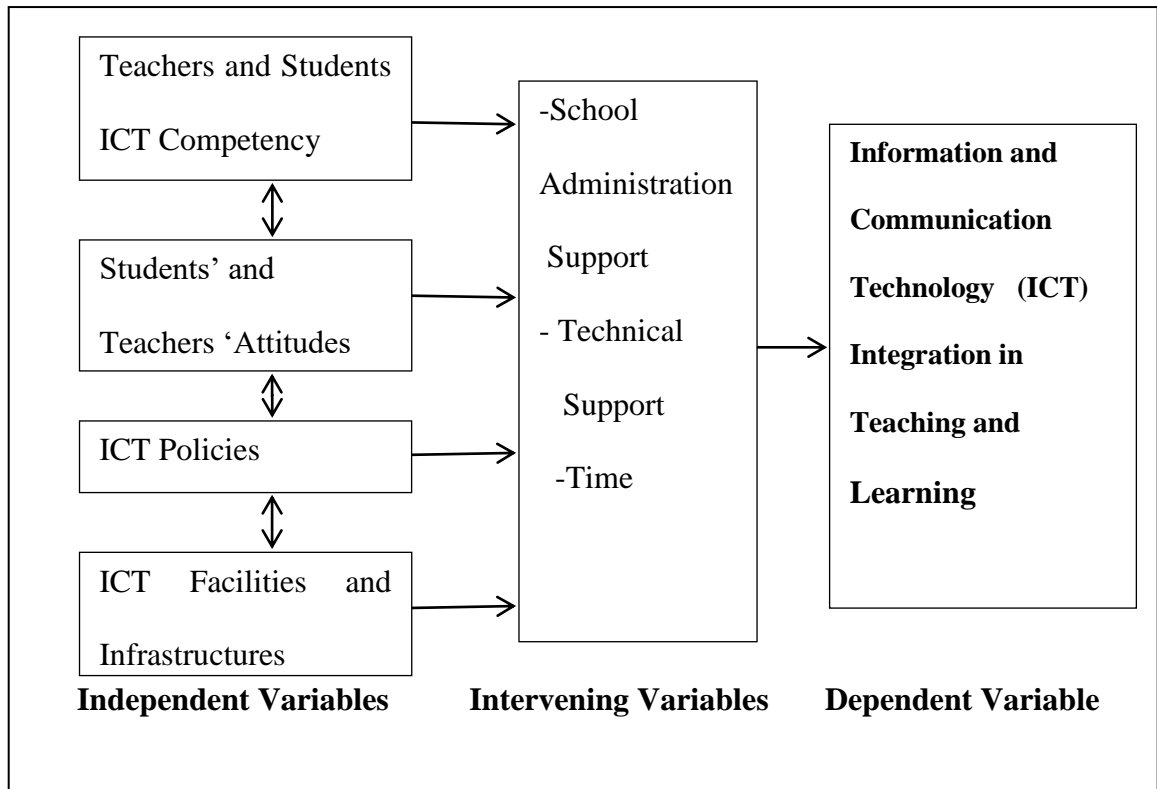
In this study, the independent variables are those that cannot be manipulated such as geography teachers' and students' competencies and attitudes, ICT policies, ICT facilities and infrastructures. The dependent variable is the ICT integration in teaching and learning geography.

Effective ICT integration in the classroom requires competencies of both teachers and learners. Therefore, school managers should ensure that both teachers and student are provided with ICT skills which can be done by organizing staff development and providing students with ICT skills. The impetus to use a given technology is also affected by users' perception on the same. Therefore, secondary schools need to formulate ICT policies and make budgets regarding ICT facilities and infrastructure.

Positive attitudes of both teachers and students also need to be nurtured on ICT use in teaching and learning. Variables which intervene in the process of ICT integration such as technical support need to be arranged to facilitate sustainability of ICT programs in schools. Teaching loads and time schedules which enables teachers to prepare for ICT integrated lessons also influence use of ICT by teachers. The interplay between these variables influences ICT integration in teaching and learning geography.

In this paper, the concepts above guide the examination of factors influencing ICT integration in teaching and learning geography in secondary schools. Therefore, teachers and students who wish to adopt ICT in teaching and learning should be competent in handling ICT. The competency of the teacher in ICTs integration in teaching is very crucial since he directs learning activities in the classroom (Bingimlas,2009).

These modern innovative technologies provide the teacher with new possibilities in teaching to make them be more creative in customizing their own teaching materials to suit ICT usage in the classroom. They also give student opportunities to effectively explore learning environments for better academic achievements.

This study adopted this conceptual frame work to capture the four important elements of ICT integration in teaching and learning which are; teachers and learner's ICT competencies and attitudes, ICT policies facilities and infrastructure. This concept clearly reflects ICT integration in teaching and learning. Since the elements of ICT integration alone may not clearly influence teaching and learning, without other intervening variable, the latter were added such as school administration support, technical support and time. This is because the influence of technical support may not

be ignored by all ICT users if they wish to adopt effective tools in their classrooms. Likewise, even if the attitudes of teachers and students were positive towards ICT integration in teaching and learning and they possessed adequate competencies in ICT skills, without the support from the school administration to establish effective ICT policies, no effective ICT integration may take place .School administration support also play a role in acquisition of ICT facilities and infrastructure. The interplay between these factors leads to effective ICT integration in the classroom as illustrated in the concept above.

1.10 Significance of the Study

The study may have the following significance:

i. The results of this study may assist teachers in improving students' understanding of abstract concepts by using innovative instructional strategies and promote students' academic achievement in geography. This is because teachers will have a better understanding of the importance of active involvement of learners in the learning process as it relates to their academic achievement.

ii. The findings may also suggest skills to be emphasized in teacher training institutions in the pedagogical preparation of geography teachers.

iii. The suggestions and recommendations made in this study may assist the education stake holders in understanding challenges to ICTs integration in teaching and learning in secondary schools.

iv. The analysis in this study brought together findings and key points from a review of important parts of available literature associated with ICT integration in teaching and learning geography which may offer guidance on

ways to enhance this process and encourage greater use of ICTs by geography teachers and learners.

v.   The ministry of education may find the findings of this study useful in making a follow up on ICT policies formulated in 2006.

1.11 Operational Terms

Attitude –Here refers to the state of mind or the feelings of teachers and the students towards ICTs integration in teaching and learning geography.

Competency– Here refers to the ability of teachers and learners to operate Information and ICTs resources in the learning environment.

Information and Communication Technologies (ICTs) – Here refers to any communication device or applications which support teaching and learning such as Radio, Television, Computers CD ,Overhead projectors, Audio and Video Tapes.

ICTs Infrastructure and Facilities - Here refers to Information and Communication Technologies' hard and software, rooms, overhead projectors and any facilities related to ICT use for teaching and learning geography in schools.

ICT Integration - adoption any electronic resource or tools in teaching and teaching and learning geography.

ICT Policy– The term here refers to the laid down plans on how ICT can be used in teaching and learning purposes in secondary schools.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Frequency of ICT Use by Teachers and Students in Teaching Geography in Secondary Schools

One of the defining features of ICT is its ability to transcend time and space and if used regularly by both teachers and learners, it enhances quality education because of its ability to foster active learning. Based on extensive research, Amin (2010) pointed out that there is direct link between ICT use by students and improved performance and this can benefit geography students in understanding of abstract topics. Similarly, Ruthven and Hennessy (2003 opine that regular use of ICT make students gain experience in using mathematical concepts and use spreadsheet to handle data. The authors explained further that ICT could expedite and more broadly, facilitate more routine components of classroom activities and increase increasing productivity of learners. This study was done on use of ICT in learning mathematics in high school but it can easily be applicable in geography learning which requires more use of ICT in understanding abstract concepts especially in physical geography. This has also been emphasized by Thomson (2007) that the generation to come expect regular use of ICT in their learning and teaching programs due to influx of this technology in the society. Therefore, for them to function well in the technology saturated society, regular use of ICTs would be crucial. Ainley et al (2009) points out that there was little understanding of the ways in which ICTs are used in schools and classrooms around the world. The author further stated that there were claims that it was not clear when and how ICTs were used in subject teaching. Secondary schools still grapple

with issues of regular use of ICTs in teaching and learning due a myriad of challenges (BECTA, 2008).

Engjelushe (2013), in his exploration of use of ICT in geographical teaching and learning in secondary schools in Alberta, discovered that 74% of teachers in this country made regular use of ICT in teaching geography and also found out that 68% of them identified ICT as very important for their class work and recommended regular use in teaching and learning the subject because they found out that ICT motivated their learners.

In Tanzania, survey done by Farrel et al (2007) revealed that the use of ICTs in learning institutions in Tanzania were irregular due to a myriad of challenges such as incompetence of teachers in ICT skills and inadequate ICT infrastructures and facilities.

Kenya government outlined in the Sessional Paper No 1 of 2005(MoEST, 2005) that many learning institutions in Kenya are reorganizing to accommodate ICTs in curriculum to enhance teaching and learning. However, there were evidences showing that the programs were still minimally exploited by many learning institutions in Kenya as revealed by BECTA (2008).

The discussions above focused on the importance of regular use of ICTs in teaching and learning various subjects in secondary schools around the world leaving out frequency of ICT use in teaching and learning geography in secondary schools. In order to fill this gap, this study set to establish how frequent teachers and students utilize ICTs in teaching and learning geography in secondary schools in Rachuonyo South Sub-County.

2.1 Teachers' and Students' Competency in ICT Integration in Teaching and Learning of Geography

ICT Competency may be defined as ability to handle a variety of ICT tools for variety of applications. ICTs integration in teaching and learning geography offers exciting opportunities for both the teachers and the learners within the learning environments. According to Gakuu and Kidombo (2008), ICTs improve instructional delivery and makes learning more effective. For that reason, teachers must be ready to acquire knowledge and skills needed to use ICTs effectively and creatively. Farrell (2007) opines that teachers and educators must know how to exploit ICTs for the purpose of opening learners up to the world of knowledge. The authors' points out that there is growing and widespread awareness that the pedagogical and technical expertise of the teacher is absolutely critical in the education reform process. However, Bingimlas (2009) points out that in many cases, the education systems are confronted by the problems of transforming the learning process to provide students with skills to function effectively in this information rich and continuously changing environment.

The discussion above explains that the changing landscape of communications and information exchange in the 21st century requires teachers to be at the cutting edge of knowledge production, modification and application (Hennesy, 2010).This is further asserted by Lim (2007) who explains that research studies in education have shown that technologies engage students in higher-order thinking only if coupled with the necessary pedagogical skills.

Use of ICT in learning geography in secondary schools includes   motivating learners and also enhancing their achievement in class, ICTs being reservoirs of geographic information in word, diagrams, map and most recent information on weather as it happens. This therefore means that ICT Integration can only be achieved with the

teacher's input and planning. Therefore teachers need to be actively engaged and passionate about teaching and learning using ICTs which can only be achieved by teachers' competency in the use of ICT.

To implement appropriate support strategies, there is need for reliable information about the existing ICT competency of teachers and about factors that enhance or hinder the teachers' application of ICT. Geography teachers' competency in ICT skills would make them play essential role in producing technology capable student who can in turn utilize these technologies in learning.

Richardson (2009) reveal that teachers in secondary schools in Cambodia lacked enough ICT skills and they still required more training and practice to enable ICT integration in teaching. Similarly, findings by Sahin (2011) about high schools utilization of ICTs in high schools in Turkey showed that the major obstacle in the process of ICT integration was inadequate training opportunities for teachers. In Malaysia, the education sector launched the 'Smart Schools' program in 1999 where students were able to interact with ICT tools and resources making them become participants in the classroom (Theng et at, 2008) and (Deaney et al, 2003).This was also the case with secondary school teachers in England who made effective use of ICTs in core subjects but thorough inspection reports showed that the development was uneven (Kargiban and Kafflash, 2010) due to the fact that majority of teachers lacked adequate skills in ICT use in teaching their subjects.

 A study by Ajayi et al (2008) further opine that generally, teachers were to a little extent exposed to the use of ICTs in teaching in Nigerian secondary schools and this scenario impeded ICT use in their classrooms. This was further asserted by Adomi et al (2010) who revealed that secondary school teachers in Nigeria lacked ICT skills to enable them use the internet to source for learning contents for their use in their

classrooms. Therefore integration of ICT in teaching and learning geography could not be easily attained without the teachers' development programs aimed at increasing their ICT skill levels. A survey done by Farrel (2007) identified a few projects exploiting ICTs for teacher development in rural schools in Uganda through the school net Uganda. However, the study did not reveal the level of teachers' competency in ICT use in the classroom. A study of teachers' competency in ICT skills is quite important because their competency is crucial in the teaching and learning environment. However Kirschner and Selinger (2003) observe that students were more adept at using the technology tools necessary for transmitting knowledge and they are always enthusiastic at using ICTs in the class over, Adomi and Kpangban (2010) in their study on ICT Application in Nigerian Secondary Schools noted that proficiency in using ICT by students was low in most African countries in the first phase of NEPAD e Schools' initiative with no experience at all in using computers. This observation clearly indicated that for ICT integration to be effective in geography learning environment, students' ICT skills should be raised.

All teachers training institutions in Kenya have embraced inclusion of ICT as a unit to equip teachers with the skills which they would need in their profession. This point is noted in the ICT in Education Options Paper (Kenya. MoEST, 2005).The paper suggested capacity building workshops for teachers to enhance their professional development. Little was however still known about the level of teachers' competency in ICT use. It is clear that teaching and learning has gone beyond the teacher standing in front of a group of pupils and disseminating information to them without the students' adequate participation as pointed out by Ajayi (2008).Therefore, teachers and students competence in ICT skills is crucial in ICT integration process. Similarly, Kigotho (2009) pointed out that computer literacy is crucial for school leavers

entering the job market and therefore there is need for students to be competent in ICT integration in learning to enable them fit in information saturated society.

A survey done by the ministry of Education Science and Technology (MoEST, 2005) established that most secondary school teachers are beginners with basic ICT skills and teachers showed little or no ICT capabilities to enable them integrate it in teaching of geography. This was also emphasized by Oloo (2009) indicating that secondary school teachers in Kenya were ill equipped to effectively integrate ICT in the classroom outlining specifically lack of knowledge of strategy on how to integrate ICT in teaching. Pelgum (2002) opine that school leaders still perceive that incompetency in ICT skills are major obstacles to the realization of effective teaching strategy. A study by Tella et al. (2010) found that the traditional or teacher-centered methods of teaching resulted in learners not enjoying lessons and missing the benefits of discovering on their own and this may contribute to poor performance in a subject such as geography.

Although the above discussion explored ICT skills of teachers and students generally, their skill levels in relation to the ICT integration in teaching and learning geography still remain unknown. The researcher thus found it necessary to focus this study on geography teachers' and students' ICT competencies in ICT integration in teaching and learning the subject so as to fill the existing gap.

2.2 Teachers' and Students' Attitudes on ICT Integration in Teaching and Learning Geography.

Attitude refers to a state of mind or a feeling, a hypothetical construct that represent an individual's degree of like or dislike for something (Wikipedia) which can either

be positive or negative. Based on research findings internationally, teachers play an important role in diffusing and utilizing ICT in the classroom. Technology integration is a complex phenomenon that involves understanding teachers' motivations, perceptions, and beliefs about learning and technology as emphasized by Keengwe and Onchwari (2008). Therefore, their attitudes and beliefs affect the way ICTs are utilized in the learning environments and their own personal perspectives on curriculum and pedagogical practices. (Bullent et al, 2009). The authors opine that teachers who have positive attitudes towards ICT feel more comfortable using it and usually incorporate it into their teachings. Similarly, Kumar et al (2008) posit that teachers who have positive attitudes towards ICT use feel more comfortable using it in their classrooms. In most cases, teachers are the key to effective implementation of the use of ICT in education and have the potential to transmit beliefs and values to students. Therefore, teachers and the learners need to develop positive attitude towards the technologies so as to use them in teaching and learning. Angeli and Panastasiou, (2008) further points out that reform in learning institutions is human elements which involve emotions, feelings, needs, beliefs and pedagogical assumptions. This means that positive attitudes of teachers and learners towards technology use can enhance their greater use in the classroom. Watts (1980) as quoted in Cuban (2000) further explained that beliefs and attitudes play a fundamental role in the way that teachers use ICT tools. Therefore alteration of mindset of key players in ICTs integration in learning is necessary and teachers who have positive attitude towards ICT and perceive it to be useful in promoting learning will evidently integrate it in their lessons more easily than those who have negative attitudes (Hew and Brush, 2007). The author further affirmed that if teachers like a type of technology and believe that it is beneficial to them in their lessons, technology integration can be

achieved more easily while the reverse is the case when they do not believe in it. Demici (2009) conducted a study on teachers' attitudes towards the use of Geographic Information systems (GIS) in Turkey and study revealed that though barriers such as lack of hardware and software existed, teachers positive attitudes towards GIS was a challenge to the successful integration of GIS into geography lessons. The attitudes of teachers towards technology greatly influence their adoption of ICT into their teachings. According to Russell and Bradley (1997), lack of positive attitudes by teachers in ICT use in the classroom implies that ICT takes a back seat to conventional learning mechanisms. This is not may not be helpful in teaching geography where the heuristic approach of learning is of importance especially in abstract concepts in learning physical geography.

Thenglau and Sim (2008) in their study on secondary school teachers' adoption of ICTs in Malaysia revealed that both teachers and students had positive attitudes towards ICT adoption in teaching and learning in general. This finding was similar to a discovery by Alison (2010) from a survey of European teachers' use of ICT in the classroom. This study revealed that in United Kingdom, teachers showed positive attitudes towards possible contributions of ICTs in learning but pointed out that this did not necessarily lead to adoption of these technologies in daily practice or improvement of teaching and learning. A survey on teachers' attitudes on ICT in high schools in Turkey also revealed that they possessed favourable attitudes on general ICT use in the classroom and use of computers were found to be advantageous when used in teaching as compared to the traditional methods of instruction and suitable for their curriculum goals (Sahin,2011).According to Demirci (2009), teachers' attitudes were positive towards GIS (Geographic Information System) where most (76%) of

them thought that GIS was an effective teaching tool for geography lessons in secondary schools in Turkey. Andoh (2012) also assert that teachers' feelings, knowledge and attitudes influence their acceptance of usefulness of the technology and integration into teaching generally in Ghanaian educational institutions.

A research done by Gakuu and Kidombo (2008) on sampled private and public schools on effective curriculum content delivery by secondary school teachers in Kenya revealed that generally, private secondary schools' teachers and students had positive attitudes towards ICTs' adoption in teaching and learning. This, they discovered, was due to availability of ICTs infrastructure in these schools. This did not compare well with their public schools' counterparts where teachers' attitudes were negative towards these technologies. Similarly, Lusike (2006) discovered that teachers' attitudes were still negative towards ICT use in teaching their subjects generally. Russell and Bradley (1997 asserted that learning occurred more easily, when the learners have positive attitudes towards ICT use in the classroom. Geography subject forms an important subject in the national curriculum and use of ICT in teaching the subject would offer heuristic approach to learning making learning become an active process. Therefore, positive perception in learners on ICT use in learning this subject enhances ICT integration.

Attitudes of teachers and learners on ICT use in teaching and learning generally have been extensively studied as shown by the discussions above. However, this leaves out study on their perceptions on ICT use in specific subject area such as geography. The current study found it necessary to establish the Geography teachers and students attitudes on ICT use in teaching and learning the subject to fill the gap.

2.3 ICT Policies in Secondary Schools.

Policy and planning are important in identifying the aims of using ICT tools in education as well as determining priorities and resources. This is more important in teaching and learning geography in secondary schools Donnelley (2007) explained that the roles of the key players in education are crucial since they provide the leadership necessary for successful implementation of policies and plans.

BECTA (2004) points out that there is need for stake holders to be guided by the policies to ensure that ICT resources and subsequent programs in the educational settings such as classroom innovations are sustained. He explained that any school that wish to use ICT in teaching and learning need to develop policies regarding the same to avoid purchase of ICT equipments without providing a strong educational purpose or goal for the use of the technology. BECTA (2004) indicate that it is important for policy makers to resist the pressure to adopt the newest technology simply because they are fashionable but rather their ability to be used and sustained. Farrel (2007) further opine that schools' ICT policies need to adhere to the national ICT policy where it sets out the rationale for teaching and learning using them and to provide a broad balanced and challenging range of ICT opportunities for the students. When both teachers and students utilize ICT technologies in schools, it should eventually effectively prepare them for future roles in the society.

UNESCO (2008) established that countries such Australia, South Korea and Singapore had national ICT policies formulated by their ministries of education and were used in various secondary schools. There were revelations that master plans which included adequate budgets to implement these policies in educational institutions in these countries had been put up to ensure success of the program. A

survey by UNESCO (2008) further reveals that Cambodia and Bangladesh are considered beginners in ICTs adoption in education with national policies, but not enough resources to implement their policies in educational institutions. Farrel (2007) revealed from a survey on ICT usage in Africa that South Africa had ICT policies in secondary schools but lacked prioritization on ICT integration in teaching and learning thereby hampering frequent usage of technologies in learning in secondary schools in that country.

Waema (2005) note that initially, ICT policies on Education in East Africa were rather hasty and haphazard but later on, at the turn of the millennium, most governments made astride by formulating ICT policies which had specific bearing on education. Uganda's national ICT policy of 2008 is a good example of a commitment to use ICTs in education. The policy spelt out how ICTs should be developed for teaching and learning as revealed by (Ndidde, 2000).The implementation of such policies in secondary schools were still a challenge to educators in that country. In Kenya, the National ICT Education Policy contained in education option paper (Kenya, MoEST ICT in Education options paper, 2005) outlined ICT potentials in human resource development. The document emphasized ICTs' integration in teaching curriculum at all levels of education and the recent vision 2030 also captured the necessary policy framework which practitioners could use to model ICT integration in teaching and learning in the country (Kenya. MoE, 2006).A case study on ICTs policies on integration in education in 5 urban and 5 rural secondary schools in Kenya reveals that private schools seemed to have clear policies on ICT use only on education management. There was therefore no revelation made on its use in teaching and learning (Jepchumba, 2008) all subjects. Many learning institutions in Kenya are reorganizing in an effort to accommodate ICTs in curriculum to enhance

teaching and learning. However, despite significant political spending by governments on technical equipments and training levels in ICT integration in teaching in schools, there were evidences showing that the programs were still minimally exploited by many learning institutions as revealed by BECTA (2008).Policy makers worldwide contend that policies in schools need to lead to significant educational and pedagogical outcomes which are beneficial for both teachers and students (BECTA,2004).It was on this basis that the current study looked at ICT policies that would have positive bearing on geography education in secondary schools in Rachuonyo South Sub-County.

Critical analysis of the reviewed literatures showed that the researchers studied ICT policies irrespective of their bearing on teaching and learning specific subjects hence the gap. This study therefore aimed at establishing availability of ICT policies which could enhance ICT integration in teaching and learning geography in secondary schools in Rachuonyo South Sub-County.

2.4 ICT Facilities and Infrastructures in Secondary Schools

Any country's educational institution which needs to use ICT in teaching and learning requires technology facilities and infrastructure before any ICT-based program is launched. For that reason, BECTA (2004) pointed out that there should be appropriate rooms or buildings in which the technologies are to be used. ICTs' infrastructure includes access to computers and the Internet, digital equipments, telecommunications, radios and televisions. For ICT integration in teaching and learning geography to be effective in any school, the infrastructure must be sound to ensure its sustainability. Access to ICT infrastructure and resources in schools is a necessary condition to the integration of ICT in education as pointed out by Plomp et

al (2009). Effective adoption and integration of ICT into teaching in schools therefore depends mainly on the availability and accessibility of ICT resources and tools. Yildrim (2007) points out that computers, updated software and hardware are key elements to successful adoption and integration of technology in teaching and learning geography in secondary schools and access to technological resources is one of the effective ways to teachers' pedagogical use of ICT in teaching. A study by Donnelley (2007) reveals that various secondary schools in Canada have access to ICT equipment and educational software. However a survey done by Tinio (2002) on ICT use in teaching and learning in public schools in Philippines indicated that a great percentage of these schools had power service although the irregularity in its supply still remained an issue. Bakar and Samwel (2006) however established that integration of ICTs in teaching and learning in many secondary schools in the United Kingdom was still a problem due lack of sufficient infrastructure. The author observed that there were some ICTs being used in the classroom but not without the problems such as erratic broadband. Seychelles was reported by Isaacs (2007) to be the country with the most developed ICT infrastructure with the highest fixed line density, electricity penetration, internet access and televisions and radio which could be use in education. Although Africa had a late start in the race to acquire ICT facilities, liberalization of the telecommunication sector in 1997 resulted in significant growth in infrastructure and access but mainly concentrated in the urban centers as revealed by Farrel (2007).The author noted that ICT tools were available in some secondary schools but their use were limited to administrative purposes and only a few of them were used by teachers and students. Further revelation by Farrel (2007) established that interactive radio instruction proved to be most widely used form of ICT in teaching and learning in secondary schools in most African countries in the Sahara. In Nigeria for example,

the absence of ICT equipment in most of Nigerian secondary schools hampered ICTs integration in teaching and learning (Okwidishu, 2005).This was further asserted by Tella et al (2008) in his assessment of secondary school teachers' use of ICTs in the same country. The author established that ICT facilities and equipments were expensive and inadequate.

Lack of infrastructure in various schools in Tanzania was acknowledged in the Tanzanian ICTs Policy for Basic Education (Farrel, 2007).The importance of ICT in assisting pedagogy was thus emphasized as the government of Tanzania still grappled with infrastructure and ICT use.

Studies indicate that a great number of secondary schools in Kenya have some ICT facilities such as computers, radio, televisions but only a few are fitted with basic infrastructure Oloo (2009). The report further revealed that there were poor ICT infrastructures in secondary schools in Kenya except in NEPAD e -Schools which were only six in the country. Kenya. MoE, (2005) on the other hand reported that majority of secondary schools had no or inadequate ICT infrastructure to enable adoption of the technology in teaching and learning. Notable however was the initiation by the government to put major ICT project to equip 200 secondary schools with ICT infrastructure (KESSP, 2004).This was further followed by the NEPAD e - schools program which had also begun to enhance ICTs infrastructure in some learning institutions in the country.The Ministry of Education (MoE, 2005) revealed that 90% of secondary schools still needed to establish standard Local Area Networks (LANs) in order to improve sharing of teaching resources. This indicated that

availability of ICT infrastructure was still a challenge in various institutions in the country.

The literature review above revealed the availability of ICT facilities and infrastructure which are used in education in general. However this leaves out the availability of these facilities in teaching and learning geography in secondary schools and this gap necessitated this study. The study therefore aimed at establishing availability of ICT facilities and infrastructure which could be used in ICT integration in teaching and learning geography in secondary schools in Rachuonyo South Sub-County.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Research Design

The study adopted descriptive survey in conducting this research. The descriptive survey research design is a process where collection of information is done by interviewing or administering a questionnaire to a sample of individuals to justify current conditions (Kombo and Tromp, 2006). Mugenda and Mugenda (2003) noted that in a survey research, information that describes existing phenomena obtained by asking individuals about their perception, attitude, behavior and values are gathered. Fraenkel and Wallen (2003) note that the major purpose of survey is to describe the characteristics of a population. The population as a whole is rarely studied instead, a carefully selected sample of respondents is surveyed and a description of the population is inferred from what is found about the sample. Descriptive survey design was chosen because it is appropriate for educational fact-finding as it yields a great deal of information, which is accurate. It also enables a researcher to gather data at a particular point in time and use it to describe the nature of the existing conditions (Cohen, Manion & Morrizon, 2000). The research aimed at gathering accurate information on factors which influence ICT integration in teaching and learning geography in secondary schools in Rachuonyo South Sub-County.

3.2 Study Area

The study was conducted in Rachuonyo South Sub-County, Homa Bay County; Kenya. It is located in south western part of Kenya and lies between Longitude 34^0 $25´$ and 35^0 0 East and Latitude 0° 15´ E and 0^0 45´ South. It covers an area of 509.5 Km^2 and has a population of 208,261 persons. It is mainly inhibited by nilotes whose

main occupations are small businesses and agriculture. More than 70% of the population lives below poverty line. Inadequacy of food in some parts of the Sub-County also hinders students' participation in education.HIV prevalence was estimated to be at 30% which is double the national average which is 14%.This situation has also affected education in this Sub-County district. This means that majority of them were unable to effectively pay school levies. The residents mostly practices subsistence farming of such crops as maize, potatoes and sorghum. The Sub County lies to the South of Rachuonyo North Sub County shares borders with Nyando Sub- County to the North East, Nyamira Sub- County to the East, Kisii Central Sub-County to the South West and Homa Bay Sub County to the West.

There are 63 Secondary schools within this district and the document analysis from the Rachuonyo South Sub-County office indicated poor results posted in geography in the past five years attaining mean scores of 4.57, 3.34, 4.38, 5.01 and 4.11 in 2006, 2007, 2008, 2009 and 2010 respectively. This research was based in Rachuonyo South Sub-County because the researcher was interested in establishing factors influencing ICT integration in teaching and learning of geography in secondary schools in Rachuonyo South Sub-County. This study focused on ICT integration in teaching and learning geography because no known study had been done to find out these facts.

 The map showing the location of Rachuonyo South Sub-County is attached as Appendix F.

3.3 Study Population

The population under study consisted of 63 Head teachers, 189 form four geography teachers, 1427 form four geography students and 1 District Quality Assurance and Standards Officer (DQASO) within the Sub-County.

3.4 Sample and Sampling Technique

Simple random sampling procedure was used to select a sample of 471 form four geography students and 63 form four geography teachers. This translated to obtaining a third of the population which was representative of the population under study (Gall et al, 2007).This method was deemed appropriate because it provided equal opportunity of selecting each element of the population (Kombo and Tromp, 2006). Saturated sampling procedure was used to select Secondary Schools Head Teachers and the District Quality Assurance and Standards Officer. The sample size was 63 Head teachers, 63 form four Geography teachers, 471 form four Geography students and 1 District Quality Assurance and Standards officer. The table below illustrates the sample frame.

Table 2: Sample Frame

Respondents	Total population.	No sampled	%
Head teachers	63	63	100
QASO	1	1	100
Geography students	1,427	471	33
Geography teachers	189	63	33

3.5 Instruments of Data Collection

The instruments used to collect data were; Questionnaires, Interview Schedules and Document Analysis Guide.

3.5.1 Head Teachers' Questionnaire

The head teachers' questionnaires were used to collect data concerning availability of ICT policies as well as availability of ICT facilities and infrastructures in secondary schools in the Sub-County. The questionnaire contained two parts. Part I contains information about ICT policy in secondary schools while part II contained information about ICT facilities and infrastructure. The questionnaire had a check list and Likert scale questionnaire which had 5 points ranging from SA-Strongly Agree, A-Agree, UD-Undecided, D-Disagree to SD-Strongly Disagree. The researcher used questionnaire as it can be designed and used to collect vast quantities of data from a variety of respondents (Wilkinson & Birmingham, 2003). The questionnaire had 19 test items which consisted of structured and unstructured test items. The structured questions were important because they led to higher response and accurate data as well as being able to be easily coded by the researcher. The unstructured test items allowed the respondents to express their views openly and provided rich insights that provide depth and coluor to the finding (Mugenda and Mugenda, 2003). The researcher developed the questionnaire. It is attached as Appendix A.

3.5.2 Geography Teachers' Questionnaire

The teachers' questionnaire was used to collect data concerning teachers' ICT Competency in adopting the technology in teaching geography and their attitudes on ICT adoption in teaching the subject, availability of ICT policies, facilities and

infrastructures. The questionnaire was deemed important in collecting data from geography teachers because it can be designed and used to collect large quantities of data from a variety of respondents (Wilkinson & Birmingham, 2003).It contained five parts. Part I contained information on frequency of ICT use in teaching geography ,part II contained information on teachers' ICT competency in integration in teaching geography, part III contained information about teachers' attitudes on ICT adoption in teaching geography, part IV has information on ICT policies in secondary schools while part V contained information on ICT facilities and infrastructures.

The questionnaire had items rated using Likert scale which had 5 points ranging from SA-Strongly Agree, A-Agree, U-Uncertain, D-Disagree to SD-Strongly Disagree. There were also closed and open-ended questions which were used to gather information on geography teachers' attitudes and ICT competencies as well as secondary schools' ICT policies. The researcher developed teachers' questionnaire and is attached as Appendix B.

3.5.3 Geography Students Questionnaires

The students' questionnaire was used to collect data concerning students' of ICT use in learning, their competencies, attitudes, availability of ICT policies, facilities and infrastructures in secondary schools. Use of questionnaire was important in saving time because it gathered data over a large sample (Kombo, Tromp, 2006).The Likert scale which had 5 points ranging from SA-Strongly Agree, A-Agree, U-Udecided, D-Disagree to SD-Strongly Disagree were used to gather the information from the students. The likert scale was used because it was much easier to construct and reliable than other scales with the same number of items (Mugenda and Mugenda, 2003).The researcher developed the questionnaire and it is attached as Appendix C.

3.5.4 Interview Schedule for Quality Assurance and Standards Officer

The interview guides were used during the interview sessions with the Quality Assurance and Standards Officer. This had particular questions which probed the adoption and use of ICTs policies in secondary schools in the Sub -County as well as existence of ICT infrastructures. The interview was used to collect the information needed from the respondent because it helped the researchers to observe the subject and record his unique perspectives or experiences as it relates to ICT integration in teaching of geography in secondary schools. Mugenda and Mugenda(1999) emphasized that the interview session is conversational and the approach allows the subject to give the interviewer insight in to where a subject is coming from and getting a complete feedback. This helped to gather information and to establish the influence of government policies on ICT application in teaching and learning geography besides getting clear and detailed information. This helped in making comparison between official policies and actual practices in schools. The interview guide for quality Assurance and Standards Officer is attached as Appendix D.

3.5.5 Document Analysis Guide

Document analysis guide focused on analysis of documents that were relevant; that is KCSE results analysis in Homa Bay County in order to obtain information about the students' mean grades in geography. It has the advantage of being reliable and saves time (Kombo and Tromp, 2006). The information gathered was used to beef up information collected by other methods of data collection. The researcher developed the interview guide and it is attached as Appendix E.

3.6. Reliability and Validity of Research Instruments

Reliability of instruments for data collection refers to their ability to measure and yield consistent results each time they are used. Validity on the other hand is the degree to which evidence and theory supports the interpretation of tests scores entailed by proposed uses of the tests (Jacob et al, 2006).There was need to ascertain both validity and reliability of the instruments to yield relevant information.

3.6.1 Reliability of the Instruments

Reliability of the instruments the degree of stability exhibited when measurement is repeated under identical conditions over a short period of time and Mugenda and Mugenda (1999) suggested that the researchers can wait for one to four weeks before administering the same questionnaires to the same group of respondents. This was determined through test retest i.e. having the same respondents complete a survey at two different points in time to see how stable the responses are (Kombo and Tromp, 2006).To determine reliability of the instruments, 10% of the population under study was used to pre-test the instruments i.e. 143 geography students, 19 geography teachers and 7 head teachers (Mugenda and Mugenda, 1999).This was necessary because it allowed the researcher to make meaningful observations, correct vague questions by paraphrasing them to improve the questionnaire as well as checking appropriateness of method of analysis. These respondents were not part of the sample used in the study. This test-retest reliability meant that the same instruments were administered to the same sample on two different occasions. The results after correlation yielded a Pearson *r* of 0.75 for students and 0.81 for teachers'. These reliability coefficients imply that more than 70 per cent of the measured variances were reliable indicating that the reliability error was low (Bowling, 2002). Gall, Borg

and Gall (2007) assert that Cronbach's coefficient alpha is best used on items which are not scored dichotomously; for instance when a test includes items that have several possible answers and each item given a different weight. In this case, alpha formula was the appropriate method because it involved a rating scale with five options. The results yielded an alpha level of 0.86 as the coefficient of reliability for students' questionnaire and 0.80 for teachers' questionnaire. These values were considered high enough to judge the instruments as reliable (Durrheim & Painter, 2006).The researcher was therefore able to proceed with collection of data.

3.6.2 Validity of the Instruments

Validity is the extent to which a test measures what it is supposed to measure (Kombo and Tromp, 2006).Instrument is considered valid if its content is relevant to research objectives. This study relied on face and content validity procedures to establish that the instruments measured what they were supposed to measure to check on face validity and content validity of the research instruments, The instruments were assessed by experts in the research content area at Maseno University.The purpose was to rid the instruments of unclear direction, vocabulary and sentences structures which might be too difficult, poorly constructed item, improper arrangement of items and ambiguity of test items which could be inappropriate for the outcomes being measured. Triangulation was also used as a way of reducing uncertainty of interpretation of results as a form of cross checking as recommended by Kapa (1997). To ensure validity of instruments before the commencement of the actual study, the instruments were presented to experts from the Department of Educational Communication, Technology and Curriculum Studies, Maseno University for scrutiny and examination. Their suggestions and recommendations were incorporated

therefore improved the effectiveness and accuracy of the instruments as well as adequacy of the items.

3.7 Data Collection Procedure.

Research proposal to carry out the study was first approved by Maseno University School of Graduate Studies before undertaking the actual study in sampled schools. The research permission letter is attached as Appendix G. The researcher then sought permission from Rachuonyo South Sub-County Office before proceeding to the field to collect data. The permission letter is attached as Appendix H. On obtaining the permission, the researcher sent letters to heads of the schools she intended to collect data from informing them of her intention. The researcher then made personal visits to the sampled schools, met the respective head teachers. The visit which was made to schools was to make the researcher become acquainted with respondents and to explain the intention of the study and arrange for possible dates for data collection. Administration of the questionnaires to the respondents were done personally by the researcher and made clarifications when need arose. This was necessary because the researcher was able to address items which seemed vague to the respondents. Documents such as KCSE result analysis Homa Bay County were analyzed by the researcher to obtain data on performance of geography students' in various Sub-Counties within the County between 2006 and 2010.To obtain in-depth data, an arrangement was made to meet the District quality and standards officer to conduct the interview.

3.8. Data Analysis Procedure

The data collected using the questionnaires was coded and organized for analysis using the Statistical Package for Social Sciences (SPSS) data editor. Quantitative data were analyzed using descriptive statistics such as frequency counts, percentages and means. Qualitative data yielded by the research instruments were transcribed into written text by combining notes taken into coherent discourse and analyzed through generation of categories and themes related to the research objectives. Quantitative data were analyzed by use of frequency counts, percentages and means scores to analyze data obtained from the questionnaires.

Frequency counts were computed for data collected by use of questionnaires on a five point likert scale. Mean scores of the respondents on each item of the scale were then calculated. To analyze frequency of ICT use by geography teachers and student, likert scale was used with scores distributed as follows: Every lesson=5, Alternate lessons=4, Once in A week=3, occasionally=2 and Not at all =1.Likert Scale was used and the researcher developed a criterion based on the responses obtained from the 5-points Likert type scale. In scoring the positively stated items, Strongly Agree (SA) earned 5 points, Agree (A) 4 points, Undecided (U) 3 points, Disagree (D) 2 points and Strongly Disagree (SD) 1 point. However for the negatively stated items, the scoring was reversed and the scores assigned as follows: Strongly Agree (SA) = 1; Agree (A) = 2; Undecided (U) = 3; Disagree (D) = 4; and Strongly Disagree (SD) = 5. To gather information on geography teachers' and students' availability of ICT facilities and infrastructure in secondary schools, likert scale type earning 5 point was also used i.e. Very much available (MA)=5, Available (A)=4, Undecided(UD)= 3,Lacking(L)=2, Extremely Lacking(EL)=1.

Qualitative data were organized, categorized, and a report was made from the themes which emerged. Teachers and students were assigned numbers as teacher 1 to 63 while students assigned as student 1 to 471. These numbers were used to ensure confidentiality of the information as well as obtaining accuracy. Teachers and students were therefore referred to by use of these numbers while reporting the data.

In interpreting mean scores, the attitudes of teachers on ICT adoption in teaching and learning of geography were categorized as negative, neutral and positive. A mean score of 2.5 and below denoted a negative attitude, a mean score of between 2.51 and 3.5 denoted a neutral attitude while a mean score of 3.51 and above indicated a positive attitude. Teachers' and students' attitudes on each item were attained by summing up the total scores of individual teachers and students and dividing by the number of items as shown by the formular given by Kombo and Tromp (2006):

$$\bar{x} = \frac{\sum S}{15}$$

Where $\bar{x}$ = Statistic mean

$$\sum S = \text{Sum}$$

15= Number of items on each factor of ICT integration on the questionnaire.

Overall attitude of teachers and students towards ICT adoption in teaching and learning of geography were attained by summing up the mean scores of all the respondents $\left(\sum \bar{x}\right)$ and dividing by the number of respondents; 471 students and 63 teachers. Findings were presented using frequency distribution tables, percentages and mean scores calculated and transcribed.

When reporting findings on geography teachers' and students' ICT competencies, mean scores of 0 to 1.00 denoted very low Competency, 1.01 to 2.00 denoted low Competencies, 2.01 to 3.00 denoted average competencies while 3.01 to 4.00 denoted high competency and 4.01 to five denoted very high competency. The obtained percentages and frequency counts were tabulated and reported.

For availability of ICT facilities and infrastructure and availability of ICT policies, a mean score of between 0 to 1.5 denoted unavailability 1.51 to 2.60 denoted inadequate while 2.61 to 5 indicated adequate. Presentations of the findings were done on tables which combined responses from all the respondents for easy comparison.

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter presents the findings and discussion of the assessment that was under taken with respect to the objectives and research questions raised in chapter one. This chapter is divided into five sections which are: Frequency of ICT integration in teaching and learning geography in secondary schools, teachers' and students' ICT competencies in teaching and learning geography, teachers' and students' attitudes on ICT integration in teaching and learning geography, availability of ICT policies in secondary schools and availability of ICT facilities and infrastructures.

4.1 Frequency of ICT Use by Geography Teachers and Students in Secondary Schools

The study sought to establish the frequency of use of the available ICTs in teaching and learning geography in secondary schools in Rachuonyo South Sub-County. The finding is shown in table three below;

Table 3: Frequency of ICT use by Geography Teachers and Students

Frequency	T (n=63) f(%)	S (n=472) f (%)
Every lesson	0(0%)	0 (0%)
Alternate lessons	0(0%)	0(0%)
Once a week	1 (1.58%)	11 (0.42%)
Occassionally	16(25.39%)	59(12.52%)
Not at all	46 (73.01%)	411(87.26%)
Mean scores	**1.28**	
	1.12	

KEY:T-Teachers   S-Students

From table 3, the information shown is that the frequency of ICT use in teaching and learning geography was very low. The mean scores obtained from the responses of both teachers and students were 1.28 and 1.12 respectively. No teacher utilized ICT every lesson and alternate lessons, one teacher (3.17%) used ICT once a week to teach the subject, 25.39% used ICT occasionally and 73.26% did not use ICT at all. Similarly, geography students did not use ICT every lesson and alternate lessons while only one of them used ICT a week, 12.52% of them used ICT occasionally but 87.26% of them did not use ICT to learn. This implies that utilization of ICTs in teaching and learning was minimal among geography teachers and students in secondary schools in this Sub County and teachers 'preferred traditional chalk and talk' methods of instruction.

The situation in these secondary schools denied students opportunities to actively participate in the learning environment which might negatively affect their comprehension and retention of what is taught as well as understanding of abstract concepts in the subject. This may be due to some factors such as user attitudes or inadequate ICT facilities and infrastructures among others. This may also mean that teachers and students lacked confidence in handling the available ICTs in their schools. Therefore, school managers need to remedy this situation by making drastic measures to look into ways in which ICT may be an integral part of teaching and learning strategy in secondary schools in this Sub County. This may be done by establishing an ICT integration enabling environments in schools such as purchase of relevant ICT tools and allowing teachers and students to access them.

A contrasting finding by Theng et al (2008) indicated that in Malaysia, secondary school teachers had confidence in the use of ICTs in teaching. The study was done on all their subjects this country while the current one was done on geography. Similarly, Scheffler (1999) revealed that in other studies, teachers' lack of competence, lack of knowledge, lack of prior experience and their resistance to apply new technologies in their lessons had been found to be the major obstacles to frequent ICT integration in teaching.

From the interview with the Sub-County Quality and Standards Officer, it was revealed that most teachers were not proficient in using ICT in teaching geography therefore, their regular use was in their geography lessons was none existent. The officer further pointed out that a greater percentage of older teachers lacked appropriate skills in ICT as compared to the younger ones. Many of the teachers preferred traditional teaching methods to the use of any new technology in teaching. The other emergent fact was the fact that generally, teachers had not been sensitized on the need to adopt ICT in teaching their subjects generally and that made them place less priority on technology use in the classrooms hence seldom used ICTs.

This revelation about infrequent use of ICTs in teaching and learning pointed to the fact that more still needs to be done in terms of creating favourable conditions regarding the programs in secondary schools. Sub-County Quality Assurance and Standards Officer suggested need for an In Service Education of Teachers (INSET) to address ICT integration issues in secondary schools and that the ministry of Education and school administrators need to come up with specific implementation strategies

and follow up mechanisms to enable both teachers and students to frequently embrace use of technologies in their classrooms.

4.2 Teachers' and Students' ICT Competencies in ICT Integration in Teaching and Learning of Geography

This section brings to light the level of geography teachers' and students' competency in use of ICT in teaching and learning the subject. Proficiency in using technology in a professional context is deemed important for any teacher who wish to integrate ICT in teaching the subject.

To investigate teachers' and students' ICT competency, the analysis was done specifically in terms of teachers' and students' competencies in handling ICT tools, use of the internet and use of ICT software. Table 4 is based on the mean scores of teachers' and students' responses with regards to their ability to use internet for teaching and learning geography.

Table 4: Teachers' and Students' Competency in Use of Internet for Teaching and Learning Geography

	Statement	T (N=63)	S (471)
1	I can send geography materials through the internet	3.39	1.46
2	I cannot discuss geography contents through the internet	3.60	3.43
3	I can source for geography materials from the internet	3.58	1.70
4	I can construct knowledge using resources from the internet	2.58	1.84
5	I can program independent learning using the internet	1.58	1.49
		1.58	1.49
	Overall mean scores	**2.94**	**1.77**

Key: **T**- Teachers   **S**- Students

As shown in table 4, geography teachers' competency in use of internet was average with an overall mean score of 2.94 while students' competency in use of the same was low with a mean score of 1.77. This disparity in competency between teachers and students may be due to the high cost of the internet which students may not afford as compared to the teachers. A total of 52.37% of teachers could send geography contents to their colleagues through the internet while 47.62% of the students could perform this task their effort to learn. A total of 67.13% of teachers had low competency in discussing geography contents with their colleagues through the internet while 59.56% students agreed with this negatively stated statement. Very few (20.83%) teachers were competent in assisting students in constructing their own knowledge using the internet. This skill was also challenging to students as only 1.48% could learn geography using this strategy. A total of 57.13 % of geography teachers were able to obtain geography resources from the internet while only 24.40%

of the students could use the internet for similar purpose. Programming independent learning in students was challenging to both teachers and students as only 0.63% of students were capable to learn through this means. The percentage of teachers who were competent in programming independent learning in students using the internet was also low (8.03%).Independent learning in students is very important because it enables students to construct their own knowledge and this can aptly be achieved by use of technology. This study revealed that teachers were more competent in utilizing internet than students. This disparity may be due to high cost of internet use which could have been too high to be afforded by students while teachers, being financially able, could at least afford to use the internet. It is also clear that teachers' role in directing learning is very crucial because it was established that students could not program independent learning on their own because statement probing this competency obtained a mean score of 1.49.

This study concludes that skill levels of learners in utilizing the internet to learn geography was low as compared to teachers. The students in secondary schools need to be allowed to utilize the internet to enable them obtain up to date and numerous geography resources. Teachers had had average competency in internet use although there were specific skills which still needed to be acquired by them such as programming students' independent learning using the internet and discussing geography contents with colleagues through the internet. These skills were found to be challenging to teachers as shown by their responses which obtained means of 1.58 and 3.60 (the latter being negatively stated statement). This finding concurs with a revelation by Adomi (2010) who established that that lack of adequate search-skills inhibited the use of internet by secondary school teachers in Nigeria. The study

investigated use of internet by teachers in their entire subject while the current study focused on teaching geography. Becker (1999) however revealed that majority (68%) of teachers in secondary schools in the United States of America used the internet in their efforts to find information resources for use in their lessons.

This scenario calls for the government's intervention assist schools in payment for internet services to facilitate teaching and learning. UNESCO (2008) emphasized that the need for teachers' expertise in ICT skills is crucial if they wish to use the technologies in the teaching-learning environment.

The study also sought the opinion of geography teachers and students on handling ICT tools in teaching geography. The responses are in table 5.

Table 5: Teachers' and Students' Competency in Handling ICT Tools for Teaching and Learning Geography

	Statement	T (N=63)	S (471)
1	I am able to store geography my geography contents in a computer	2.12	1.99
2	I can use combined visual and audio media in geography lessons	3.30	4.03
3	I can retrieve geography notes from a CD	2.88	2.50
4	I cannot use projector in geography lessons	3.65	2.03
5	I can use a computer to make geography notes	2.17	1.84
	Overall mean scores	2.92	2.47

Key: **T**- Teachers   **S**- Students

As shown in table 5, the competencies overall mean score of geography teachers were average with a mean score of 2.92 obtained from their responses. Compared to teachers, students' overall competency in use of ICT tools in learning was low as their responses obtained a mean of 4.47.

A total of 47.61% of teachers were competent in teaching geography using combined audio and visual media with this statement scoring a mean of 3.30 while students' responses on this statement obtained a mean score of 4.03. A total of 64.51% of them were competent in learning geography using audio visual medium of instruction. This difference in responses between teachers and students may have been due to teachers' inadequate skills in preparation of ICT integrated lesson while students focused more on the motivation and excitement brought by audio media contents in the classroom. This result emphasized the predicted motivation brought by learning through, pictures sound and text which appeals to senses of learners and make students remember more what is learned. This means of instruction should therefore be utilized more in geography lessons to facilitate effective learning. This can be possible if proper budgets are put in place to enhance the purchase of relevant ICT tools.

Geography teachers had average competencies in retrieving notes from CD as this statement scored a mean of 2.88 with as total of 31.68% of them competent in the skill while 46.02% were incompetent on the same. This shows that teachers had some basic ICT skills which could be exploited for ICT integration in teaching geography. However, since less than half of them were competent in the skill, majority of them still required training in basic ICT skills to facilitate efficient ICT utilization in geography classrooms. Compared to geography teachers, students' responses on this

statement scored a mean of 2.50 which was considered average competency. However a total of 51.31% of them were incapable in this skill while only 16.18% were competent to retrieve geography notes from a CD.

Use of computers to make notes by geography teachers obtained a mean score of 2.17 with only 12.67% of them competent in this skill, 31.74% undecided while more than half (57.15%) of them were incompetent. Computer use by students was also not impressive according to their responses which score a mean of 1.84 with a total of 42.41% of them incompetent, 36. 09% undecided while only 1.48% indicated that they were competent. Making notes using a computer is very crucial in ICT integration process since it's a basic skill required by anybody to effectively utilize technology in the classroom. This kind of scenario means that ICT integration in the classroom may still not be attainable if skill levels of key players in learning environment are not increased.

Although this study showed low competencies of students in use of ICT tools in learning, it was evident that students had some potential in utilizing ICTs. These potentials need to be tapped by educators in bringing change in geography learning environments especially in understanding of abstract concepts. This result contradicts a revelation by Adomi (2010) which established that considerable percentages (44%) of senior secondary students in Lagos state Nigeria were able to operate computers to enhance their performances in the classrooms.

Majority (65.07%) of geography teachers were incompetent in storing their teaching contents in a computer, 31.63% were undecided while only 23.80% were proficient in

this skill. Compared to teachers, students' responses obtained very low mean score (1.99) with 65.38% of them incompetent, 11.11% undecided while only 2.96% were competent in the same skill. Similarly, use of projector in the classroom posed a challenge to many geography teachers as a total of 63.48% of them responded that they were incapable while only 1.47 % of them indicated capability in this skill. Geography students' responses also obtained a low mean score of 2.03 with a total of 70.48% incapable in using projector to learn.

Since this study revealed that teachers had average ability in ICT use while students had low ability, it was clear that geography teachers had more potential in utilization of ICT tools for teaching purposes than geography students. These skills need to be exploited and developed for ICT integration in teaching geography. This may be made possible by purchasing affordable ICT tools to be used in schools.

This study concludes that since ICT integration involves fitting technology into the curriculum, mere average competency in ICT skills by teachers might not be sufficient in ICT integration in the classroom. This study recommends that teachers' development in terms of offering in-service training to increase ICT skill levels in order to facilitate ICT integration in teaching and learning geography was necessary. Students also need to be taught computer skills in secondary schools especially in form one and two to enhance acquisition of ICT skills. Students too need to be allowed to interact with the available ICT tools in their schools.

 The study sought teachers' and students' responses regarding their competencies in use of ICT software. Table 6 presents the information.

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Table 6: Teachers' and Students' Competency in Use of ICT Soft ware in

Teaching and Learning Geography

Mean Scores

	Statement	T (N=63)	S (471)
1	I can utilize geography educational soft ware in my lessons	1.47	2.64
2	I can use televised contents in geography lessons	2.52	2.33
3	I can use videotaped contents in geography classes	2.61	2.48
4	I am able to use radio broadcast contents in geography lessons	3.74	2.59
5	I can assess performance using a computer	1.84	1.78
	Overall mean scores	2.43	2.46

Key: **T**- Teachers **S**- Students

Generally, both teachers and students had low competencies in utilization of ICT softwares as shown in table 6. Teachers' and students' responses obtained mean scores of 2.43 and 2.36 respectively. Despite this low ability, 60.30% of teachers had competencies in specific skills such as use of televised contents in teaching geography. Compared to teachers, only 15.70% of students were competent in the same skill while 55.92% of them were incompetent in learning through the same means. A total of 30.15% of teachers indicated that they were competent in utilizing videotaped contents in their geography classrooms. Compared to teachers, 60.71% of students indicated that they could utilize this skill in learning geography. This disparity in ability between teachers and students may have been due to students' familiarity with video films out of the classrooms. Teachers however may have considered the preparation involved in using this software in order to teach

effectively. This competency in the students can still be exploited to bring positive learning outcomes in them if skill levels of teachers are increased to facilitate their learning.

A total of 60.11% of students indicated that they were competent in use of radio broadcast contents to learn while only 20.14% of teachers could use contents from radio broadcast to teach this subject. Based on responses of both teachers and students on this statement, school managers and education stakeholders should tap the potentials in this area for teaching and learning purposes. Apart from that, involvement of technical support may also be considered so that ICT integration in teaching and learning geography can be carried out effectively.

It was revealed that teachers low competencies in evaluation of students 'work using ICT as shown by the mean scores obtained from their responses (1.84). Similarly, students' competency was also low with mean response of 178. These responses clearly indicated that they were incompetent in use of education software in teaching and learning the subject respectively. However, a total of 64.11% of students strongly indicated that they were undecided on learning geography using educational soft ware while 47.62% of the teachers disagreed and 52.38% strongly disagreed with the statement. This may imply that both teachers and students were unfamiliar with utilization of educational soft wares in the classroom. This software is quite important because it offers students opportunity to construct their own knowledge by directly interacting with the technology for learning purposes. School administrators need to purchase geography educational software in order to allow both teachers and student to use them. This finding was contrary to a revelation by Kerski and Wanner (2003)

on use of ICTs in geography education by students in Boulder high school in the United States which established that students were able to use GIS (Geographic Information System) in learning geography, worked with GIS and demonstrated increased use of maps.

Although it stood out that both teachers and students had low competencies in use of ICT soft wares in teaching and learning geography, they certainly possessed some competencies in specific ICT skills which could be exploited for teaching and learning purposes. As the study revealed, these skills were not adequate for effective ICT integration in the classroom. Both geography teachers and students still required more training in ICT skills and practice to facilitate ICT integration in teaching and learning in secondary schools.

A summary of ICT competencies of teachers and students is presented in table 7

Table 7: Summary of Geography Teachers' and Students' ICT Competencies

Statement		Mean Scores
Use of internet to teach / learn geography	**T**	2.94
	S	1.77
Use of ICT tools to teach/ learn geography	**T**	2.92
	S	2.47
Use of ICT software to teach / learn geography	**T**	2.43
	S	2.36
Teachers' overall mean score		2.72
Students' overall mean score		2.20

Key: T-Teachers S-Students

Generally, teachers' ICT competency in teaching geography was average with an overall mean of 2.72. However, the students' overall mean was low (mean score of

2.20). Revelation from this study implies that teachers had the potential in using ICTs in teaching geography lessons although some competencies still needed to be acquired by them. Students should be taught ICT skills which may be possible if computer studies are made compulsory in forms one and two to enable students integrate ICT in learning geography.

This study is similar to a study by Kargiban and Kafflash (2012) which revealed that in India, learners' use of ICT in learning was still low but steadily gaining momentum considering the government's commitment towards technology use in various secondary schools in that country. However a contrary revelation by Kerski and Wanner (2003) established increased use of ICT in geography education in Boulder high school in the United States. A research finding by Richardson (2009) on secondary schools teachers' ability in ICT skills in secondary schools in Cambodia also established that, teachers were to a little extent proficient in ICT skills though not enough to enable them integrate them in teaching all their subjects generally. Similarly Sahin (2011) revealed that in secondary schools in Turkey, the major obstacle in the process of ICT integration in teaching in all high school subjects was inadequate ICT training opportunities. Findings by Egbedokun and Sofowora (2010) on technology application in teaching geography in secondary schools in Nigeria also revealed that most geography teachers lacked appropriate ICT skills to enable them adopt the new technologies in teaching. Bingimlas (2009) also pointed out that teachers had the desire to integrate ICT in education but were hindered by lack of appropriate ICT skills. A similar finding by Scheffler (1999) revealed that teachers' lack of competence, lack of knowledge, lack of prior experience and their resistance to apply new technologies in their lessons were the major obstacles to ICT integration

in teaching. On the contrary, secondary school teachers in England effectively used ICT in teaching core subjects but thorough inspection reports showed that the development was uneven (Deaney et al, 2003). Kargiban and Kafflash (2012) also further revealed that teachers in high schools in Alberta had ICT capabilities and use them in their classroom.

Average ability in technology use might not be sufficient for ICT integrated lessons because the process involves fusing ICTs in lessons to meet the set objectives. Therefore, specific skills need to be acquired by teachers in areas which were challenging to them such as assessment of students' performance using ICT. Programming learning using radio broadcast contents and use of televised geography contents in the classrooms. Other skills which needed to be acquired by geography teachers were programming independent learning using internet, assisting students to construct their own knowledge and storing geography contents in a computer. Apart from that, availing adequate ICT facilities and effective ICT policies would be of importance.

Majority (93.65%) of geography teachers indicated that their competencies were inadequate and could prevent them from integrating ICT in teaching geography. This clearly shows that teachers lacked confidence in utilization of ICT in geography classrooms.

Based on the findings, since the competency of geography teachers were average in ICT skills with vital ICT skills in the integration process lacking and students' were low, it was not possible for effective ICT integration to take place thereby hampering effective understanding of abstract concepts in geography by students. Therefore

school managers should improve skill levels of teachers by considering in-service training to enhance effective ICT integration in teaching geography. This study also suggests that basic computer studies be introduced in secondary schools as a compulsory subject in form one and two to equip students with basic ICT skills. The government should also consider increasing capitation per students to facilitate this program in secondary schools.

This finding is crucial to education stake holders because the study shed light on the situation on the ground. They therefore need to provide necessary skills which may enable ICT integration in teaching and learning in specific subject areas.1

4.3 Teachers and Students Attitudes on ICT use on ICT integration in Teaching and Learning of Geography in Secondary Schools.

For successful adoption of ICT in teaching and learning of geography, it is imperative that both teachers and students posses the right attitudes towards communication technologies Kigotho (2009).This section deals with analysis of attitude of geography teachers and students on ICT use in teaching and learning geography.

Table 8 presents the information on teachers and students attitudes on ICT use in teaching and learning geography.

Table 8: Teachers and Students Attitudes on ICT use in Teaching and Learning Geography

	Statement	Mean Scores	
		T (n=63)	S (n=471)
1	Use of ICT in learning is motivating to students	3.71	3.12
2	I prefer using ICT in geography class	3.00	2.33
3	ICT use in learning geography can make students understand abstract concepts	2.33	2.97
4	Classroom experience can be enhanced by use of ICT	2.63	2.66
5	I wish I can get a chance to use ICT in geography lessons	3.49	3.79
6	Geography contents can be clearer if ICT is used in class	3.14	3.29
7	Use computer engage students in class work	4.12	3.81
8	I am not comfortable with the use of ICT in geography lessons	2.69	2.19
9	I get discouraged by the thought of using ICT in geography classes	2.17	1.90
10	Use of ICT in geography has advantage over being without it	2.75	3.37
11	It does not make any difference to me whether I use ICT in my geography classes or not	2.41	2.20
12	Use of ICT in geography lessons make my work better	3.28	3.80
13	Use of ICT in geography lessons is relevant to students for future use	3.76	4.05
14	I do not think ICT use in my geography classes can be effective	3.06	1.96
15	I will do as little as possible with ICT in my geography classes	2.23	1.72
	Overall Mean Scores	**3.06**	**2.89**

KEY T-Teachers   S-Students

As shown in table 8, attitudes of geography teachers and student on ICT integration in teaching and learning geography were neutral. Both teachers' and students' responses indicated that to some extent, there were possibilities that if given opportunities, they

may utilize ICT in their geography classes. Teachers expressed their liking for computers' in their classrooms as 79.35% of them favored this statement which obtained a mean score of 4.12 while Students' mean score on the same statement was 3.81 with 71.33% of them in favour of the statement.

Teachers' responses on attitudes obtained mean scores of 3.06 while geography students' responses obtained mean score of 2.89. A total of 79.35% of geography teachers felt that use of computers to teach geography could engage students in the classroom while only 11.10% of them had contrary view on the same statement. This finding showed that teachers were aware of the potential of computers in enhancing learning outcomes in students. This revelation is good news to education stake holders who are keen on reforming education. With neutral attitudes by both teachers and learners, implementation of national ICT policies in secondary institutions may not be an uphill task if other factors such as infrastructures and effective policies are availed schools. Students' responses on this statement obtained a mean score of 3.81. A total of 71.33% of them had favorable attitudes on ICTs' ability in improving learning while only 23.76% of them had negative perception on the statement.

The perception on ICTs' potential to motivate learners was also favorably responded to by teachers whose responses on this statement obtained a mean score of 3.71 with a total of 65.06% of them in favour of the statement while only 15.87% had negative perception on the same. Compared to geography teachers, a total of 44.37% of geography students had positive perception on the statement with the responses obtaining a mean score of 3.12.

On relevance of ICT in the classroom being relevant to students in future careers, 66.75% of teachers agreed with the statement and their responses obtained a mean of 3.76. The students' responses however scored high mean (4.05) with a total of 70.60% of them having positive perceptions on this statement. This signifies that both teachers and students were aware of the potential of ICT in work places and would wish that they start using them in schools during class time. More than half (61.14%) of geography students had positive perception on use of ICT to make them better learners. This statement scored a mean of 3.68.Comparatively, a total of 53.98% of teachers felt that use of ICT could make them better teachers while 30.01% of them had negative perception on this statement. This implies that teachers and students in secondary schools in this Sub County had the desire to utilize ICT in the learning environment to prepare the students for ICTs future use in their careers. Today's students have the desire to utilize ICT as this is a requirement in any professional engagement in future. In terms of preference, the teachers' responses scored a mean of 3.00 while students' perception on the same statement scored a mean of 2.33 indicating negative attitudes. This implies that if ICT facilities were availed in secondary schools, teachers may effectively utilize them if enabling environment was put in place. This is because a total of teachers (61.90%) believed that ICT could enhance understanding of abstract concepts in geography.

Learning and teaching geography involves use of mathematical concepts which can easily be managed by use of ICT in a geography lessons. Compared to teachers, 60.84% of students were in favour of the statement.

A total of 51.69% of the geography students realized that ICT use make geography contents clear. This is due to its ability to present information through pictures, text

and sound which is quite appealing to learners. Compared to students, a total of 50.58% of teachers were positive on the statement. More than half (50.78%) of geography of teachers positively indicated that if given chance, they could use ICT in their lessons, 33.33% of them were unsure while only 15.86% were negative on the statement. Compared to teachers, students' responses on this statement scored a mean of 3.79 and 72.90% of them had the desire to use ICT in geography classes while only 15.45% were negative on the statement. This clearly shows eagerness of both teachers and student in handling ICTs in their geography classrooms. This implies that they had realized the importance of ICT integration in enhancing achievements of learners. Since the general attitudes of teachers and learners on ICT integration in teaching and learning were neutral, it means that they were not opposed to ICT use in the classrooms but only need slight motivation for this practice to take off. However, this may only be possible if other factors influencing ICT integration are improved. Becker (2000) in his findings on pedagogical motivation for students' use of computer asserted that students are generally more "on-task" and express more positive feelings when they use computers than when they are given other tasks to do.

A total of 63.48% teachers still practiced the 'custodian of knowledge' role whenever necessary as the thought of using ICT in teaching discouraged some of them. Many (68.78%) of students had contrary attitudes on the same statement as the responses here obtained a least mean of mean of 1.90. A total of 66.23% of geography students favorably indicated that ICTs' use in learning had advantage over learning without with the responses here obtaining a mean score of 3.37 while teachers' mean score on the same was 2.75.This supports the constructivists belief that knowledge is generated by the learners through experience-based activities rather than directed by instructors

(Roblyer, 2006). In addition, knowledge is constructed through hands-on activities or personal experience not transmitted.

The current study found that teachers still dominated classroom activities whenever necessary, for example 66.65% geography teachers indicated that they could do as little as possible with ICT in their geography classes while only 15.87% of them had contrary view. A total 86.19% of geography students also still felt uninterested in using ICT in their geography classes. This situation may be due to the fact that familiarity with ICT tools was lacking among many students and they did not know the opportunities offered by these technologies.

Deaney et al (2003) revealed a similar conclusion that students rarely perceived ICT as directly befitting learning as they expressed reservations about using technology in learning in secondary schools in England.

The findings from this study contrasts findings by Al-zaidiyeen et al (2010) on teachers attitudes and level of technology use in classroom in Jordanian rural secondary schools where it was found that teachers held positive attitudes towards the use of ICTs in their classroom. Similarly, Thenglau and Sim (2008) revealed that generally, secondary school teachers in Malaysia had favorable perceptions towards ICTs' use in teaching all their subjects.

Although this study focused on ICT use in teaching geography, findings by Tella et al (2008) on assessment of the use of ICT in teaching science education in secondary schools in Nigeria established that teachers perceived ICTs as very useful in teaching and learning, Prokop and Fancovicova (2008) also found out that secondary school

students in Slovakia had negative attitudes towards ICT use in learning in general while in Turkey high school student had positive perception on blended learning as revealed by Korkmaz and Karakus (2009).

The neutral perception by both geography teachers and students on ICT use in teaching and learning imply that both teachers and students were not opposed to ICT use in the classrooms and only needed favourable environment to use them. The study finding indicate that effective ICT integration in teaching and learning geography could not be attainable because use of the technology demands positive perception on practitioners

Education stake holders need to exploit this opportunity to enhance ICT integration in teaching and learning. This can be done by availing ICT facilities and infrastructures as well as establishing ICT policies.

4.4 Availability of ICT policies on ICT Integration in Teaching and Learning Geography in Secondary Schools

Policies are guiding principles which are designed in order to influence decisions. Therefore, the presence of ICT policy in an institution leads to order and effective use of the technology in teaching and learning. This study aimed to establish the availability of ICT policies in secondary school in teaching and learning geography. Table 9 presents Head teachers, geography teachers' and students' responses on availability of ICT policies in secondary school.

Table 9: Head Teachers', Geography Teachers' and Students' Responses on

Availability of ICT Policies in Secondary Schools

No.	Statement	Mean scores		
		HT (n=63	T (n=63)	S (n=471)
1.	All teachers and students access computers for teaching and learning purposes	1.82	1.77	1.57
2.	There is an ICT club in school.	1.61	1.47	1.08
3.	Geography teachers integrate ICT in their lessons	1.92	1.58	1.90
4.	Geography teachers and students are allowed to use electronic resources for teaching and learning.	1.39	1.25	1.95
5.	Teachers and students use internet in learning geography	0.57	0.66	0.54
6.	computer laboratory is accessed by only students doing computer studies	2.17	1.97	0.25
7.	Radio is used in teaching and learning geography	2.60	1.72	1.50
8.	Teachers coordinate use of electronics tools in learning geography in the school	1.87	3.93	2.18
9.	Only higher classes have access to computers in the school	2.77	3.15	1.89
10.	Television is used for teaching and learning geography in the school.	2.41	1.02	1.17
11.	ICT integration in teaching and learning is encouraged in the school	1.01	2.07	1.44
12.	There is no proper planning on use of computer laboratory by geography teachers and students	2.51	1.36	1.92
13.	Students can access electronic resources for learning purposes in the school	1.89	2.84	1.76
14.	ICTs use by teachers in the school is properly arranged	1.12	1.93	0.63
15.	Teachers are not given opportunity to integrate any ICT in geography lessons	3.41	2. 87	2.41
	Overall mean response by Head teachers			**2.08**
	Overall mean response by Geography teachers			**1.84**
	Overall mean response by geography Students			**1.89**

KEY: HT-Head Teachers **T**- Teachers **S** - Students

From table 9, regarding availability of ICT policies in secondary schools, the responses from all the respondents indicated that ICT policies were inadequate since averagely, the statements obtained mean scores of 2.08 (Head Teachers), 1.89 (Geography Teachers) and 1.84 (Geography Students). The study revealed that teachers coordinated use of electronics in learning geography in their schools as indicated by high mean score obtained from teachers' responses (3.93).However head teachers' and students' responses indicated that coordination here was minimal as the mean scores from their responses were 2.18 and 1.87 respectively. This difference in responses by the respondents showed that clear policy regarding coordination of use available electronic tools for teaching and learning geography was lacking. This scenario may also mean that the teachers were eager and ready for ICT use in secondary schools and could easily take control of ICT integrated lessons.

This lack of coordination impacts negatively on ICT integration process and students may fail to reap the benefits that ICTs provides to the learning environment. Responses from the head teachers indicated that many of them did not give teachers opportunity to utilize available ICTs to use in teaching geography as shown by the high mean score obtained from their responses. However both teachers and students had different responses (mean scores 2. 87 and 2.41 respectively) on this statement which showed that to some extent, they had opportunity to use ICT in their lessons. This could have meant that some teachers had enthusiasm in use of the available electronic materials and could integrate them in their geography classes without head teachers' efforts.

The policy on access to available computers in secondary schools was also responded to differently by head teachers, geography teachers and geography students whose responses yielded mean scores of 2.77,3.15 and 1.89 respectively. This still pointed to the fact that coordination of the use of available ICTs in the schools such as the computers was mostly done by teachers as shown by the higher mean score obtained from their responses (3.15).The students however seemed to be accessing these computers more often without teachers' knowledge, a clear indication of absence of coordination on ICT use in secondary schools. Policy on access to computer laboratories in secondary schools by students doing computer studies in this district was not clear as shown by the different responses by head teachers (mean score 2.17), geography teachers (mean score 1.97) and geography students (mean score 0.25).This scenario showed that to a large extent other students who did not do computer studies got access to the computer laboratories without teachers supervision and that they had the zeal to use the available computers. Regarding this finding, it was therefore construed that if proper policy were put in place in these schools, geography students could benefit from ICT use due to the opportunities they had to access the computer laboratories in their schools. However, all groups of respondents agreed that not all teachers and students accessed the computers for teaching purposes as indicated by the low mean scores obtained from their responses (head teachers, 1.82, geography teachers, 1.77 and geography students,1.57).There was inadequate use of television in teaching and learning geography indicated by the head teachers' mean score of 2.41.Geography teachers and students mean scores on the same statement were even lower (1.02 and 1.17 respective). Similarly, policy on use of radio was minimal as the study revealed that use of radio in teaching and learning geography was still not adequately attainable. This implies that despite the availability of televisions and

radios in some secondary schools as indicated in table 16, no adequate policies are in place regarding their use in teaching and learning geography. Policies on ICT integration in geography lessons, geography teachers being allowed to use electronic resources for teaching and learning given opportunities and need to avail ICT policies in secondary schools were minimal as indicated by low mean from all the respondents. The study also revealed that there was little encouragement regarding ICT integration in teaching and learning in secondary schools in the district. This was shown by low mean scores obtained from all respondents (Head teachers 1.01, geography teachers 2.07 and geography students 1.44).Besides very minimal use of internet for teaching and learning purposes, there was also minimal plan on how available ICTs were used for teaching and learning purposes in secondary schools in this sub-County as shown by the low mean scores from the respondents. This paints a grim picture on utilization of the available ICTs in secondary schools in this Sub County. School administrators need to reconcile these policies to synchronize teachers and students activities in the classroom regarding utilization of ICT.

This study revealed that policies in secondary schools in Rachuonyo South Sub County were inadequate and therefore could not support ICT integration in teaching and learning geography. This finding corroborates a revelation from a survey by UNSECO (2008) that high schools in Cambodia and Bangladesh lacked enough resources to implement their ICT policies. Similarly, Adomi (2010) disclosed that problems of poor policies and project implementation hampered the use of ICTs in secondary schools in Nigeria. However, UNESCO (2008) reported that ICT policies with regards to its usage in teaching and learning were established in countries such as Australia, South Korea and Singapore. The report above indicated that these countries

had laid down policies in education with effective plans to implement them and budget provision for effective implementation.

From the open ended questions, it was established from the head teachers' responses that there existed some policies in secondary school because 22.22% of them indicated that there were ICT policies while a total of 77.77% of them indicated that they lacked ICT policies in their schools. Head teacher numbers 6, 12 and 52 disclosed that these policies were dominantly for administrative purposes and production of exams. Policies on use of television were purely for staff entertainment while only 9.52% of head teachers indicated that they occasionally allowed students to access them for entertainment purposes.

Regarding how lack of ICT policies affected teaching and learning, 66.66% of the head teachers were of the opinion that they were important but inadequate ICT facilities hindered the development of these policies in their schools. This implied that students were missing a great deal of opportunities offered by the rich learning environment which is provided by ICT integration in the classrooms. However head teacher number 12 and 47 insinuated that traditional chalk and talk method of instruction was still effective in meeting lesson objectives.

From the interview with the Sub County Quality Assurance and Standards Officer whose views were sought regarding availability of ICT policies in secondary schools, it was revealed that there were no proper guidelines on utilization of ICTs in teaching and learning. The officer reiterated that there were encouragements by the ministry of education regarding ICT use in teaching and learning but very little emphasis on

actual practice due to challenges such as inadequate ICT infrastructures. This situation means that shift towards technology enhanced learning was still unattainable and traditional chalk-talk still prevailed in many secondary schools. The officer further emphasized that since there is national ICT policy which has direct bearing on teaching and learning in schools, there is therefore need for the ministry of education to institute follow-up mechanisms to ensure that secondary schools formulate ICT policies to enhance ICT integration in teaching and learning. This may be done through emphasis and proper funding towards ICT infrastructural development in schools to enhance ICT policy establishment in schools.

Findings from this study revealed the grim situation regarding ICT policies in the secondary schools despite establishment of national ICT policies which aimed at reforming education. This study established that very little is taking place in secondary schools in terms of establishment of favourable policies for ICT integration in teaching and learning. It is therefore necessary for school managers to establish ICT policies which would enable teachers and learners to use them in the classroom. The government too need to make follow up mechanisms to ensure that ICT policies exist in schools to enhance ICT integration in teaching and learning.

4.4 Availability of ICT Facilities and Infrastructure on ICT Integration in Teaching and Learning Geography Secondary Schools

This objective was to establish the availability of ICT facilities and infrastructure on ICT integration in teaching and learning geography. The findings are presented in table 10

Table 10: Head teachers', Teachers' and Students' Responses on Availability of ICT Facilities and Infrastructure in Secondary Schools

Mean Scores

	ICT facilities/Infrastructure	HT N=63	T N=63	S N=471
1	Desktop Computers	2.63	2.60	1.40
2	Radio	3.84	4.61	3.64
3	Internet connected computers	1.50	1.36	1.59
4	Lap Tops	1.87	1.86	1.48
5	Power	3.66	3.65	1.90
6	Power Cables	3.46	3.50	2.85
7	Overhead Projectors	1.14	1.41	2.02
8	Multimedia Presentation Rooms	1.06	1.06	1.84
9	Computer Laboratories	2.03	2.03	1.51
10	Television	2.84	3.76	3.38
	Overall Mean Scores	**2.44**	**2.59**	**2.39**

KEY: Head Teachers,   T-Teachers, S-Students

Regarding availability of ICT facilities in secondary schools in Rachuonyo South-Sub County, ICT facilities and infrastructure were inadequate as indicated by the responses from head teachers, teachers and students. The overall mean scores of all the respondents were 2.44, 2.59 and 2.39 respectively as shown in table 10.

This study however revealed that radios and televisions were dominant ICT tools in secondary schools in this sub-County. This was shown by the high mean scores obtained from the responses on this statement. A total of 77.77% of head teachers, 65.07% of geography teachers and 65.81% of geography students confirmed this

scenario regarding availability of radios. Similarly, a total of 57.14% of head teachers and 58.73% of geography teachers confirmed availability of televisions in secondary schools. This implies that these tools could be afforded by many schools in this Sub-County. Since these facilities existed in these schools, there is need for them to be integrated in teaching and learning.

A total of 65.07% of head teachers confirmed availability of power in their schools, 57.14% of teachers also confirmed this scenario. Source of power is an important ingredient in any move to integrate ICT in teaching and learning. The presence of power therefore means that this Sub-County was headed to the right direction in terms of ICT integration should enabling environment be availed in secondary schools. The study established that power cables were available due to the presence of power in a number of secondary schools as confirmed by a total of 66.66% of head teachers and 55.95% of geography teachers. However students did not know anything about the presence of power cables in school as 87.26% of them were undecided.

Facilities such as desktop computers, multimedia rooms and overhead projectors were extremely lacking in secondary schools in this Sub-County. This was shown by the responses from head teachers, geography teachers and geography students. A total of 98.41% of Lack of multimedia presentation rooms while only 1.58% of the head teachers responded positively to the statement as shown in table 10. Multimedia rooms are important in a school because they provide students with motivating experience out of normal classrooms. Geography lessons in secondary schools in this Sub County were taught in normal classrooms. A total of 93.65% of head teachers of the respondents indicated that overhead projectors were extremely lacking in

secondary schools in this Sub-County while only 1.58% of them responded that this tool was very much available in their schools. Although overhead projectors are expensive and may not be afforded by many schools, they are very important tools for delivery of contents to a large student's population especially in the current situation where schools grapple with under staffing.

The availability of computer laboratories in secondary schools in this Sub County was still not impressive as 80.94% of head teachers indicated that these facilities were lacking in their schools. A total of 94.4% of head teachers also indicated that internet connected computers were lacking. The cost of purchasing computers and internet service connections for teaching and learning could be forbidding for many secondary schools and this may have been the reason for non existence of this facility in many schools. This kind of situation showed that the opportunities offered by the internet for either obtaining geography educational resources or communication by students and teachers were denied. Muntaz (2000) states that many scholars proposed that lack of funds to obtain the necessary hardware and software is one of the reasons why teachers do not use technology in their classrooms. A survey done by Tinio (2002) on ICT use in public schools in Philippines indicated that many high schools had power connection services enough to enable ICT integration in classrooms generally. The current study however focused on availability of ICT facilities and infrastructures in secondary schools in Rachuonyo South Sub-County.

Curriculum planners and educators have realized that meaningful improvement and availability of teaching and learning resources have a positive impact on performance of students (Ellington, 1993) but in this Sub County, the absence of some of these

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resources in schools may have hampered effective adoption of ICT in teaching and learning of geography.

Although it was evident from the results that many schools in Rachuonyo South Sub-County had some ICT facilities which could be adopted in teaching and learning geography such as radios and televisions, it was clear that these facilities were inadequate. It was therefore construed that ICT integration could still not be effectively realized and abstract concepts and topics in geography could still be dismally performed by geography students. Similarly, Bakar and Samwel (2006) revealed that in the United Kingdom, integration of ICTs in teaching and learning in many secondary schools was still a problem due lack of sufficient infrastructures. On the contrary, Plante and Beattie (2004) revealed that Canadian secondary schools' availability of ICT infrastructure was at 72 % and that most schools use ICT in teaching and learning. However, this finding concurred with that by Okwidishu (2005) on use of ICT in learning in most Nigerian secondary schools. The author established that the absence of ICT equipments impeded its integration in teaching and learning in this county. However, Egbedokun and Sofowora (2010) established a contrary finding that 55% of teachers in secondary schools in Nigeria had access to ICT facilities.

The Head teachers whose schools had computers indicated that these ICT tools were rarely used by both teachers and learners. The study furthers established that the state of the few computer laboratories in these schools were appalling because they were not well equipped to enable ICT integration in teaching and learning of geography.

From the open ended questions, it was revealed that the dominant media of communication in secondary schools in this district were television and radio. The head teachers further explained that these were not used for teaching and learning geography. Some of the reasons put forward were that they regarded them as time consuming and this points to the fact that there was rush to complete the syllabus therefore most teachers felt that ICT would slow down their pace in this process. A part from time, many of the head teachers also gave other reasons such as poor state of the facilities as well as unwillingness of geography teachers to utilize them.

It was evident from the findings that emphasis on acquisition of ICT facilities and infrastructures was lacking in this Sub-County. From the interview with the DQASO, he emphasized that acquisition of ICT infrastructures and facilities was so slow and suggested that the government need to assist secondary school teachers in this endeavor. This finding was similar to a revelation by Bingimlas (2009) that lack of access to ICT infrastructure greatly influenced ICT integration in high school classrooms in Australia. For effective ICT integration in Secondary schools in Rachuonyo South Sub-County, provision of relevant ICT technologies is of great importance. Inadequate technological infrastructures could be a barrier to ICT integration in teaching and learning. Therefore school administrators need to invest on ICT Infrastructure and facilities to facilitate ICT integration in teaching and learning of geography. Secondary schools administrators need to invest on ICT Infrastructure and facilities to enable teaching and learning strategy to be effective in these schools. Basic requirements such as electricity, rooms and relevant ICT tools in the classrooms needs to be put in place to enable ICT integration program to have effect. Inadequate

technological infrastructures could be a barrier to ICT integration in teaching and learning geography in secondary schools in Rachuonyo South Sub-County.

This study revelation is important to education stake holder in understanding the dire situation regarding state of ICT facilities and infrastructures. This would make them make relevant move towards improving the situation in secondary schools.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of the Findings

Findings of the study are summarized per study objective as follows:

5.1.1 Frequency of ICT Use by Teachers and Students in Teaching and Learning Geography in Secondary Schools

The study established that frequency of ICT use in teaching and learning geography in secondary schools in Rachuonyo South-Sub County was very low. Utilization of ICTs in teaching and learning was therefore minimal in secondary schools in this Sub-County.

5.1.2 Teachers' and Students' ICT Competencies on Its Integration in Teaching and Learning Geography.

Following the observation made, generally geography teachers' ICT competencies were average while students' ICT competencies were low. Teachers had some ICT competencies in use of the internet although they still needed to improve on som skills which were deemed crucial in ICT integration in teaching the subject. Although ICT competencies of geography students were low, they also had some skills which only needed to be developed in order for them to effectively utilize ICTs in their lessons.

5.1.3 Teachers' and Students' Attitudes towards ICT use on ICT Integration in Teaching and Learning of Geography.

Findings from the study revealed that geography teachers and students had neutral attitudes on ICT use in teaching and learning geography respectively. For effective ICT integration in teaching and learning , positive attitudes still need to be nurtured among teachers and students to facilitate this process.

5.1.4 Availability of ICT Policies on ICT Integration in Teaching and Learning Geography in Secondary Schools.

Regarding availability of ICT policies in secondary schools, it was revealed that the ICT policies were inadequate. There was uncoordinated use of available ICTs in secondary schools that could not enhance ICT integration in teaching and learning geography.

5.1.5 Availability of ICT Facilities and Infrastructure on ICT Integration in Teaching and Learning of Geography.

Regarding the extent of availability of ICT facilities and infrastructure in secondary schools in Rachuonyo South Sub-County, this study established that they were inadequate an could not facilitate ICT integration in teaching and learning geography. This study however revealed that radios and televisions were dominant ICT tools in secondary schools in this Sub-County while desktop computers, multimedia rooms, overhead projectors, computer laboratories and internet connected computers were extremely lacking.

5.2 Conclusion

The study's conclusions are outlined as per the objectives as follows:

5.2.1 Frequency of ICT Use by Geography Teachers and Students in Secondary Schools

The study established that geography teachers and students did not use ICT in teaching and learning frequently. This depicted low ICT integration in teaching and learning in secondary schools in Rachuonyo South-Sub County.

5.2.2 Teachers' and Students' ICT competency on ICT Integration in Teaching and Learning Geography

Following the observation made, ICT competencies of teachers were average while students' ICT competencies were low. The study concluded that these competencies could not permit effective ICT integration in teaching and learning.

5.2.3 Teachers' and Students' Attitudes on ICT Integration in Teaching and Learning of Geography

Generally attitudes of geography teachers and student on ICT adoption in teaching and learning geography were neutral. The study concluded that neutral attitudes of both teachers and students on ICT integration in teaching and learning geography was not adequate for ICT integration in teaching and learning geography.

5.2.4 ICT Policies on Its Integration in Teaching and Learning Geography in Secondary Schools.

Generally, ICT policies were inadequate in all secondary schools in this Sub-County as most of teaching and learning activities in these schools were not supported by ICTs. Therefore ,the study concludes that effective ICT integration in teaching and learning could not take place in the absence of proper ICT policies.

5.2.5 Availability of ICT Facilities and Infrastructure in Secondary Schools

Regarding the extent of availability of ICT facilities in secondary schools in Rachuonyo South Sub-County, it was concluded that there were some ICT facilities and infrastructures in secondary schools in this Sub-County but they were inadequate and could not encourage effective ICT integration in teaching and learning geography.

5.3 Recommendations

The study recommends the following as per the research objectives:

Frequency of ICT use in teaching and learning geography

 i. There is need for various secondary school managers to avail ICT facilities to enhance regular use in teaching and learning geography.

Teachers and Students ICT competencies in ICT integration in teaching and learning geography

 i. Secondary schools should increase ICT skill levels of teachers and students to facilitate ICT integration in teaching and learning by embracing teachers' development through in –service training.

 ii. The school managers need to consider inclusion of computer studies as a compulsory subject in form one and two to facilitate skill acquisition in students.

Availability of ICT policies in secondary schools

 i. The government should institute follow up mechanisms to ensure that secondary schools invest in ICT infrastructural development to enhance ICT policy development in these schools to enhance ICT integration in teaching and learning geography

Availability of ICT Facilities and Infrastructure in Secondary Schools.

 i. Secondary schools' managers need to invest on ICT facilities and infrastructures to facilitate ICT integration in teaching and learning geography.

5.4 Suggestions for Further Research

Based on the limitations, findings and conclusions reached in this study, the following are suggestions for further research:

i. The study sought to find out how frequent teachers and learners use ICTs in their lessons. The researcher recommends a similar study to find out the effect of frequent use of ICT in teaching and learning on students' achievements.

ii. There is need for research to find out further, why geography students have low competency in ICT use in learning geography.

iii. The current study examined the attitudes of geography students and teachers on ICT use in teaching and learning. There is need for further research to find out why their attitudes are not positive towards ICT integration in teaching and learning.

iv. There is need for research to find out why secondary schools in this sub-County do not have ICT policies because the current study found out that policies were lacking to facilitate ICT integration in teaching and learning geography.

v. This study established that radios and televisions were dominant ICTs in secondary schools in this county. Therefore   need for further research to establish why they were not integrated in teaching and learning.

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APPENDICES

Appendix A: Head Teachers' Questionnaire

This questionnaire is designed to determine the factors affecting ICT integration in teaching and learning geography in secondary schools in Rachuonyo South Sub-County.

The responses shall be treated with deserved confidentiality and shall be used for the purpose of this study only. You are therefore requested NOT to write your name on the questionnaire

Below are statements about ICT policies in your school. This section consists of two parts and each statement has possible answers.

Kindly tick (√) where appropriate.

N/B: ICT in this questionnaire refers to use of Radio, Television, Computers CD, Audio and Video tapes and any relevant information and communication technology resources and tools used in teaching and learning geography

PART I: ICT POLICY

1. Does your school have ICT policy?

    YES ☐
    NO   ☐

2. If YES how does the ICT policies in your school support teaching and learning of geography?

If NO, give reasons

S/No	STATEMENT	SA	A	UD	D	SD
1	All teachers and students access compute rs for teaching and learning purposes					
2	There is an ICT club in school.					
3	Geography teachers integrate ICT in their lessons					
4	Geography teachers and students are allowed to use electronic resources for teaching and learning					
5	Teachers and students use internet in learning geography					
6	computer laboratory is accessed by only students doing computer studies					
7	Radio is used in teaching and learning geography					
8	Teachers coordinate use of electronics in learning geography in the school					
9	Only higher classes have access to computers in the school					
10	Television is used for teaching and learning geography in the school.					
11	ICT integration in teaching and learning is encouraged in the school					
12	There is no proper planning on use of computer laboratory by geography teachers and students					

13	Students can access electronic resources for learning purposes in the school					
14	ICTs use by teachers in the school is properly arranged					
15	Teachers are not given opportunity to integrate any ICT in geography lessons					

16. How are ICT policies in the school used?

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17. How does lack of ICT policies in your school affect ICT integration in teaching and learning geography?

PART II: AVAILABILITY OF ICT INFRASTRUCTURE AND FACILITIES IN SECONDARY SCHOOLS

Please indicate the extent to which ICT facilities and infrastructures are available in your school by putting a tick (√) in the corresponding column.

KEY: 5 =Very Much Available,**4**= Available **3**=Undecided, **2** = Lacking 1=Extremely Lacking

ICT Facilities/Infrastructure	Very much available	Available	Undecided	Lacking	Extremely lacking
Desk top Computers					
Radio					
Television					
Internet connected Computers					
Lap Tops					
Power					
Power cables					
Overhead Projector					
Multimedia presentation room					
Computer Laboratory					

19. How are the ICT facilities available used for teaching and learning geography?

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20. How did you acquire the available ICT in your school?

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21. Are the ICT in the school adequate for teaching and learning geography?

Appendix B: Geography Teachers' Questionnaire

This questionnaire is designed to determine the factors affecting ICT integration in teaching and learning geography in secondary schools inRachuonyo South Sub County.

The responses shall be treated with deserved confidentiality and shall be used for the purpose of this study only. You are therefore requested NOT to write your name on the questionnaire.

Below are statements about your Competency in ICT integration in teaching geography.

This section consists of five parts and each statement has possible answers. Kindly tick (√) where appropriate.

N/B: ICT used in this questionnaire refers to use of Radio, Television, and Computers CD. Audio and Video tapes and any relevant information and communication technology resources and tools used in teaching and learning geography

PART I: FREQUENCY OF ICT INTEGRATIONIN IN TEACHING GEOGRAPHY

1. Kindly indicate how often you use ICT in teaching by putting tick (√) in the space provided

Please respond to each statement by putting a tick (√) *in the space below.* **KEY: 5** =Every Lesson, Alternate Lessons=**4,**

Once a week=3, Occasionally=2, Not Used=1

How often do you use ICT to teach geography				
Every lesson	Alternate lessons	Once a week	Occasionally	Not Used

PART II: TEACHERS COMPETENCY IN ICT INTEGRATION IN TEACHING OF GEOGRAPHY

Please respond to each statement by putting a tick (√) in the corresponding column.
KEY: 5 =strongly agree, **4**= Agree **3**=Not sure, **2** = disagree, **1**=strongly disagree

S/NO	STATEMENT	SA	A	UD	D	SD
	Teachers' Competencies in Use of Internet to teach geography					
1	I can send geography materials through the internet					
2	I cannot discuss geography contents through the internet					
3	I can source for geography materials from the internet					
4	I can construct knowledge using resources from the internet.					
5	I program independent learning using the internet					
Teachers' Competencies in handling ICT Tools for teaching						
6	I am able to store my geography contents a computer					
7	I can use combined visual and audio media in geography lessons					
8	I can retrieve geography notes from a CD					
9	I can use projector in geography lessons					
10	I can use a computer to make geography notes					
Teachers' competencies in use of ICT software to teach geography						
11	I can utilize a geography educational software in my lessons					
12	I can use televised contents in geography lessons					
13	I can use videotaped contents in geography classes					
14	I am able to use radio broadcast contents in geography lessons					
15	I can asses performance using a computer					

16. Can your ICT competency level enable ICT use in teaching geography?

YES ☐

NO ☐

PART III: TEACHERS' ATTITUDES IN ICT INTEGRATION IN TEACHING OF GEOGRAPHY

Please respond to each statement by putting a tick (√) in the corresponding column.
KEY: 5 =strongly agree, **4**= Agree **3**=Not sure, **2** = disagree, **1**=strongly
Disagree

S/No	STATEMENT	SA	A	UD	D	SD
1	Use of ICT in learning is motivating to students					
2	I prefer using ICT in geography class					
3	ICT use in teaching geography can make students understand abstract concepts					
4	Classroom experience can be enhanced by use of ICT					
5	I wish I can get a chance to use ICT in geography lessons					
6	Geography contents can be clearer if ICT is used in class					
7	Use of computer engage students in class work					
8	I am not comfortable with the use of ICT in Geography lessons					
9	I get discourage by the thought of using ICT in geography classes					
10	Use of ICT in geography lessons advantage over being without it					
11	It does not any difference to me whether I use ICT in geography classes or not					
12	Use of ICT in geography lessons make better in the subject					

13	Use of ICT in geography lessons is relevant to student for future use					
14	I do not think ICT use in my geography classes can be effective					
15	I will do as little as possible with ICT in my geography classes					

PART IV: ICT POLICIES IN SECONDARY SCHOOLS

Please respond to each statement by putting a tick (√) in the corresponding column.
KEY: 5 =strongly agree, **4**= Agree **3**=Not sure, **2** = disagree, **1**=strongly disagree

S/ No	STATEMENT	SA	A	UD	D	SD
1	All teachers and students access computers for teaching and learning purposes					
2	There is an ICT club in school.					
3	Geography teachers integrate ICT in their lessons					
4	Geography teachers and students are allowed to use electronic resources for teaching and learning					
5	Teachers and students use internet in learning geography					
6	computer laboratory is accessed by only students doing computer studies					
7	Radio is used in teaching and learning geography					
8	Teachers coordinate use of electronics in learning geography in the school					
9	Only higher classes have access to computers in the school					
10	Television is used for teaching and learning geography in the school.					

11	ICT integration in teaching and learning is encouraged in the school					
12	There is no proper planning on use of computer laboratory by geography teachers and students					
13	Students can access electronic resources for learning purposes in the school					
14	ICTs use by teachers in the school is properly arranged					
15	Teachers are not given opportunity to integrate any ICT in geography lessons					

16. How does lack of ICT policies in the school affect ICT integration in teaching and learning geography?

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PART V: AVAILABILITY OF ICT FACILITIES AND INFRASTRUCTURES IN SECONDARY SCHOOLS

Please indicate the availability of ICT facilities and infrastructures in your school by putting a tick (√) in the corresponding column.

ICT Facilities/ Infrastructure	Very much available	Available	Undecided	Lacking	Extremely lacking
Desk top Computers					
Radio					
Television					
Internet connected Computers					
Lap Tops					
Power					
Power cables					
Overhead Projector					
Multimedia presentation room					
Computer Laboratory					

KEY: 5 =Very Much Available**, 4**= Available **3**=Undecided, **2** = Lacking

1=Extremely Lacking

Appendix C: Geography Students' Questionnaire

This questionnaire was to be completed by Form four geography students only.

This questionnaire is designed to determine the factors affecting ICT integration in teaching and learning geography in secondary schools in Rachuonyo South Sub-County.

The responses shall be treated with deserved confidentiality and shall be used for the purpose of this study only. You are therefore requested NOT to write your name on the questionnaire.

N/B: ICT used in this questionnaire means use of Radio, Television, and Computers and any relevant information and communication technology resource use in teaching and learning geography.

This section consists of five parts and each statement has possible answers.

Kindly tick (√) where appropriate.

PART I: FREQUENCY OF ICT USE IN LEARNING GEOGRAPHY

1. Kindly indicate how often you use ICT in teaching by putting tick (√) in the space provided

   Please respond to each statement by putting a tick (√) in the space below.

   KEY: 5 =Every Lesson, Alternate Lessons=4,

   Once a week=3, Occasionally=2, Not Used=1

How often do you use ICT to teach geography				
Every lesson	Alternate lessons	Once a week	Occasionally	Not Used

PART II: STUDENTS' ICT COMPETENCY IN ICT INTEGRATION IN LEARNING OF GEOGRAPHY

Below are statements about your Competency in ICT integration in learning geography.

(Each statement was to be responded to by putting a tick(√) in the corresponding columns)

KEY: 5 =Strongly agree 4, =Agree, 3=Not sure, 2= Disagree, 1= Strongly disagree'

S/NO	STATEMENT	SA	A	UD	D	SD
	Teachers' Competencies in Use of Internet to teach geography					
1	I can send geography materials through the internet					
2	I cannot discuss geography contents through the internet					
3	I can source for geography materials from the internet					
4	I can construct knowledge using resources from the internet.					
5	I program independent learning using the internet					
Teachers' Competencies in handling ICT Tools for teaching						
6	I am able to store my geography contents a computer					
7	I can use combined visual and audio media in geography lessons					
8	I can retrieve geography notes from a CD					
9	I can use projector in geography lessons					
10	I can use a computer to make geography notes					
Teachers' competencies in use of ICT software to teach geography						
11	I can utilize a geography educational software in my lessons					
12	I can use televised contents in geography lessons					
13	I can use videotaped contents in geography classes					

S/No	STATEMENT					
14	I am able to use radio broadcast contents in geography lessons					
15	I can asses performance using a computer					

PART III: STUDENTS' ATTITUDES ON ICT USE IN INTEGRATION IN LEARNING OF GEOGRAPHY

(Each statement was to be responded to by putting a tick(√) in the corresponding columns)

KEY: 5 =Strongly agree 4, =Agree, 3=Not sure, 2= Disagree, 1= Strongly disagree'

S/No	STATEMENT	SA	A	UD	D	SD
1	Use of ICT in learning is motivating to students					
2	I prefer using ICT in geography class					
3	ICT use in teaching geography can make students understand abstract concepts					
4	Classroom experience can be enhanced by use of ICT					
5	I wish I can get a chance to use ICT in geography lessons					
6	Geography contents can be clearer if ICT is used in class					
7	Use of computer engage students in class work					
8	I am not comfortable with the use of ICT in Geography lessons					
9	I get discourage by the thought of using ICT in geography classes					
10	Use of ICT in geography lessons advantage over being without it					
11	It does not any difference to me whether I use ICT in geography classes or not					
12	Use of ICT in geography lessons make better in the subject					

13	Use of ICT in geography lessons is relevant to student for future use					
14	I do not think ICT use in my geography classes can be effective					
15	I will do as little as possible with ICT in my geography classes					

PART IV:ICT POLICIES IN SECONDARY SCHOOLS

Please respond to each statement by putting a tick (√) in the corresponding column.

KEY: 5 =strongly agree, 4= Agree 3=Undecided, 2 = disagree, 1=strongly

Disagree

S/No	STATEMENT	SA	A	UD	D	SD
1	All teachers and students access compute is for teaching and learning purposes					
2	There is an ICT club in school.					
3	Geography teachers integrate ICT in their lessons					
4	Geography teachers and students are allowed to use electronic resources for teaching and learning					
5	Teachers and students use internet in learning geography					
6	computer laboratory is accessed by only students doing computer studies					
7	Radio is used in teaching and learning geography					
8	Teachers coordinate use of electronics in learning geography in the school					

9	Only higher classes have access to computers in the school					
10	Television is used for teaching and learning geography in the school.					
11	ICT integration in teaching and learning is encouraged in the school					
12	There is no proper planning on use of computer laboratory by geography teachers and students					
13	Students can access electronic resources for learning purposes in the school					
14	ICTs use by teachers in the school is properly arranged					
15	Teachers are not given opportunity to integrate any ICT in geography lessons					

PART V: AVAILABILITY OF ICT FACILITIES AND INFRASTRUCTURE IN SECONDARY SCHOOLS

Please indicate the extent to which ICT facilities and infrastructures are available in your school by putting a tick (√) in the corresponding column.

KEY: 5 =Very Much Available,4= Available 3=Undecided, 2 = Lacking 1=Extremely Lacking

ICT Facilities/Infrastructure	Very much available	Available	Undecided	Lacking	Extremely lacking
Desk top Computers					
Radio					
Television					
Internet connected Computers					
Lap Tops					
Power					
Power cables					
Overhead Projector					
Multimedia presentation room					
Computer Laboratory					

Appendix D: District Quality and Standards Officer's Interview Guide

PART I: TEACHERS COMPETENCY IN ICT INTEGRATION IN TEACHING GEOGRAPHY

1. Are geography teachers in secondary schools in this sub-County capable of using ICT in teaching?

2. What ICT competency needs should be addressed?

PART II:POLICIES IN SECONDARY SCHOOLS
1. Do secondary schools in this Sub-County have ICT policies?

2. How are the ICT policies in secondary schools used in teaching and learning

PART III:AVAILABILITY OF ICT FACILITIES AND INFRASTRUCTURE
1. Do Secondary schools in the Sub-County have ICTs infrastructure?
2. Which ICTs facilities and infrastructure are available in Secondary schools in the Sub-County?
3. Would you consider the infrastructure in the Sub-County adequate for ICT use in teaching and learning of geography?
4. How can secondary schools be assisted regarding acquisition of ICT facilities and infrastructure

Appendix E: Document Analysis Guide

1. What are the mean scores of Form 4 geography students in KCSE from 2005 to 2009?

Appendix F: Teachers' and Students' Competencies in Use of ICT in Teaching and Learning Geography

I: Teachers' and Students' Competencies in use of Internet for Teaching and Learning Geography

	Statement		SA	A	UD	D	SD	Mean Score
					Percentages			
1	I can send geography materials through the internet	T	30.15	22.22	19.04	14.28	14.28	**3.39**
		S	30.14	17.48	9.76	4.88	37.79	**1.46**
2	I cannot discuss geography contents through the internet	T	33.33	23.80	23.80	3.17	11.11	**3.60**
		S	29.29	30.36	24.20	6.58	9.55	**3.43**
3	I can source for geography materials from the internet	T	30.15	26.98	25.39	6.34	11.11	**3.58**
		S	15.49	8.91	14.43	30.14	31.49	**1.70**
4	I program independent learning using the internet	T	9.52	11.11	31.74	23.80	23.80	**2.58**
		S	0.42	1.06	36.09	8.06	54.56	**1.84**
5	I program independent learning using the internet	T	3.17	4.76	4.76	22.22	65.07	**1.58**
		S	0.21	0.42	0.84	45.43	53.07	**1.49**
	Teachers' overall mean score							**2.94**
	Students' overall mean score							**1.77**

II: Teachers' and Students' Competency in Handling ICT Tools for Teaching and Learning Geography

	Statement		SA	A	UD	D	SD	Mean Score
1	I am able to store my geography contents a computer	T	14.28	9.52	11.11	33.33	31.74	**2.12**
		S	0.84	2.12	31.63	26.53	38.85	**1.99**
2	I can use combined visual and audio media in geography lessons	T	19.04	28.57	28.57	11.11	12.69	**3.30**
		S	39.27	25.26	29.29	4.24	1.91	**4.03**
3	I can retrieve geography notes from a CD	T	17.40	14.28	22.22	31.74	14.28	**2.88**
		S	9.92	6.96	25.90	38.00	19.32	**2.50**
4	I can use projector in	T	36.50	26.98	17.46	7.93	11.11	**3.65**

			SA	A	UD	D	SD	Mean Score
	geography lessons	S	28.02	42.46	28.02	0.63	0.84	**2.03**
5	I can use a computer to make geography notes	T	7.93	4.76	31.74	7.93	49.20	**2.17**
		S	0.42	1.06	36.09	8.23	53.50	**1.84**
	Teachers' overall mean score							**2.92**
	Students' overall mean score							**2.47**

Key: T-Teachers(N=63)   S -Students (N=471)

III: Geography Teachers' and Students' Competency in Use of ICT Soft ware in Teaching and Learning Geography

			Percentages (%)					
	Statement		**SA**	**A**	**UD**	**D**	**SD**	**Mean Score**
1	I can utilize geography educational software in my lessons	T	0	0	0	47.62	52.38	**1.47**
		S	0	0	64.11	16.77	19.10	**2.64**
2	I can use televised contents in geography lessons	T	30.15	30.15	12.69	11.11	15.87	**2.52**
		S	2.54	13.16	30.36	23.35	32.57	**2.33**
3	I can use videotaped contents in geography classes	T	14.28	15.87	17.46	22.22	30.15	**2.61**
		S	22.29	38.42	24.41	6.15	8.70	**2.48**
4	I am able to use radio broadcast contents in geography lessons	T	7.93	11.11	31.74	23.80	25.39	**3.74**
		S	33.12	26.96	22.50	15.71	1.69	**2.59**
5	I can asses performance using a computer	T	1.58	3.17	28.57	11.11	55.55	**1.84**
		S	2.12	2.33	12.95	37.15	45.43	**1.78**
	Teachers' overall mean score							**2.43**
	Students' overall mean score							**2.46**

KEY T -Teachers (n=63) S- Students (N=471)

Appendix G: Teachers' and Students' Attitudes on ICT Integration in Teaching Geography

Percentages

KEY T-Teachers (n=63) S-Students (n=471)

	Statements	SA	A	UD	D	SD	Mean score
1	Use of ICT in learning is motivating to students	23.14	21.23	17.40	21.01	17.19	**3.12**
2	I prefer using ICT in geography class	1.40	2.90	45.22	27.81	22.50	**2.33**
3	ICT use in learning geography can make students understand abstract concepts	40.55	22.29	24.20	9.55	3.39	**2.97**
4	Classroom experience can be enhanced by use of ICT	18.47	6.79	23.17	24.84	26.11	**2.66**
5	I wish I can get a chance to use ICT in geography lessons	34.39	38.51	18.89	10.40	5.05	**3.79**
6	Geography contents can be clearer if ICT is used in class	30.36	21.23	16.13	11.67	20.39	**3.29**
7	Use computer engage students in class work	46.07	25.26	4.88	11.88	11.88	**3.81**
8	I am not comfortable with the use of ICT in geography lessons	30.99	39.70	6.34	4.88	8.06	**2.19**
9	I get discouraged by the thought of using ICT in geography classes	2.33	4.03	24.89	27.81	40.97	**1.90**
10	Use of ICT in geography has advantage over being without it	27.81	38.42	17.83	14.01	1.91	**3.37**
11	It does not make any difference to me whether I use ICT in my geography classes or not	44.58	21.80	15.92	7.21	11.46	**2.20**
12	Use of ICT in geography lessons make my work better	35.45	25.69	14.22	20.22	4.42	**3.80**
13	Use of ICT in geography lessons is relevant to students for future use	46.70	29.43	13.16	2.54	7.14	**4.05**
14	I do not think ICT use in my geography classes can be effective	48.82	30.36	20.80	3.18	1.79	**1.96**
15	I will do as little as possible with ICT in my geography classes	47.77	38.42	6.15	3.60	2.33	**1.72**
	Overall mean						**2.89**

Appendix H: Head Teachers', Teachers' and Students' Responses on Availability of Policies in Secondary Schools

Head Teachers', Geography Teachers' and Students' Responses on Availability of ICT Policies in Secondary Schools

No.	Statement	Mean scores		
		HT (n=63)	T (n=63)	S (n=471)
1.	All teachers and students access computers for teaching and learning purposes	1.82	1.77	1.57
2.	There is an ICT club in school.	1.61	1.47	1.08
3.	Geography teachers integrate ICT in their lessons	1.92	1.58	1.90
4.	Geography teachers and students are allowed to use electronic resources for teaching and learning.	1.39	1.25	1.95
5.	Teachers and students use internet in learning geography	0.57	0.66	0.54
6.	computer laboratory is accessed by only students doing computer studies	2.17	1.97	0.25
7.	Radio is used in teaching and learning geography	2.60	1.72	1.50
8.	Teachers coordinate use of electronics tools in learning geography in the school	1.87	3.93	2.18
9.	Only higher classes have access to computers in the school	2.77	3.15	1.89
10.	Television is used for teaching and learning geography in the school.	2.41	1.02	1.17
11.	ICT integration in teaching and learning is encouraged in the school	1.01	2.07	1.44
12.	There is no proper planning on use of computer laboratory by geography teachers and students	2.51	1.36	1.92
13.	Students can access electronic resources for learning purposes in the school	1.89	2.84	1.76

14.	ICTs use by teachers in the school is properly arranged	1.12	1.93	0.63
15.	Teachers are not given opportunity to integrate any ICT in geography lessons	3.41	2. 87	2.41
	Overall mean response by Head teachers			**2.08**
	Overall mean response by Geography teachers			**1.84**
	Overall mean response by geography Students			**1.89**

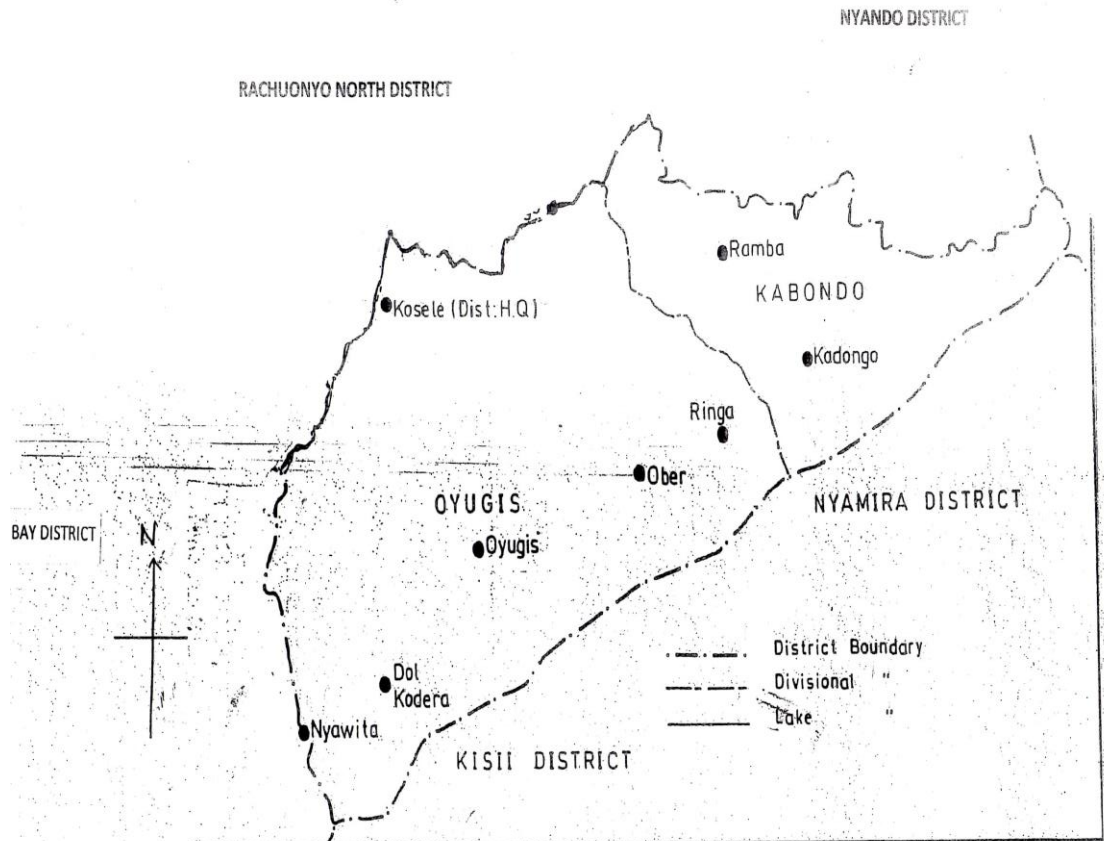**KEY: HT-Head Teachers T**- Teachers S - Students

Appendix I: Head Teachers', Teachers and Students' Responses on Availability of ICT Facilities and Infrastructures in Secondary Schools

ICT facilities/Infrastructure		Percentages (%)					Means Score
		VMA	A	UD	L	EL	
Desktop Computers	HT	17.4	12.69	17.46	20.63	31.74	**2.63**
	T	17.4	12.69	17.46	23.08	30.54	**2.60**
	S	0	0.42	1.69	42.46	49.04	**1.40**
Radio	HT	66.66	11.11	0	1.58	0	**3.84**
	T	65.07	31.74	3.17	0	0	**4.61**
	S	65.81	4.24	4.45	2.33	0	**3.64**
Internet connected computers	HT	0	0	1.58	47.61	50.79	**1.50**
	T	0	0	0	36.50	63.49	**1.36**
	S	0	0	0	59.23	40.76	**1.59**
Lap Tops	HT	1.58	11.11	0	47.61	50.79	**1.87**
	T	7.94	4.76	3.17	33.71	50.79	**1.86**
	S	1.69	4.03	4.24	33.71	67.51	**1.48**
Power	HT	57.14	7.93	0	14.28	36.68	**3.66**
	T	57.14	6.34	0	17.46	19.04	**3.65**
	S	12.73	8.49	0.43	12.95	65.39	**1.90**
Power Cables	HT	57.14	9.52	0	0	43.65	**3.46**
	T	49.61	6.34	14.28	20.63	3.17	**3.50**
	S	0	0	87.26	10.61	2.12	**2.85**
Overhead Projectors	HT	1.58	1.58	0	3.17	94.54	**1.14**
	T	0	0	0	41.26	58.73	**1.41**
	S	0	0	35.03	33.33	31.21	**2.02**
Multimedia Presentation Rooms	HT	1.58	0	0	0	98.41	**1.06**
	T	1.58	0	0	0	98.41	**1.06**
	S	0	0	0	84.92	15.07	**1.84**
Computer Laboratories	HT	14.28	4.76	0	31.74	49.20	**2.03**
	T	14.28	4.76	23.35	31.74	33.33	
	S	2,12	1.91	6.79	23.35	65,81	**1.51**
Television	HT	57.14	3.17	4.76	31.74	26.98	**2.84**
	T	58.73	6.34	1.58	19.04	14.28	**3.76**
	S	45.01	2.54	16.98	16.56	18.89	**3.38**
Overall Mean scores	HT	**2.44**					
	T	**2.59**					
	S	**2.39**					

KEY: HT- Head teachers (N=63), T= Teachers (N=63), S- Students (N=471

Appendix J: Rachuonyo South Sub-County Map

RACHUONYO SOUTH DISTRICT
ADMINISTRATION BOUNDARIES

NYANDO DISTRICT

RACHUONYO NORTH DISTRICT

●Ramba

KABONDO

●Kosele (Dist:H.Q)

●Kadongo

Ringa
●

●Ober

OYUGIS

NYAMIRA DISTRICT

BAY DISTRICT

N

●Oyugis

Dol
●Kodera

District Boundary
Divisional   "
Lake   "

●Nyawita

KISII DISTRICT

Appendix K: Provisional Research Authorization Letter

MASENO UNIVERSITY
DEPARTMENT OF EDUCATIONAL COMMUNICATION, TECHNOLOGY &
CURRICULUM STUDIES

Tel: 254-057-351622/351008/351011   Private Bag
Ext: 3381   **MASENO**
Fax: 254-057-351221

Ref: PG/MED/035/2008   **Date:** April 11, 2011

TO WHOM IT MAY CONCERN

This is to confirm that **ANYANGO FLORENCE MITA**, Reg. No. **PG/MED/035/2008**
is a bonafide Master of Education student in this department. Her research topic is
"Factors Influencing Information and Communication in Teaching and Learning of
Geography in Secondary Schools in Rachuonyo District, Kenya:"

Any assistance given to her in the course of her research will be appreciated.

Thank you.

DEPARTMENT OF EDUCATION
COMMUNICATION & TECHNOLOGY
MASENO UNIVERSITY

Prof. F.C.Indoshi
CHAIRMAN OF DEPARTMENT

Appendix L: Research Permission Letter

MINISTRY OF EDUCATION, SCIENCE & TECHNOLOGY
State Department of Education

E-mail: rachuonyosoutheduc.office@gmail.com
Telephone 05931267

when replying please quote

REF: RACH/S/G/77/VOL. III/62

SUB COUNTY EDUCATION OFFICE,
RACHUONYO SOUTH SUB COUNTY
P.O. Box 178,
OYUGIS

15/4/2011

TO WHOM IT MAY CONCERN

RE: ANYANGO FLORENCE MITA, Reg. No. PG/MED/035/2008
With reference to Maseno University letter No. PG/MED/035/2008 dated April11,
2011. May I inform you that the student Anyango Florence Mita, Reg. No.
PG/MED/035/2008 has been authorised to conduct research on "Factors Influencing
Information and Communication in Teaching and Learning of Geography in Secondary
Schools in Rachuonyo District, Kenya".

Any assistance will be appreciated.

M. A. MIRUKA,
For: SUB-COUNTY DIRECTOR OF EDUCATION,
RACHUONYO SOUTH SUB- COUNTY.