

**FACTORS INFLUENCING INTEGRATION OF INFORMATION AND
COMMUNICATION TECHNOLOGY IN TEACHING AND LEARNING: THE
CASE OF SELECTED SECONDARY SCHOOLS IN LAMU WEST SUB-
COUNTY, KENYA**

BY

PRISCILLA WAMBUI MUTIE

**A RESEARCH PROJECT REPORT SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTERS IN
DISTANCE EDUCATION OF THE UNIVERSITY OF NAIROBI**

2016

DECLARATION

This project report is my own original work and has not been presented for award of a degree in any other university for examination.

Sign.....

Date

Priscilla Wambui Mutie

L45/61321/2011

This research project report has been submitted for examination with my approval as university supervisor.

Sign.....

Date

Mr. Augustine Mwangi

Lecturer,

Department of Distance Studies,

University of Nairobi.

DEDICATION

This work is dedicated to my late husband Mr. Daido S.T Kirori for having supported me during my first degree. To my loving children Eric, Bonaya, and Mercy for their support and encouragement. May they reach greater academic heights than this.

ACKNOWLEDGEMENT

This Research study would have turned to be a mere dream, had it not been for the support and contribution of following people: My supervisor Mr. Augustine Mwangi, through his persistent and unswerving guidance, I have managed to complete the research project successfully, my sincere gratitude for his constant advice and constructive criticism. To all the teaching and non-teaching staff of the department of distance studies especially Chairperson Dr. Ann Nderitu, Dr. Naomi and Dr. Juliana Munialo. I appreciate the kind assistance I received.

I am indebted to the Ministry of Education, Lamu County for allowing me to collect data in the schools, our member of parliament and the C.D.F Lamu West for their support and the manager Mr. Chege for allowing me time to write this paper. I am also indebted to the principals, teachers, and students of Mpeketoni Secondary, Mkunumbi Secondary, Hongwe Secondary and Lamu Girls for providing the data for this research. I am grateful to my father Mr. Joseph Mbondo for his love for education, my mother Mrs. Beatrice Mutie for her encouragement, my siblings sister Lucie Muthoni, brothers Boniface and Pius for their unending support. I am also grateful to Mpeketoni Education Officer, Mr. Karaya, Pastor and my church members of A.I.C Mpeketoni for their prayers and encouragement.

Lots of gratitude goes to Mr. Samuel Muiruri for his endless support, may Jehova God pay you according to his riches. I am thankful to Mr. Munyua for proof reading my work, my M.D.E colleagues for their encouragement and moral support especially Njuguna, Ken, Winnie, and Mulatya, I cannot exhaust the list of all the persons that gave support, but I wish them God's favour.

TABLE OF CONTENTS

Declaration	ii
Dedication	iii
Acknowledgement	iv
Table of contents.....	v
List of tables.....	viii
List of figures	ix
List of Acronyms and Abbreviation	x
Abstract.....	xi
CHAPTER ONE: INTRODUCTION	1
1.1 Background of the Study	1
1.2 Statement of the Problem.....	6
1.3 Purpose of the Study	7
1.4 Objectives of the Study.....	8
1.5 Research Questions	8
1.6 Significance of the Study	9
1.7 Delimitation	9
1.8 Limitations of the Study.....	10
1.9 Assumptions of the Study	10
1.10 Definition of Significant Terms used in the study	10
1.11 Organization of the Study	11
CHAPTER TWO: LITERATURE REVIEW	13
2.1. Introduction.....	13
2.2 Integration of ICT in Teaching and Learning	13
2.3 ICT Infrastructure on ICT integration.....	16
2.4 Subject Content/ materials on ICT integration	17
2.5 Level of ICT Training in the teaching staff on ICT integration	20
2.6 Attitude of Teachers on ICT Integration.....	22
2.7 Theoretical Framework.....	24
2.8 Summary of Literature Review.....	25
2.9 Conceptual Framework.....	26

CHAPTER THREE: RESEARCH METHODOLOGY	28
3.1 Introduction.....	28
3.2 Research Design.....	28
3.3 Target Population.....	28
3.4 Sample Size and Sampling Procedures.....	29
3.5 Research Instruments	30
3.6 Instrument Validity	30
3.7 Instrument Reliability	31
3.8 Procedure for Data Collections.....	31
3.9 Data Analysis Techniques.....	32
3.10 Ethical Issues	32
CHAPTER FOUR: DATA ANALYSIS, PRESENTATION AND INTERPRETATION	34
4.1 Introduction.....	34
4.2 Questionnaires Return Rate	34
4.3 Demographic characteristics of respondents	35
4.3.1 Gender of the respondents.....	35
4.3.2 Age of respondents.....	36
4.3.3 Respondent’s Academic Qualifications.....	37
4.3.4 Length of service.....	38
4.3.5 School Category	39
4.4. Infrastructure availability.....	39
4.4.1 Availability of School Email address.....	39
4.4.2 Maintaining ICT equipment in the school.....	40
4.4.3 Utilizing the ICT facilities in the school	41
4.4.4 ICT infrastructural capacity	41
4.4.5 Availability of ICT infrastructure in school.....	43
4.4.6 Access to ICT infrastructure	43
4.5 Subject Content.....	44
4.6 Level of ICT Training.....	47
4.6.1 Received Any Form of ICT Training.....	47

4.6.2 Factors that influence the level of teachers ICT knowledge and skills	47
4.6.3 Enough ICT competent teachers	49
4.6.4 Lack of trained enough ICT skilled teachers	49
4.7 Attitudes of teachers	50
4.7.1 Attitude towards ttechnology	50
4.7.2 ICT Usage in Class all the Time	50
4.7.3 Students like using computer	52
CHAPTER FIVE: SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS	53
5.1 Introduction.....	53
5.2 Summary of Findings.....	53
5.3 Discussion of Findings.....	55
5.3.1 Integration of ICT in Teaching and Learning	55
5.3.2 Infrastructure and Integration of ICT in Teaching and Learning.....	57
5.3.3 Subject Content and Integration of ICT in Teaching and Learning	58
5.3.4 Level of ICT Training and Integration of ICT in Teaching and Learning.....	58
5.3.5 Attitude of Teachers and Integration of ICT in Teaching and Learning.....	60
5.4 Conclusion of the study	61
5.5 Recommendations.....	62
5.6 Suggestions for Further Research	62
REFERENCES.....	63
APPENDICES	73
Appendix I: Letter of introduction to respondents.....	73
Appendix II: Questionnaire for the principal and the teacher.....	74
Appendix III: Questionnaire for students	79
Appendix IV Table for determining sample size for a given population	81
Appendix V: Lamu West secondary schools enrolment and staff establishment june 2015	82

LIST OF TABLES

Table	Page
Table 3.1 Target Population.....	29
Table 3:2 Sample Size	30
Table 3.3 Operationarization of Variables.....	33
Table 4.1: Questionnaire return rate	34
Table 4.2: Gender of the respondents	35
Table 4.3: Age of students	36
Table 4.4: Age of principals and teachers.....	36
Table 4.5: Respondent’s Academic Qualifications.....	37
Table 4.6: Length of service	38
Table 4.7: School Category.....	39
Table 4.8: Availability of School Email address	40
Table 4.9: Maintaining ICT equipment in the school.....	40
Table 4.10: Underutilizing the ICT facilities in the school	41
Table 4.11: ICT infrastructural capacity.....	42
Table 4.12: Availability of ICT infrastructure in school	43
Table 4.13: Access to ICT infrastructure.....	44
Table 4.14: Subject Content.....	44
Table 4.15: Principals and teachers rating on Subject ICT integration	45
Table 4.16: Students rating on ICT integration in subjects	46
Table 4.17: Received Any Form of ICT Training	47
Table 4.18: Factors that influence the level of teachers ICT knowledge and skills	48
Table 4.19: Enough ICT competent teachers.....	49
Table 4.20: Lack of trained enough ICT skilled teachers.....	49
Table 4.21: Attitude of teachers towards technology	50
Table 4.22: Usage of ICT in Class all the Time	51
Table 4.23: Students like using computer.....	52

LIST OF FIGURES

Figure 1: Conceptual Framework	26
--------------------------------------	----

LIST OF ACRONYMS AND ABBREVIATION

CBIS	Computer Based Instruction Simulation
CDE	County Director of Education
CEMESTE	Centre for Mathematics Science and Technology Education in Africa
EFA	Education for All
EMAIL	Electronic Learning
EU	European Union
FSE	Free See Education
ICESCR	International Convenience on Environment, Social and Cultural Rights
ICT	Information Communication Technology
IEC	International Electrotechnical Commission
IT	Information Technology
MDE	Masters in Distance Education
MOE	Ministry of Education
NEPAD	New Partnership for Africa's Development
SAL	Arid and Semi Arid Land
SSA	Sub Saharan Africa
UNESCO	United Nations Educational Scientific and Cultural Organization
UNHD	United Nations Human Development

ABSTRACT

New technologies have changed the nature in which things are done at education systems in the world today. This study investigated factors influencing the use of ICT in teaching and learning in our secondary schools in Kenya. The objectives of the survey were to determine the impact of ICT infrastructure, Subject Contents availability, level of ICT training and attitude of teachers on ICT as a factor affecting integration of ICT in the processes of teaching and learning in secondary schools in Lamu west Sub County. The target population was 5249 respondents from 18 high schools in Lamu West who consist of 18 school principals, 190 teachers and 5041 students in Lamu West. The study utilized primary data .Three sets of questionnaires were used to collect data from three levels of key education stake holders. These are teachers, head teachers, and students. Data analysis and presentation was done using SPSS. About half of the schools visited maintained the ICT equipment well where else about a quarter did not show any concern about the ICT equipment. Over 80% of the schools underutilized the ICT facility while 20% felt that ICT services were maximally used. All the school respondents felt that there were small computers, lack of internal connectivity and irregular power supply. From the questionnaires and interviews conducted it came out apparently that lack of finances to train the teachers on ICT programmes and lack of enough time due to tight work and study schedules affected integration of teaching and learning to a great extent. The study revealed that 67% of the teacher's respondents had fear of technology while 33% didn't. The researcher asked the respondents if the researched schools had available email addresses and the findings of the study showed that 100% of the schools investigated had them. On the maintenance of the ICT equipment, the results of the survey reviewed that about half of all the schools with ICT equipment was well maintained whereas 20% of the schools did not show concern for the welfare of the equipment. According to the outcomes of the research, the researcher found out that 65% of the respondents who were supposed to be the key players in implementing use of ICT in teaching and learning had not received any form of ICT training. Only a meager 35% had received ICT training. This shows that for ICT integration to be effective, this one bit has to be dwelt with by focusing more on growing the skills of those who are involved in implementing it that is, the teachers and the students. The findings of this study, therefore, show that lack of proper mechanisms of equipping the teachers with skills to handle ICT has contributed to the state of ICT integration in our classrooms. The study, therefore, recommends that educators and students should be thoroughly trained on how to use ICT equipments to avoid guess work or recklessness. The policy makers should use the findings of this study to formulate teacher training programmes in teachers training colleges and during in-service education and trainings (INSET). Finally, the government should offer standard measure across all schools on the requirements for the set up of ICT equipment along with the training, contents to be used.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Information Communication and Technologies (ICTs) offer a window of prospects for academic establishments and alternative organizations to harness and use technology to enrich and support the teaching and learning method. E-learning is an example of the utilization such ICT-supported teaching and learning strategies whose use in academic establishments is gaining momentum with the passage of time (Omwenga, 2004). Educational systems all over the world are beneath increasing pressure to use the new data and communication technologies (ICT) to show students the information and skills they have within the twenty first century. In the past decade, the new ICT tools have radically modified the means individuals communicate and do business. They as well, have the potential to rework the overall nature of education: the location where learning takes place as well as when it takes place, and also the roles of learners and teachers within the learning process.

ICT is a technology that has changed the way things are done all over the world since its inception in the mid 20th century. The world has become one big village where one can tell what is happening in any given part of the world within a fraction of a minute and thus the important term “Global village” commonly used. (Gilbert, 2000 and Twigg, 2001) ICTS will change teaching and learning profoundly (William, Massy, and Zemsky, 2010) compare the introduction of technology in teaching and learning to the influence of the printing press.

All over the world education is viewed as playing a significant role in both social and economic development. Sharma, (2007) says instruction is a powerful weapon to battle out lack of awareness, neediness, and infections. To accomplish common objectives of education, the arrangement of value training and preparing is imperative. This will prompt an extensive variety of advantages. All inclusive the USA took the principal activity to consolidate data innovation (ICT) into its standard issues, for instance, in education, health, and government among others (Barnes, 2006). Most of the training programmes include general objectives that focus on developing awareness, knowledge, and skills in either the use of computers or the integration of computers into teaching and learning (IPS, 2003). In a study done in Canada in 2004, almost all principals reported that their schools utilized desktop PCs or tablets for instructive purposes, for example, exercises coordinated towards lesson readiness, execution or assessment amid the 2003/04 academic year. Under 1% of the secondary and elementary schools in in Canada were without computers.

Many governments in Africa have tried to put emphasis in training since independence. This has made numerous authorities to build their spending allocations in training (UNESCO, 2008). The move is propelled by the fact that training is the foundation of commercial development and advancement. Aside from extending distribution to instruction, governments have been transforming their practice framework, particularly in developing nations. Education reform endeavors in less industrialized countries have focussed on making exercise a powerful apparatus for national advancement (Abagi and Odipo 2007). Information and Communication (ICT) is currently the focal point of

education reform endeavors that involve its use in coordination with changes in curriculum, teacher training, teaching and learning and assessment (Kozma, 2000).

Today, many countries include ICT integration, either in the national policies or in the laws pertaining to the education sector. In Australia, for example, the commonwealth Government has set goals for schools in relation to ICT development. The Government wants students to leave schools as confident, creative and productive users of new technologies on society. Schools are prospected to incorporate ICT into their operations. The Philippines Department of Education has also formulated policies for ICT use. The same trend is evidenced in Vietnam, Malaysia, Indonesia, Uzbekistan, and others where the national government set goals for ICTs in education. In Asia and the Pacific, including emerging countries, teachers in primary, secondary and tertiary levels are being trained in the use of ICTs in education with varying degree of scope.

Kamau, (2008), argues pre-service teacher training institutions in even the poorest African countries are slowly being equipped with computers, and increasingly, teachers are being exposed to this technology, through various school networking initiatives as well as the presence of telecenters, multipurpose community centers, and internet cafes. Among the most ambitious African efforts is the NEPAD e-school programme. The programme is on a multi-collaborative partnership strategy between the NEPAD, major ICT companies and ministries/departments of education in different participating African countries. Due to the high shrinkage of educational resources in Africa and the increasing demand for secondary teaching in the regions, technology intervention is seen to be one of the most available choices for school transformation. Without turning a blind eye to the basic needs of secondary schools in Africa, like those of building more classrooms,

there is growing indication that ICTs may be the only economically sound and realistic means of expanding access and improving the quality of secondary education in Africa (Isaacs, 2002). The NEPAD e-school initiative is designed to accomplish this goal through public-private partnership approach. As with so many other educational –ICT initiatives in Africa, its focus remains primarily on the importance of giving pupils and teachers ICT skills, rather than on using ICT to enhance their wider learning experience. A review of experience with ICTs in education project by IEC (2001) finds that in Africa, projects tend to follow a pattern of high levels of take-up. In Kenya, ICT can be seen as a way to merge into a globalizing world. ICT is visualized as a tool that can support the innovation of teaching, learning and the management of education, and that contributes to improve efficiency and quality of teaching MOET (2008). Educators in Kenya are encouraged to implement ICT applications reasonably in new and innovative methods of teaching and learning at schools MOET (2008).The challenge confronting our educational systems is how to transform the curriculum and teaching-learning process to provide students with the skills to function effectively in this dynamic, information-rich, and continuously changing environment. ICTs provide an array of powerful tools that may help in transforming the present isolated, teacher-centred and text-bound classrooms into rich; student focused, interactive knowledge environments. To meet these challenges, learning institutions must embrace the new technologies and appropriate ICT tools for learning. They must also move towards the goal of transforming the traditional paradigm of education.

To keep a breast with technology, the government of Kenya through the Ministry of Education launched a multi-million Information and Communication technology Trust

Fund. In his speech, during graduation ceremony for ICT grandaunts at the Kenya Institute of Education on November 28, 2004, the minister for education asserted that the administration was focused on giving 2500 of the 3500 open optional schools in Kenya with PCs by the year 2008. The ministry is setting out on this yearning system to connect all secondary and primary schools to the Internet in 10 years. The Education permanent secretary reported that six schools would profit by a test case program which was formally dispatched on September 29, 2005. We noted that Kenya is among 16 countries selected to benefit from the first phase of the e-initiative by the New Partnership for Africa's Development (Nepad).

The programme is to offer knowledge and real-life experience by implementing information communication technologies (ICT) in schools across Africa that will inform the model for a large-scale rollout. The Permanent Secretary (PS) of education in Kenya said that the Government had ageeed to partner with Microsoft for the supply of computers to schools. It had also agreed that Sh1.5 million had been released to buy the machines. "We are committed to integrating ICT into our education system and are investing in access, equipment, and skills. (Muriithi, 2005) In Kenya, like other developing countries, the use of ICT is still restrained by computer literacy training. She contends that the present ICT curriculum merely deals with 'teaching about computers' and not how computers can be used to transform the teaching and to learn in our schools. In her thesis, she says that integration should consider learning pedagogy, the pattern of student use of ICT, and the extent of use in teaching and learning programmes. A wide range of learning technologies should be selected and incorporated into the teaching and learning program.

According to Gakuu & Kidombo, (2008) studies on integration of ICT in teaching and learning at secondary level in Africa indicate that even though some Kenyan Secosndary schools have ICT facilities, they are supplied by donors, for example, school-Net computers for schools- Kenya (CFSK), parents, and other well wishers. It is not yet scientifically established how the ICT facilities are used for effective instructional purposes.

In Lamu West sub-county Kenya, our secondary schools are equally struggling to integrate ICT in their day to day classroom teaching and learning. The researcher concurs with Gunga (2007) in saying that students should open up and think more critically and therefore become real scholars.

1.2 Statement of the Problem

Researchers indicate an abundance of computers and technological infrastructure in higher education institutions. In campus- based contexts, teaching staff learn to use those technologies which they can incorporate into their teaching activities that provide affordances for what they already do most in an easier manner, instead than those which radically alter teaching and learning practices (Kirkup & Kirkwood, 2005).

A study by Kiptalam (2010), observed that access to ICT facilities is a major challenge facing most African countries, with a ratio of one computer to 150 students against the ratio of 1:15 students in the developed countries. The computers are in school, but they are of no value to teaching and learning. A study by Keiyoro (2010) also identified poor internet connectivity, and lack of the required Multimedia equipment, as key hindrances

to the effective use of ICT in teaching and learning of science subjects in cyber and NEPAD e-schools.

The central problem of this study is that despite the critical role of ICT in sectors like banking, construction transport, and communication, it has not been fully adopted in the teaching and learning processes in many developing countries like Kenya. While there is a broad range of innovations in ICT to support efficient and quality of delivery of educational services, there is considerable technology lag in the Kenyan schools. Most schools institutions still use nearly obsolete systems and consequently are unable to exploit educational potential of the emerging technologies GOK (2006a). With changes in modern technologies, learners need to be equipped with updated knowledge that will make them familiarize with the constantly evolving world. This knowledge leads to improved communication and increased earnings as a result of e-Commerce and self employment in the ICT sector. The study, therefore, generated knowledge on factors influencing integration of ICT in teaching and learning

1.3 Purpose of the Study

The essence of the research was to examine the factors influencing integration of ICT in teaching and learning the case of selected secondary schools in Lamu West Sub County.

1.4 Objectives of the Study

The investigation was funnelled through these objectives:

1. To examine the extent to which ICT Infrastructure influences the integration of ICT in teaching and learning in secondary schools of Lamu West Sub County
2. To determine the degree to which subjects contents affect integration of ICT in teaching and learning in high schools of Lamu West Sub County
3. To examine the extent to which the level of ICT training among teachers influence integration of ICT in teaching and learning in high schools of Lamu West Sub County
4. To review the extent to which the attitude of teachers towards ICT impacts integration of ICT in teaching and learning in high schools of Lamu West Sub County

1.5 Research Questions

The study addressed the following reseach questuions:

1. To what extent does ICT Infrastructure influence integration of ICT in teaching and learning in secondary schools of Lamu West Sub County?
2. To what extent does subject content availability influence integration of ICT in teaching and learning in secondary schools of Lamu West Sub County?
3. To what extent does the level of ICT training influence integration of ICT in teaching and learning in secondary schools of Lamu West Sub County?
4. To what extent does teachers' attitude influence integration of ICT in teaching and learning in secondary schools of Lamu West Sub County?

1.6 Significance of the Study

The findings of this study will provide education policy makers and managers/administrators with information to help formulate their teacher training programs involving ICTs for education. It may also help Ministry of Education Science and Technology (MOEST) in formulating institutional capacity building framework to empower ICTs for education.

The findings of the study will give direction and shed some light to the teachers on how to integrate ICTs in teaching and learning, which is in line with Millennium Development Goals and vision 2030 in Kenya. This could assist them to become more innovative and efficiently embrace ICTs in their teaching activities.

The research findings may also be used to determine both initial and In-Service Education, and Training (INSET) needs for teachers in this 21st century. This may impact on curriculum development and teacher training institutions to offer refresher courses to the teachers that address the need to respond adequately to an ever-changing technological and digital landscape.

1.7 Delimitation

The study covered all public secondary schools in Lamu West Sub-county of Lamu County. The study looked at ICT on ICT Infrastructure, subject contents availability, ICT training among teachers and attitude of teachers on ICT.

1.8 Limitations of the Study

According to Best & Khan (1998), limitations are conditions beyond the control of the researcher that may place restrictions on the conclusion of the survey. It is possible that the information given by the respondents was biased though there was always a briefing before distributing the instruments to be teachers, principals, and the students.

1.9 Assumptions of the Study

The study was carried out on the basis of the following assumptions:

The sample chosen for the survey represents the population. The data collection instruments to be used in the study would be valid and reliable and would measure the desired constructs. The respondents would answer questions correctly and truthfully: that all the respondents would give genuine, truthful and honest responses to the questionnaires.

1.10 Definition of Significant Terms used in the study

Attitude refers to the way that you think and feel about somebody or something

ICT Infrastructure: ICT Infrastructure can be defined as technologies that enable recording, processing, retrieving and the transmission of information or data.

ICT Integration Use of technology in communication, data processing, and data storage to impact the knowledge on learners.

- It is the use of technology in teaching curriculum subjects

Information and Communication Technology: an umbrella term referring to a wide range of Software technology component such as computer,

telecommunication, internet, video and digital cameras that can be used by teachers to support their work.

Infrastructural capacity refers to the ICT hardware like computers, software, internet connectivity and electrification

Level of ICT Training: Act of enhancing or making better in terms of quality, value or usefulness. This can be by making ideas, objects or processes more desirable by adding or removing components.

The term can also be applied to people as well, via methods such as performance reviews which are meant to try and improve an employee in some manner.

Learning The art of acquiring new or modifying and reinforcing existing knowledge, behaviours, skills, values or preferences.

Subject Contents: A studied content in order to obtain a particular body of information rather than to achieve competence in a skill (as penmanship, typing, or composition)

Teaching Impart knowledge to or instruct (someone) as to how to do something;
- an overly simplified way that discourages independent thought.

1.11 Organization of the Study

This study is organized in five sections. The first part is the introduction, and it contains information on the background of the survey, the statement of the problem purpose of the study, the objectives of the survey, the research questions the significance of the survey, delimitation of the study, assumption of the study, definition of significant terms as used in the survey and abbreviations. Chapter two contains literature review. It covers

integration of ICT in teaching and learning, ICT Infrastructure, Subject Content, level of ICT training, attitude of teachers on ICT, theoretical background of the study, summary of literature review and finally on conceptual framework. Chapter three describes research design, target population, sample size and sampling procedures, research instruments, instrument validity, device reliability, process for data collection and finally data analysis techniques. Chapter Four describes the methods that were used to collect the data from the field through research instruments and the data analysis procedures that were used to arrive at the answers to the research questions. Chapter five contains a succinct summary of the findings, discussions, conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

This section pinpoints observational and theoretical data from a few sources on themes that are straightforwardly connected to the exploration issue. It scrutinizes what different writers and researchers have expounded on integration of ICT in teaching and learning, ICT Infrastructure, Subject Content, level of ICT training attitude of teachers on ICT, theoretical background of the study, summary of literature review and finally on conceptual framework.

2.2 Integration of ICT in Teaching and Learning

ICT started to be regarded gradually not only as a skill worthy to acquire but also as a valuable tool for development of other skills. In the present world, ICT has become an essential component of a school curriculum, a support apparatus for providing teachers and students with improved teaching and learning methods in all the subjects. The content of the national curriculum statements in countries like the USA and the UK and Australia provide clear information from the change of the teaching of ICT alone to its combination as an important instrument in the school curricula (McDonald & Davis 2010).

In response to the modern advancement in technology, the revised curriculum in Kenya incorporated ICT as a teaching tool Kenya Institute of Education (2002). A survey done by the Kenya National examination Council revealed that students' academic performance and interest in secondary school biology has been generally poor. This has

been attributed to the current methods of instruction, for instance, the expository approach of education in which the teacher spends most of the time giving verbal explanations in the form of talk and chalk while students listen and write notes from chalk board. Apparently, such inadequate and limited teaching methods tend negatively to affect the learners view of scientific concepts and associated methods (Kiboss & Ogunniyi 2003). The study assessed the effects of computer based instruction simulation (CBIS) program developed for the teaching of biology, on improving students understanding and perception of the cell theory. The findings in this study reaffirmed that the use of computer based instructional programs tend to improve achievement scores of students as compared to the use of traditional or regular methods on instruction (Ndirangu 2006).

Shunguyia (2010) conducted a case study of instruction technology in the curriculum of the education program of Kenyatta University. It was found out that the instructional media are meager and limited such that most student teachers end up finishing their training program without a single opportunity for involvement in necessary practical professional experiences. The study further found out that communication technology department had constraints and shortages of various types (in relation to media), including equipment, technicians, practice rooms and ever present debilitating influence of the large student numbers (Shunguyia, 2010). However, current study was carried out in Secondary schools but not in a university.

Recent trends towards the constructivist approach and teacher learner interaction suggest that the learning process can be enhanced through the use of technology, which adapts to

the presentation of user needs, preferences, and requests. Because the internet is usually interactive in nature, it is well suited for a creative learning approach (World Bank 2006). The ability to share knowledge and experiences with an emerging global community is one of the biggest benefits of internet to education. This enables the students actively to seek out their counterparts in other countries in order to come up with joint research projects on a variety of topics World Bank (2004). Furthermore, online resources offer teachers access to a vast and diverse collection of educational materials enabling them to design curriculum that best suits the needs of their learners. The growth of research networks in a global scale, usually over the internet, is also helping in empowering indigenous research and development programmes in developing countries. Virtual research groups composed of interconnected specialists in different parts of the world allow data bases to be shared, conferences to be organized, papers to be circulated and discussed, and collaborative research and report to be undertaken (Mugenda, 2006). ICTs can be employed as a tool in provision of immediate and up to date resources using one or more media to a large number of educators and learners in an easy and cheap way.

Changes made to resources are immediately available to teachers and students without incurring major distribution costs. New technologies can also help in improving the quality of administrative activities and processes including human resource management, student registration and monitoring of students enrolment and achievement (Mugenda, 2006). Historically, secondary education is widely known to be more accessible in urban areas than in rural communities in Africa (World Bank, 2004). Additionally, there are some significant gender differences when it comes to the accessibility of secondary education in Africa. Further, religious, socio-cultural, and economic factors have greatly

contributed to this incongruence that has placed young women at severe inconvenience (Dowes, 2003). ICTs can and are used to extend educational provisions through enhanced distance education opportunities. The World Education Forum (2000) listed “harness new ICTs” as one important strategy to help achieve the education for All goals. The aim of this study was to establish if the level of establishment of ICT in the schools is at a level which can enable meaningful learning to take place. The attitude of the students and teachers in use of ICT was also investigated as it affects their use in education.

2.3 ICT Infrastructure on ICT integration

The expansion of infrastructure and essential services are the biggest challenges of the e-school development in Africa. Basic foundations are fundamental in the successful implementation of the e-learning (World Bank 2006). Technical and necessary infrastructures, coupled with sustaining schemas, make up structures that can either empower or restrict the application of information Technology in secondary education in Africa. The infrastructure requirements call for vast sums of investments from various stakeholders, especially the governments of particular states. There are a number of challenges concerning access to and use of ICT in Kenya, including high levels of poverty, limited rural electrification, and frequent power disruptions. African countries need to commit themselves innovative projects such as those of electrifying rural areas in order to benefit both rural communities and the schools that serve them. This can be better achieved by investing in solar energy as a source of power especially for communities that are far from urban centers (Gunga and Ricketts 2006).

As well, all schools need to be prepared when it comes to the necessary ICT infrastructure. This will greatly aid the next generations with the needed tools and resources for access and use and to be able to attain the desired skills (Gulbahar & Guven 2008). Schools are outfitted with electronic resources and technological infrastructure available like software, hardware, as well as network infrastructure. These are very necessary for the integration of ICT into teaching and learning (Afshari, 2009). He further indicates that limited access to computers serves as another limitation to using computers in classrooms. (Muntaz, 2000) observed that lack of well established ICT infrastructure is one of the reasons why teachers and educators fail to employ computer related technology in class.

The effective use of both software and hardware is reliant on the equity of access to resources by staff. The need for connectivity has always been faced by barriers and will require major shifts in the regulatory environment as well as the new attention to public-private partnerships and common sizes. Developed countries have 80% of the world's internet users. (UNHD, 2001).

2.4 Subject Content/ materials on ICT integration

Subject content materials are important in teaching and learning process because they clarify subject content/concepts and make learning easier. The materials could be manipulated in a short time (Posne, 2008). The focus of the study will be the identification of the ICT materials and resources available in schools and accessible to the teachers and students. The materials should enable the teachers, and their students achieve their objectives.

The model being developed characterizes inside and outside influences upon integration of technology, first in regard to teachers' commitment to integrating the use of ICT and the external constraints in operation contexts. Within this background, we examine pedagogic beliefs in the possibilities of technology changing the subject of teaching and learning. It includes major 'affordances' (or perceived advantageous attributes) of the application of technology in the class, as well as describing the teacher's concerns and cautions about the displacements and threats that may arise due to its accommodation. The final issue in the model concerns altering the pedagogy and practice, that is, the emergence of different qualitative benefits and the perceived enhancement of subject learning. It includes several approaches of reconciling pupils' interactions with ICT which teachers employ in order to overcome some of the obstructive features of particular forms of use (Bollou, & Ngwenyama 2008).

Currently, there exists an extensive database of sources on the use of ICTs in Africa, and by examining it, there is evidence of a rapid growth of ICT use, specifically in the urban schools. African governments have loosened their ICT sectors and invested hugely on the same (Bollou & Ngwenyama 2008) even amid other problems like the combat of hunger and poverty. There are several limitations and challenges facing sub-Saharan Africa as a region, and these pose more problems in regard to striking a balance between technology and national development. The slow connectivity experienced in Africa is characterized by scarce resources, the absence of access or the entire lack of Information Technology, lack of integration of local languages into systems updating and varying the contents posted on the websites (Kamel & Weigler 2001).

The latter are considered to be situated in the cultural realms . When learners accept the altering and rebalancing of the system, this correspondingly change to realtering their strategies. This study identifies the key affordances as well as constraints, which arise when new technologies are used to support core subject learning. According to policy makers all over the world, such initiatives should lead to critical technological and pedagogic changes within subject teaching. In England at least, however, this rhetoric of ‘modernization’ has barely touched curriculum and assessment in core subjects, where a powerful rhetoric of ‘raising standards’ maintains a view of academic capability as independent of technology use (Fullan, 2001).

Today, Africa is facing the uneven access to information and communication technology (ICT) which results to digital divide with the developed countries. This has led to over dependence on the developed western nations. (Jensen, 2002) asserts that prohibitive cost coupled with sparse and unreliable telecommunication networks forms the major hindrance for many people in Africa to use ICTs. Findings show that the greatest number of internet users in Africa resides in either South Africa or Kenya in the sub-Saharan region or in Morocco and Egypt in the north of the country. South Africa has a well developed internet system in both business and academic sectors and its degree of connectivity places it in the top 25 in the world (Langmia, 2005). This well developed internet infrastructure has significantly influenced the teaching and learning activities.

2.5 Level of ICT Training in the teaching staff on ICT integration

Appropriation and utilization of ICT in schools requires skilled staff and visionary school initiatives. Instructors and school pioneers should be educated about the potential that ICT presents in the process of teaching and learning in schools. Where this information is deficient with regards to, approaches defined by government and speculations made towards execution of ICT in schools, as often as possible miss chances to understand the fancied school changes (Higgins and Moseley, 2011). Thinking and making arrangements for preparing ICT instructors is by all accounts regarded as an extra cost as opposed to as a necessary level for changes in educating and school changes. A noteworthy test distinguished in numerous creating nations in regards to appropriation and utilization of ICT in schools is that there is no enough staff, and where there are, they are no doubt IT experts with no training experiences, abilities, and/or capabilities. To successfully saddle ICT for school purposes requires managed interests in supporting instructors preparing keeping in mind the end goal to make new learning environment (Jimoyiannis, and Komis, 2007). Educators assume a fundamental part in usage and utilization of ICT as they are at the focal point of educational programs execution and development at school level. In any case, numerous schools confront a test of deficiencies of ICT educators and other IT proficient that bolster reception and utilization of it in classroom. Various schools keep losing all trained ICT instructors to the private sector, which appears to pay higher reimbursement rates GOK (2010). An overview by Kandiri, (2012) on ICT access and use in Kenyan secondary schools demonstrates that, of 2250 ICT instructors, who moved on from colleges and tertiary establishments in 2010, 1350 were invested in modern and/or ICT administration and 900 went to practice ICT in different education institutions. Of those in administration, 189 were in specialized organizations, and 711

were in auxiliary schools. This shows a generally little number of qualified ICT educators in Kenyan schools.

Hennessy, (2010) asserted that the vast majority of projects towards educators preparing in ICT concentrated on essential proficiency abilities instead of on reception and utilization of innovation in instructing. As indicated by Andoh, (2012) instructors making organizations have proceeded to accentuation educating about the change as opposed to on the most proficient method to utilize innovation to educate. In the wake of investigating and sorting out an assortment of methodologies found in ICT employs as a part of educator preparing organizations, (Andoh, 2012) reasoned that these foundations were not satisfactorily setting up their instructor students to adequately use innovation in instructing and learning. A study by (Ananiadou and Rizza 2010) on the utilization of ICT in educators preparing schools in nine OECD nations found that ICT was considered as a transversal subject cutting over every single other issue. Thus no one felt in charge of it. This, the authors realised had adverse effect on instructor trainees utilization of ICT when presented on schools.

The pre-service and in-service training for teachers in ICT is very necessary for proper integration of ICT in the education system in any country. Teachers need to be fully prepared in order to be able to manipulate and use actually the ICT materials and resources to enhance the teaching and the learning process. The teacher is responsible for establishing the classroom environment and preparing the learning opportunities that facilitates student's use of technology to learn and communicate, (UNESCO, 2008).

Research findings have revealed that most teacher training courses are focused on basic computer operations rather than advanced computer skills and subject specific

pedagogical applications (Tin, 2002). The use of new technology requires new teacher roles, new pedagogies and new approaches to teaching and learning. It, therefore, requires that teachers need to have a comfortable level of ICT skills to enable them use ICT as a primary tool for teaching and learning as they endeavour to cover the curriculum. Teachers need to be confident and competent users of software and hardware so as to enable them understand classroom organization and the structring of learning tasks, for IT resources becomes a necessary and integral part of teaching and learning (Tin, 2002).

2.6 Attitude of Teachers on ICT Integration

Research shows that if teachers perceive ICT programs as either satisfying their own needs or their students' needs, it is likely they would implement it in school. Research proposes that educators' ampleness, abilities, and states of mind impact effective usage of ICT in schools, (Keengwe and Onchwari 2011). In the event that instructors' observations are individual toward utilization of ICT, then they can, without much of a stretch, give helpful knowledge about its execution. A study by (Simonson, 2008) uncovered that instructors' abilities, observation, and states of mind were identified with their utilization of ICT in educating and learning. The more gifted instructors were in ICT, the more probable they were to utilize it in classroom. Further study by (Drent and Meelissen 2008) uncovered that inspirational disposition, individual business and computer experience affected appropriation and utilization of ICT by educators. A comparable study by (Huang and Liaw, 2008) demonstrated that instructors' aptitudes, mentalities, and observations changed their acknowledgment of the value of ICT and its execution in schools. A survey by EU School net in 2010, (Andoh, 2012) counting teachers' use of Acer note pads in six European Union countries, revealed that a broad number of individuals saw usage of note pad had constructive outcome on their learning, evoked

premium, progressed individualized learning and extended study past school day. Regardless, a study by (Korte and Husing, 2007) prescribed that minimal number of instructors saw focal points of ICT in schools were not unmistakably recognized.

A few educators saw ICT as a costly exercise in futility. A report by (Becta, 2008) on a study of UK instructors (Andoh, 2012) uncovered that educators' inspiration about conceivable commitments of ICT in schools was directed as they turned out to be relatively uncertain and some of the time dubious about particular and current focal points of it. (Woodrow, 2002) focuses that for effective change of school practice; instructors need to create uplifting mentalities toward advancements. (Von Braak, Tondeur, and Valcke, 2008) contended that confident computer demeanors by educators are relied upon to cultivate usage of ICT in schools. Further study by Teo (2012) on instructors' states of mind towards computer use in Singapore, found that educators were more confident about their mentality towards computers and goal to utilize them, than the supportiveness of computer towards instructing and learning. These studies uncover that educator's aptitudes, observations, and states of mind impact selection and utilization of ICT in schools.

According to Eggen and Kanchak cited in Olaleye (2011), real teachers' attitudes are fundamental to effective teaching and learning. They identified a number of teachers' attitudes that will facilitate a caring and supportive classroom environment, their enthusiast, caring, firm, democratic practices to promote students responsibility, use of time for lessons efficiently and have established efficient routines and interact freely with students and providing motivation for them.

According to Scott, (2011) noted that Cyprus primary school principals generally hold positive attitudes towards ICT. He also noted several statistical differences across their gender, years of service, academic qualifications, access to a computer and internet services, in-service training on ICT for education and learning, etc. which affected the teachers attitude towards integration of ICT in teaching and learning. These factors are found to influence the integration of ICT into teaching and to learn in public secondary schools in Homa Bay District. Scott further noted that positive attitudes towards computer have been found to decrease with age, experience, voluntariness specialization, and computer ownership. Due to these, teachers' attitudes towards the integration of ICT into teaching and learning is an important variable to be investigated. This will help in allowing the stakeholders in Education at various levels in making informed decisions at the planning and implementation levels.

2.7 Theoretical Framework

This study is based on Social Psychology Theories. These are the theories that describe the behavior of an individual. The Social Psychology Theories (SPT) include Theory of Reasoned Action (Fishbein & Ajzen, 1975) which explains the different behavior based on behavioral intention that determines ones behavior or attitude. This theory, combined with other models, has a significant influence on intention to use or adopt the intended technology. The second is the Theory of Planned behavior (Ajzen, 2009). This theory highlights particular salient believes that determine behavior intentions and patterns. Many studies have used this method on ICT adoption such as Hsu & Chin (2004), Chen & Yen (2003) among others. The third argument is the Technology Acceptance Model which focuses mainly on the adoption and use of ICT as well as its perceived usefulness and ease to use.

Many scholars who have used the Social Psychology Theories confirm that there is a significant relationship between the intended behavior and use of the proposed technology

Innovation Diffusion Theory, (Rogers, 2003). This theory has been used in studying individual's technology adoption and use. Innovation Diffusion theory consists of five elements that include, innovation, time, communication, channels and social systems. According to Rogers (2003), an individuals' technological behavior and perception influences him/her to decide to adopt and use a particular technology. Many studies have been done using Innovation Diffusion Theory such as (Agarwal & Prasad, 2007). In their study, five main elements of Innovation Diffusion Theory were tested, and the findings showed that there was significant relationship with other factors in ICT adoption.

2.8 Summary of Literature Review

From the review of literature, it can be noted that many factors affect the integration of ICT in Secondary school education and other institutions of learning. Such factors may include teacher and student preparation to integrate and use ICT in education, professional teacher training towards ICT and student training on computer literacy skills, level of integration of ICT in secondary school curriculum, access to ICT and availability of ICT resources. The previous studies which have been done on use of ICT have each a unique difference as compared to the present study. One of the factors that distinguish them is the time and place of the survey. As pointed out earlier ICT is changing very fast and repeating a similar study in the same area after a period of time like 3 years might present entirely different results. The study by (Oloo, 2009) was a general survey on learning institutions in the country which did not give the unique difference in level of use and integration ICT in Secondary schools depending on the degree of development

and nearness to urban areas. The survey done by the Kenya National Examination council investigated the perceptions using only CBIS program in Secondary School Biology. The current study, on the other hand, examined the factors influencing integration of ICT in teaching and learning the case of selected secondary schools in Lamu West Sub County

2.9 Conceptual Framework

The conceptual framework exemplifies the relationship between the independent and the dependent variables in a diagrammatical presentation

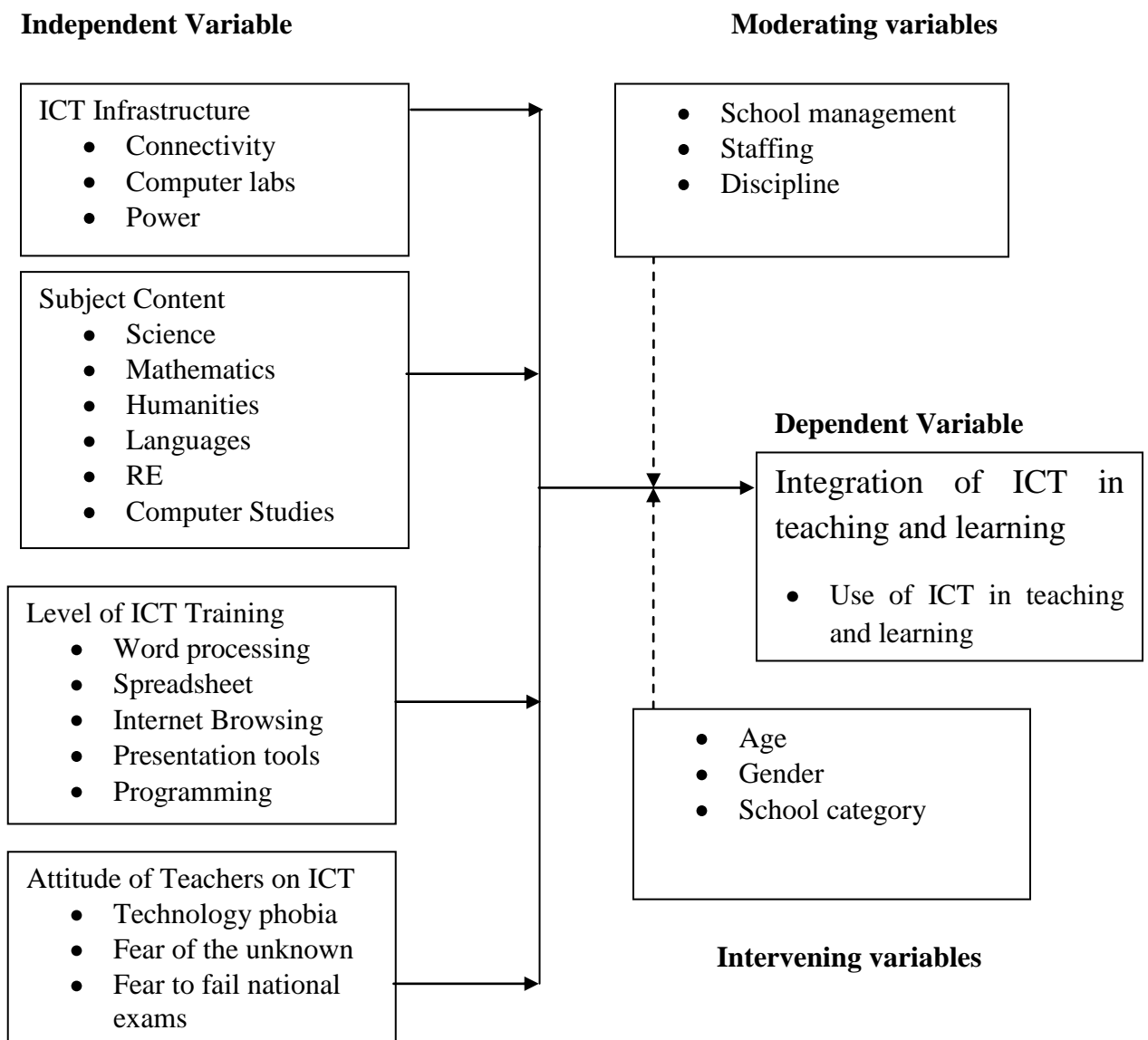


Figure 1: Conceptual Framework

This research study conceptualized that the factors that influence integration of ICT in teaching and learning are ICT infrastructure e.g. connectivity computer labs, power connectivity, Subject content like science mathematics humanities languages, RE, and computer studies. Level of ICT training and attitude of teachers on ICT in the technology phobia on ICT, fear of the unknown and fear of the national examinations. This will enable proper integration of ICT in teaching and learning in public schools in Kenya. School management staffing and discipline moderates the integration of ICT while the age, gender, and category at the institutions were also found valuable on the use of ICT.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section outlines research methodologies that were applied. It covers the research design, target population, sample size and sampling procedures, research instruments, instrument validity, pilot study, device reliability, process for data collections and finally data analysis techniques

3.2 Research Design

Research design is the method of arranging the existing condition for data collection and analysis in a way that aims at minimizing expenditure of efforts, time and money (Kombo and Tromp, 2006). Orodho (2005) notes that the research design employed depends on what the researcher is trying to investigate. In this study, descriptive survey was used. This method is preferred because information is readily obtainable from subjects in their natural environment, concerning their attitudes or beliefs on certain issues of the study.

3.3 Target Population

Mugenda (2003) defines target population as set of people, products, firms, and market that contains information that is of interest to the researcher. A target population of 5249 respondents from 18 secondary schools in Lamu West who consisted of 18 school principals, 190 teachers and 5041 students in Lamu West Sub County.

Table 3.1 Target Population

Description	Target Population
Student	5041
Principals	18
Teachers	190
Total	5249

Source: County Education Office

3.4 Sample Size and Sampling Procedures

Stratified random is a sampling methods that divides the population into smaller divisions (strata). Where the layers are formed depending on members' characteristics, it is known as stratified random sampling. A random sample is then taken from each stratum in a number proportional to the layer's size by comparing it to the population. These subsets of the strata are, further, pooled to form a random sample. In this study, stratified random sampling was used. In this case, the secondary schools were classified into boarding girls' school, boarding boys school, mixed day boarding, island schools and mainland schools. The strata are as follows as shown in Table 3.2. A sample size of 498 respondents was picked. See Krejcie & Morgan (1970) table.

Table 3:2 Sample Size

	Target Population	Sample Size
Student	5041	357
Principals	18	18
Teachers	190	123
Total	5249	498

3.5 Research Instruments

The research instruments that were used consisted of a questionnaire and document analysis. According to Gay (2008), an inquiry offers considerable advantages in its administration. The questionnaire was considered as the best method to collect data because it can be used for large numbers of population simultaneously and also provide the investigation with a natural accumulation of data. (Gay, 2008) maintains that questionnaires offers respondents enough autonomy to express their views or opinions and also make suggestions. Documents such as admission registers, fees records, and class registers were used to counter check the dropout, transition, retention and completion rates among the enrolled students.

3.6 Instrument Validity

According to Kumar (2005), validity of an instrument represents the degree to which a test measures what it purports to measure. Content validity was used to assess whether the substance of the questionnaire measured what it is supposed to measure. The instruments were presented to experts in the area of study. The specialists in the field of

research helped in improving the tools. The experts' feedback, in form of recommendations to the researcher, was incorporated in the final devices.

3.7 Instrument Reliability

This can be defined as a measure of the degree to which a research instrument yields consistent results on data after repeated trials. To ensure reliability, the researcher used a test-retest method to estimate the extent to which the same results could be obtained with a repeated measure of accuracy. This determined the reliability of the instruments. The questionnaires were administered to five teachers, 2 principals and forty students who were not included in the primary study. The answered questionnaire was scored manually and after two weeks the same was administered to the same group of respondents. The responses were scored manually and a comparison between the answers obtained in the first and second test was made.

Mugenda and Mugenda (1999) defines reliability as a measure of the degree to which research instruments yield consistent results after repeated trials. Based on the analysis of the pre-testing, the relationship between the two tests during the pilot study was calculated using the Pearson's product momentum correlation coefficient. A coefficient value of 0.80 was obtained and thus considered reliable for this study.

3.8 Procedure for Data Collections

A permit for the collection of data was obtained from the Ministry of Education. Thereafter the C.D.E Lamu County was contacted to give an introductory letter to school head teachers and the people involved. The head teachers of the schools participating in

the study were contacted to inform them of the study and make prior arrangements to see their class teachers.

3.9 Data Analysis Techniques

Data from the field was coded and edited according to the themes that emanated from the research objectives and questions. Qualitative data was derived from open-ended questions in the questionnaires while the quantitative data was derived from closed ended questions. The coded data was analyzed using both qualitative and quantitative techniques. The quantitative data was analyzed and presented using descriptive statistics such as frequency distribution, tables and percentage and also in narrative form. Qualitative data was presented in narrative form. The responses from the likert scale was sorted and coded according to the research objectives. Similar responses from the likert scale were grouped together during presentation. That means the agree and strongly agree responses and the disagree and strongly disagree responses were combined together as either positive or negative responses depending on the question. In some cases where it is deemed necessary, emphasis was given to all responses individually. The undecided response was taken to mean neutral. For the items which required ranking, measures of central tendency (*the mode*) were used to determine the most highly ranked contributing factor.

3.10 Ethical Issues

In this study, the researcher sought consent to interview human subjects from the county director of education, Lamu County and the National Commission for Science

Technology. The researcher in a letter of introduction explained to the participants the essence of the study thereby requesting them to voluntarily respond to the questionnaire

Table 3.3 Operationalization of Variables

Objectives	Variables	Indicators	Measurements	Scale
To determine the extent of the ICT infrastructure in the integration of teaching and learning in secondary schools	ICT infrastructure	Connectivity, computer labs, equipment, and emails, laptops	Percentage and frequencies	Ordinal
To determine the extent of the influence of subject content in the integration of ICT in teaching and learning in secondary schools	Subject content	Maths Science Languages Arts Humanities Computer Studies	Percentage and frequencies	Nominal
To determine the extent of the influence of the level of ICT trainings in the integration of teaching and learning in secondary schools	Level of ICT training	Use of computer expertise, lesson preparation. Schemes of work.	Percentage and frequencies	Ordinal 1
To determine the extent of influence of teachers attitude in the integration of ICT in teaching and learning in secondary school.	Attitude of teachers on ICT.	Fear of technology, fear of the unknown, fear to fail national exams	Percentage and frequencies	Nominal

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, AND INTERPRETATION

4.1 Introduction

This chapter details the results of the study as proposed in the research methodology. The section presents data analysis which means categorizing, ordering, manipulating and summarizing of data to obtain answers to research questions by reducing data to intelligible and interpretable form using statistics. The presentations of the finding in this study were done using tables and percentages. Interpretations and discussions on the findings were made in line with the objectives of the study.

4.2 Questionnaires Return Rate

The study administered 498 questionnaires which were responded to 85.3%. The researcher and her assistant made a close follow up of the exercise. The sampled population was also readily available on request in their various locations. Table 4.1 shows the questionnaire return rate.

Table 4.1: Questionnaire return rate

Target respondents	Sample size	Response rate	Return	Return rate
Principals	18	15		88%
Teachers	123	100		81%
Students	357	310		86%
Totals	498	425		85.3

4.3 Demographic characteristics of respondents

This section presents the demographic information of the respondents in the study. It provides a summary on gender, age, academic qualification, years of experience and indication on whether they have a computer in their offices. The study outcomes are pinpointed in the subsequent sections.

4.3.1 Gender of the respondents

The principals and teachers were asked to state their gender and data collected was presented as indicated in table 4.2.

Table 4.2: Gender of the respondents

Gender	Principals		Teachers		Students	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Male	12	80	75	75	173	56
Female	3	20	25	25	137	44
Total	15	100	100	100	310	100

In relation to the results of the study presented in table 4.2, most of the principals were male (80%) while (20%) were female. On findings out about the teachers gender, the study found that majority 75% were male while 25% were female. Gender of the students was also analyzed, and it was found that majority of the students were male as shown by 56% and female were demonstrated by 44%. This information helped the researcher to obtain a general gender description of respondents to avoid gender bias in conclusions and recommendations of the study.

4.3.2 Age of respondents

The principals' and teachers age was also a factor to consider in this study. Data were collected from principals and educators and recorded as shown in table 4.3.

Table 4.3: Age of students

Age	Frequency	Percent
14 years	11	4
15 years	63	20
16 years	101	33
17 years	111	35
Above 18 years	24	8
Total	310	100

Table 4.3 reveals that the ages of the students were as follows; majority 33% were 17 years, followed by 35% who were aged 16 years, 20% were 15 years, 8% were above years while 4% were 14 years old.

Table 4.4: Age of principals and teachers

Age	Principals		Teachers	
	Frequency	Percent	Frequency	Percent
less than 25 years	0	0	20	20
26 -35 years	6	40	40	40
36-45 years	7	47	27	27
46-55 years	2	13	13	13
Total	15	100	100	100

The findings in Table 4.4 reveal that majority of the principals were aged 36-45 years as shown by 47% this was followed by those aged and 26-35 years as demonstrated by 40% while 13% were aged 46-55 years. Most of the teachers 40% were found to be on their youthful age of 26-35 years, 27% were middle aged 36-45 years, 20% were aged less than 25 years while 13% were aged 46-55 years. The years of teachers illustrate the degree of participation of teachers in their teaching activities depicting that a large number of teachers were still in their active period in teaching profession. This information helped the researcher to determine their level of participation in integration of ICT in teaching and learning. On comparison, the findings agree with Rimyan (2006) who argued that young teachers perceived instructional technologies as more suitable, unlike senior teachers who viewed technology as difficult to use.

4.3.3 Respondent's Academic Qualifications

The study sought to establish educational requirements in order to verify respondents' competencies in ICT integration in teaching and learning as presented in Table 4.5.

Table 4.5: Respondent's Academic Qualifications

	Principals		Teachers	
	Frequency	Percent	Frequency	Percent
PhD	0	0	0	0
Master Degree level	4	26.6	9	9
Undergraduate Degree	10	66.7	71	71
Diploma	1	6.7	20	20
Total	15	100	100	100

Table 4.5 shows that majority 66.7% of the principals had attained education upto the undergraduate level, 26.6% had attained to the masters level while another 6.7% had attained education upto the diploma level. On the teachers level of education, 71% had attained their undergraduate degree, 9% had attained their masters degree while 20% had attained education upto the diploma level. Table 4.4 showed that the highest number of respondents reached Bachelor of Education degree. The findings agree with report by United Nations (2014) which emphasized that a significant number of teachers were trained enabling ease to use technology based pedagogy in classroom activities. However, the findings disagree with (Rastogi & Malhotra, 2013) that a very low number of teachers were trained for efficient use of technology in teaching and learning.

4.3.4 Length of service

The length of service was considered an important variable as it has an impact on the teachers' use of ICT in teaching and learning. The findings are as shown in Table 4.6.

Table 4.6: Length of service

Length of service	Principals		Teachers	
	Frequency	Percent	Frequency	Percent
Less than a year	0	0	7	7
1-5 years	3	20	27	27
6-10 years	9	60	46	46
11-15 years	3	20	20	20
Total	15	100	100	100

The findings of this study found that majority 60% of the principals had served for 6-10 years, 20% had served for 11=15 years while another 20% had served for 1-5 years. On

the length of service for the teachers, it was found that majority of the teachers had served for 6-10 years, followed by 27% who had served for 1-5 years, 20% had served for 11-15 years while 7% had served for less than a year.

4.3.5 School Category

The students were asked to indicate their school category. Table 4.7 shows the response.

Table 4.7: School Category

School Category	Frequency	Percent
Sub County	165	53
County	117	38
National	28	9
Total	310	100

The study found that majority of the students 53% were from sub county schools, followed by 38% who were from county schools while national schools had the least number of respondents represented by 9%.

4.4. Infrastructure availability

The researcher wanted to find out the state of the infrastructure in the schools. The data was collected and recorded in as shown in subsequent sections.

4.4.1 Availability of School Email address

The respondents were requested to note whether their school had an email addresses.

Table 4.8 presents the findings.

Table 4.8: Availability of School Email address

Availability of School Email address	Principals		Teachers	
	Frequency	Percent	Frequency	Percent
Yes	15	100	100	100
No	0	0	0	0
Total	15	100	15	100

According to the findings of the study it became apparent that 100% of the schools researched had available email addresses.

4.4.2 Maintaining ICT equipment in the school

The respondents were asked to indicate the level of maintenance and service of ICT equipment in the school. Table 4.9 presents the findings

Table 4.9: Maintaining ICT equipment in the school

Maintaining ICT equipment in the school	Principals		Teachers	
	Frequency	Percent	Frequency	Percent
Very well	9	60	33	33
Well enough	6	40	47	47
Not at all	0	0	20	20
We don't have computers at all	0	0	0	0
Total	15	100	100	100

Findings show that the principals majority 60% of the administrators were of the opinion that ICT equipment in the school were very well maintained while 40% of the principals

were of the view that ICT equipment in the school were maintained well enough. However majority 47% of the teachers were of the view that ICT equipment in the school were well enough maintained, followed by 33% who indicated that ICT equipment in the school were very well maintained while 20% indicated that that ICT equipment in the school were not at all maintained.

4.4.3 Utilizing the ICT facilities in the school

The respondents were asked to indicate their level of agreement with the statement that the school is underutilizing the ICT facilities they have. Table 4.10 presents the findings.

Table 4.10: Underutilizing the ICT facilities in the school

	Principals		Teachers	
Underutilizing the ICT facilities in the school	Frequency	Percent	Frequency	Percent
Agree	15	100	67	67
Disagree	0	0	33	33
Total	15	100	100	100

Findings shows that all the principals were in agreement that ICT facilities are underutilized in the school. Majority, 67% of the teachers, agreed that ICT facilities are underutilized in the school while 33% disagreed that ICT facilities are underutilized in the school.

4.4.4 ICT infrastructural capacity

The respondents were asked to rate the statements on ICT infrastructural capacity. Table 4.11 presents the findings.

Table 4.11: ICT infrastructural capacity

Statement			Strongly Agree		Agree		Disagree		Strongly Disagree	
			F	P	F	P	F	P	F	P
Inadequate number of computer	Principals	9	60	6	40	0		0	0	
		Teachers	40	40	8	53	7	7	0	0
Lack of internet connectivity	Principals	6	40	9	60	0		0	0	
		Teachers	53	53	27	27	20	20	0	0
Lack of access to computers	Principals	3	20	6	40	6	40	0	0	
		Teachers	27	27	53	53	20	20	0	0
Insufficient irregular supply or power	Principals	0	0	9	60	6		0	0	
		Teachers	20	20	47	47	33	33	0	0
High cost of hardware and software	Principals	9	60	6	40	0		0	0	
		Teachers	60	60	20	20	20	20	0	0
Un availability of appropriate software	Principals	3	20	12	80	0		0	0	
		Teachers	53	53	46	46	0	0	0	0
Structural arrangements of computer	Principals	12	80	3	20	0		0	0	
		Teachers	40	40	0	53	7	7	0	0

The table shows that majority 60% of the principals strongly agreed that there was inadequate number of computer while majority 53% of the teachers agreed on the same. On lack of internet connectivity, it was found that 60% of the principals agreed while 53% of the teachers strongly agreed. The principals agreed and disagreed at 20% that

there was lack of access to computers while 53% of the teachers agreed on the same. Majority, 60% of the principals, disagreed that there was insufficient, or irregular power supply and 47% of the teachers disagreed on the same. It was found that there was high cost of hardware and software as shown by 60% of principals who strongly agreed and 60% of teachers who strongly agreed. It was found that there was unavailability of appropriate software, and there was no structural arrangement of computer.

4.4.5 Availability of ICT infrastructure in school

The students were asked to indicate whether the school had ICT infrastructure. Table 4.12 depicts the findings.

Table 4.12: Availability of ICT infrastructure in school

Availability of ICT infrastructure in school	Frequency	Percent
Yes	217	70
No	93	30
Total	310	100

Table 4.12 shows that majority 70% of the students indicate that ICT infrastructure in school was available while 30% indicated that there was no ICT infrastructure in school.

4.4.6 Access to ICT infrastructure

The students were requested to note whether they had access to ICT infrastructure. Table 4.13 present the findings.

Table 4.13: Access to ICT infrastructure

Access to ICT infrastructure	Frequency	Percent
Yes	139	45
No	171	55
Total	310	100

It was found that majority 55% of the students did not have access to ICT infrastructure while 45% had access to ICT infrastructure.

4.5 Subject Content

The respondents were asked to indicate the level of integration of ICT in teaching and learning of different subjects in their school. Table 4.14 depicts the findings.

Table 4.14: Subject Content

Level of integration of ICT in teaching and learning of different subjects in your school	Principals		Teachers	
	Frequency	Percent	Frequency	Percent
Very Satisfactory	3	20	13	13
Satisfactory	6	40	27	27
Fair	6	40	40	40
Poor	0	0	20	20
Totals	15	100	100	100

The table shows that majority of the principals indicated that it was satisfactory with a response rate of 40% while another 40% indicated that the level of integration of ICT in teaching and learning of different subjects in their school was fair. Majority, 40% of the teachers, indicated that the level of integration of ICT in teaching and learning of different subjects in your school was fair, followed 27% who indicated that it was

satisfactory, 20% indicated it was poor while 13% indicated that it was very satisfactorily.

Table 4.15 shows how principals and teachers rated ICT integration in various teaching subjects.

Table 4.15: Principals and teachers rating on Subject ICT integration

Subject	Principals		Teachers		Average
	Frequency	Percent	Frequency	Percent	Percentage
Mathematics	0	0	0	0	0%
Biology	9	60	80	80	70%
Chemistry	3	20	70	70	45%
Physics	1	7	3	3	5%
English	1	7	7	7	7%
Kiswahili	0	0	8	8	4%
Geography	2	13	27	27	20%
History	0	0	6	6	3%
RE	0	0	4	4	2%
Agriculture	0	0	2	2	1%
Computer	11	73	97	97	85%

On the subjects, it was found that computer studies was rated very good on integration of ICT in teaching and learning with a high percentage of 85%. This was followed by biology which was rated good with 70% integration. There was fair integration of chemistry with 45%. Geography had poor integration of 20% while the rest had poor integration of less than 10%. Mathematics had the poorest integration of 0%.

The students were asked to rate the following statements on ICT integration in the classroom in subjects.

Table 4.16 shows the response of student on ICT integration.

Table 4.16: Students rating on ICT integration in subjects

Statement	Strongly agree		Agree		Disagree		Strongly disagree	
	F	P	F	P	F	P	F	P
ICT integration in the classroom teaching improves academic standards	105	34	121	39	53	17	31	9
ICT integration waste a lot of time	59	19	68	22	146	47	37	13
The old generation teachers cannot cope with ICT	96	31	121	39	59	19	34	11
ICT integration is very interesting and a big boast to learning	146	47	102	33	50	16	12	5
ICT integration helps schools to cover the syllabus in time	50	16	59	19	140	45	62	20

The students agreed 39% that ICT integration in the classroom teaching improves academic standards. The students disagreed that ICT integration waste a lot of time as shown by 47%. The students agreed 39% that the old generation teachers cannot cope with ICT and ICT integration is very interesting and a big boast to learning strongly

agreed 47%. The students disagreed that ICT integration helps schools to cover the syllabus in time as shown by 45%.

4.6 Level of ICT Training

The study examined the level of ICT training received in this section.

4.6.1 Received Any Form of ICT Training

The respondents were asked to indicate whether they had received any form of ICT training

Table 4.17 shows their response

Table 4.17: Received Any Form of ICT Training

	Principals		Teachers	
Received Any Form of ICT Training	Frequency	Percent	Frequency	Percent
Yes	9	60	27	27
No	6	40	73	73
Total	15	100	100	100

Majority, 60% of the principals, had received ICT training while 40% did not receive any ICT training. It was found that majority 73% of the teachers did not have any ICT training while 27% had done attended an ICT training programme.

4.6.2 Factors that influence the level of teachers ICT knowledge and skills

The respondents were asked to rate the factors that influence level of teachers ICT knowledge and skills and the results are depicted in table 4.18

Table 4.18: Factors that influence the level of teachers ICT knowledge and skills

Statement		Strongly Agree		Agree		Disagree		Strongly disagree	
		F	P	F	P	F	P	F	P
Lack of finance to train on the use of ICT program	Principals	4	80	1	20	0	0	0	0
	Teachers	40	40	53	53	7	7	0	0
Insufficient amount of pre- service training on ICT	Principals	6	40	9	60	0	0	0	0
	Teachers	53	53	27	27	20	20	0	0
Lack of time for in – servicing staff on ICT	Principals	9	60	3	20	3	20	0	0
	Teachers	46	46	53	53	0	0	0	0
Lack of familiarity with good practice rooted on understanding of how learners learn	Principals	12	80	3	20	0	0	0	0
	Teachers	33	33	40	40	27	27	0	0

The study found that the schools lack finance to train on the use of ICT program as shown by 80% of principals and 53% of teachers. The schools have insufficient amount of pre- service training on ICT as shown by 60% of principals and 53% of teachers. 60% strongly agreed of the principals indicated that there was lack of time for in – servicing staff on ICT while 53% of the teachers agreed on the same. It was found that 80% of the principals strongly agreed that there was lack of familiarity with good practice rooted on understanding of how learners learn while majority 40% of the teachers agreed on the same.

4.6.3 Enough ICT competent teachers

The students were asked to indicate whether there were enough ICT competent teachers.

Table 4.19 shows their response.

Table 4.19: Enough ICT competent teachers

Enough ICT competent teachers	Frequency	Percent
Yes	105	34
No	205	66
Total	310	100

The table shows that majority of the students indicated that there was not enough ICT competent teachers while 34% indicated that there were enough ICT competent teachers.

4.6.4 Lack of trained enough ICT skilled teachers

The students were asked to indicate whether lack of enough ICT skills in their teachers affect the integration of ICT in teaching and learning. The results of the findings were shown on table 4.20.

Table 4.20: Lack of trained enough ICT skilled teachers

Lack of enough ICT skills in their teachers affect the integration of ICT in teaching and learning	Frequency	Percent
Yes	251	81
No	59	19
Total	310	100

It was found that Lack of enough ICT skills in their teachers affect the integration of ICT in teaching and learning as shown by 81% who indicated yes while 19% indicated that Lack of enough ICT skills in their teachers did not affect the integration of ICT in teaching and learning.

4.7 Attitudes of teachers

The researcher wished to establish the attitude of teachers in ICT; whether teachers had a fear of technology and their usage in class all the time.

4.7.1 Attitude towards ttechnology

The research requested the respondents to indicate whether the teachers had the fear of technology in ICT. Data was collected and records from the principals and teachers as shown in table 4.21

Table 4.21: Attitude of teachers towards technology

Fear of Technology	Principals		Teachers	
	Frequency	Percent	Frequency	Percent
Yes	6	40	67	67
No	9	60	33	33
Total	15	100	100	100

It was found that majority of the principals did not have fear of technology as shown by 60% while 40% had fear of technology. On the teachers, it was found that majority 67% had fear technology while 33% did not have fear of technology.

4.7.2 ICT Usage in Class all the Time

The respondents were asked to indicate the level of agreement on ICT usage in class.

Table 4.22 presents the findings.

Table 4.22: Usage of ICT in Class all the Time

Description		Strongly Agree		Agree		Disagree		Strongly disagree	
		F	P	F	P	F	P	F	P
I would use ICT in class all the time if given a chance	Principals	9	60	6	40		0	0	0
	Teachers	40	40	53	53	7	7	0	0
ICT integration is very interesting and a big boost to learning	Principals	3	3	9	60	3	20	0	0
	Teachers	27	27	53	53	20	20	0	0
ICT wastes a lot of time	Principals	0	0	6	40	9	60	0	0
	Teachers	20	20	33	33	47	47	0	0
ICT integration is very involving	Principals	12	80	3	20	0	0	0	0
	Teachers	40	40	53	53	7	7	0	0
Only the young generation can use ICT integration in teaching and learning	Principals	0	0	3	20	12	80	0	0
	Teachers	33	33	27	27	40	40	0	0

Findings show that most principals (60% strongly agreed) and teachers (53% agreed) that they would use ICT in class all the time if given a chance. It was agreed that ICT

integration is very interesting and a big boost to learning as shown by 60% of principals and 53% of teachers who agreed. The respondents disagreed that ICT wastes a lot of time as shown by 60% of principals and 47% of teachers. The respondents indicated that ICT integration is very involving, and they disagreed that only the young generation can use ICT integration in teaching and learning.

4.7.3 Students like using computer

The students were requested to indicate whether they liked using computers in their learning experience. Table 4.23 shows the findings.

Table 4.23: Students like using computer

Students like using computer	Frequency	Percent
Yes	267	86
No	43	14
Total	310	100

The table shows that majority 86% of the students indicated that they like using computers in their learning experience while 14% indicated that they did not like using computers in their learning experience.

CHAPTER FIVE
SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND
RECOMMENDATIONS

5.1 Introduction

This chapter contains a summary of the findings as drawn from chapter four; it contains an abridged form of overall findings. It expresses the researcher's convictions of the findings as they are. This has been done by comparing and contrasting them with other empirical findings in chapter two. Finally, the chapter suggests areas for further research.

5.2 Summary of Findings

According to the findings of the study it became apparent that 100% of the schools researched had available email addresses. The findings of the study revealed that in majority of the schools, the ICT equipment was well maintained whereas some schools did not show concern for the welfare of the equipment.

The researcher found out that majority of the schools under-utilized the ICT facilities. As the researcher administered the interviews and questionnaires, several realizations came to light. That most of the respondents both principals and teachers felt that there were inadequate computers. That there is lack of proper internet connectivity, irregular power supply, high cost of hardware and software. The researcher also found that they had no appropriate educational software and thus negatively impacted on the capability of proper ICT integration in teaching and learning.

According to the findings of the research, the researcher found out that majority of the respondents who were supposed to be the key players in implementing use of ICT in teaching and learning had not received any form of ICT training.

From the analysis of the questionnaires administered it came out strongly that several factors influenced the levels of teacher's ICT knowledge and skills. These included lack of finance to train on the use of ICT programs, insufficient amount of pre-service training on ICT and a lack of time due to tight work and study schedules. Moreover, most of the respondents did not have the proficiency to prepare lessons involving use of ICT or identifying learning situations suitable for ICT use.

According to the findings of the study, it was also revealed that majority of the respondents were not able to find useful curriculum resources on the internet. Neither were they able to monitor student progress using computers. It was also revealed that teacher could not use ICT in giving effective presentation or use ICT for collaborating with others. Lastly, these curriculum implementers could not install educational software's on computers and use internet to support student learning unless they had help from a third party to do the same.

The study revealed that majority of the principals did not fear technology while majority of the teachers had fear of technology. This shows that for ICT integration to be effective this one bit has to be dealt with by focusing more on growing the skills of those who are involved in implementing it that is the teachers and students. The findings of the study

proved that many of the respondents felt that there is no maximum usage of ICT in class all the time.

5.3 Discussion of Findings

The purpose of this study was to elucidate factors influencing integration of ICT into teaching and learning in secondary schools in Kenya: a case of selected secondary schools in Lamu west Sub County. The discussion is based on the study research questions which are; i) To what extent does ICT Infrastructure influence integration of ICT in teaching and learning in secondary schools of Lamu West Sub County?; ii) To what extent does subject content availability influence integration of ICT in teaching and learning in secondary schools of Lamu West Sub County?; iii) To what extent does the level of ICT training influence integration of ICT in teaching and learning in secondary schools of Lamu West Sub County?; iv) To what extent does teachers' attitude influence integration of ICT in teaching and learning in secondary schools of Lamu West Sub County?

5.3.1 Integration of ICT in Teaching and Learning

A survey done by the Kenya National examination Council revealed that students' academic performance and interest in secondary school biology has been generally poor. This has been attributed to the current methods of instruction, for instance, the expository approach of instruction in which the teacher spends most of the time giving verbal explanations in the form of talk and chalk while students listen and write notes from chalk board. Obviously, such inadequate and limited teaching methods tend negatively to affect the learners view of scientific concepts and associated methods (Kiboss &

Ogunniyi, 2003). The study assessed the effects of computer based instruction simulation (CBIS) program developed for the teaching of biology, on improving students understanding and perception of the cell theory. The findings in this study reaffirmed that the use of computer based instructional programs tend to improve achievement scores of students as compared to the use of traditional or regular methods on instruction (Ndirangu, 2006).

In this study, research findings indicated that all the sampled schools researched had available email addresses. Findings also indicated that only half the schools had well maintained equipment. It was also clear from the research findings that a significant majority (67%) under-utilised the facilities. These findings were substantiated by the finding that all teachers and students who participated in the research felt that there were inadequate computers, lack of proper internet connectivity, irregular power supply, high cost of hardware and software and no appropriate educational software which negatively impacted on the capability of proper ICT integration in teaching and learning. Lack of these facilities, equipment, and software could be contributing to the under-utilization of the ICT facilities.

This study concurs with (Gulbahar & Guven 2008) that schools need to be equipped with the necessary ICT infrastructure in order to equip the next generations with the needed tools and resources for access and use and to be able to attain the expected skills. Afshari, (2009) also concurs with this study and argues that limited access to computers is a barrier to effectively using computers in classes. Lastly Muntaz, 2006 observed that

lack of well established ICT infrastructure is one of the reasons why teachers do not use technology in their classes.

5.3.2 Infrastructure and Integration of ICT in Teaching and Learning

As (Gunga and Rickets, 2006) puts it there is need to commit ourselves to innovative rural electrification projects to benefit both rural schools and communities. This can be more innovative with the application of solar energy system for electric power.

This research finding conquers with Gunga and shows that there was lack of proper internet connectivity, irregular power supply, high cost of hardware and software and no appropriate educational software which negatively impacted on the capability of proper ICT integration in teaching and learning.

Just as Gulbahar & Guven (2008) suggested schools need to be equipped with the necessary ICT infrastructure in order to equip the next generation with the needed tools and resources for access and use and to be able to attain the expected skills.

Efficient and effective use of technology depends on the availability of hardware and software and the equity of access to resources by staff. The quest for connectivity has faced numerous challenges and requires major shifts in the regulatory environment as well as the new attention to public- private partnerships and social sizes. Developed countries have 80% of the world's internet users. (UNHD, 2001).

5.3.3 Subject Content and Integration of ICT in Teaching and Learning

As many policy makers worldwide, found out updating the content of learning material should lead to pedagogic change along with significant technological within subject teaching. In England at least, however, this rhetoric of ‘modernization’ has barely touched curriculum and assessment in core subjects, where a powerful rhetoric of ‘raising standards’ maintains a view of academic capability as independent of technology use (Fullan, 2001).

The study concure with Muriithi,2005 on the present ICT merely dealing ‘teaching about computers’ and not how computers can be used to transform the teaching and learning in our schools. This study also agrees with a survey by Kandiri (2012) on ICT access and use on Kenya secondary schools displaying relatively small number of qualified ICT teachers in Kenyan schools.

The study found that computer studies and biology had good ICT integration of 85% and 70% respectively. There was fair integration in chemistry with 45% while the rest of the subjects had poor integration of 20% and below. Mathematics had the poorest integration with 0%.

5.3.4 Level of ICT Training and Integration of ICT in Teaching and Learning

A study by (Kandiri, 2012) on the usage and axcessibilty of ICT in Kenyan secondary schools reveals that, out of 2250 ICT teachers, who graduated from colleges, universities and other tertiary institutions in 2010, 1350 were absorbed in ICT services centers while 900 went to teach ICT educational institutions. Of those who chose teaching, 189 were absorbed in technical institutions while the rest in secondary schools. This number,

compared to other countries, shows that there is a small number of qualified ICT teachers in Kenyan schools.

The researcher of this study finding also indicated that a significant majority (65%) of the respondents who were supposed to be the key players in implementing use of ICT in teaching and learning had not received any form of ICT training. This is also a key contributing factor to the under-usage of the ICT infrastructure. The researcher also found out that several factors influenced the levels of teacher's ICT knowledge and skills amongst them being lack of finance to train on the use of ICT programs, insufficient amount of pre-service training on ICT and a lack of time due to tight work and study schedules. The study, therefore, concurs with Andoh, (2012) that teachers training institutions have continued to emphasize teaching about the technology rather than on how to use technology to teach.

Moreover, most of the respondents did not have the proficiency to prepare lessons involving use of ICT or identifying learning situations suitable for ICT use. Accordingly, a significant majority (70%) of the respondents were not able to find useful curriculum resources on the internet, monitor student progress using computer, use ICT in giving effective presentation, use ICT for collaborating with others, install educational software on computers and use internet to support student learning unless they had help from a third party.

5.3.5 Attitude of Teachers and Integration of ICT in Teaching and Learning

A study by (Simonson, 2008) showed that attitudes, skills, and perceptions were either directly or indirectly related to the usage of ICT in the process of teaching and learning. Teachers in ICT were more skilled, and this increased the likelihood of them using ICT in the classroom. Another study by (Drent & Meelissen, 2008) exhibited that positive attitude, computer experience, and entrepreneurship had a positive influence on the adoption and use of ICT by teachers. Nevertheless, a research by (Korte & Husing, 2007) suggested that few teachers perceived benefits of ICT in schools were not properly laid out.

Some teachers viewed ICT as waste of time and expensive. A report by (Becta, 2008) on a survey of UK teachers, (Andoh, 2012) showed that teachers' optimism on various potential benefits of ICT in schools, was moderate as they became unsure and even sometimes doubtful about the advantages. Woodrow, (2002) points that for a successful revolution of school practice; teachers have to develop positive attitudes toward innovations.

This study revealed that a majority of the teachers respondents had fear of technology whereas, this could also be a key factor in the under-utilization of ICT infrastructure in schools. On studying the attitudes, there was a significant agreement in the fact that ICT is not just for the young generation, and there is no way that it wastes time nor is it too involving and that ICT use in learning is both interesting and a big boost to learning.

The study, therefore, agrees with Scott (2011) on principals general positive attitudes toward the ICT. The study also noted just like Scotts statistical differences across the respondents gender, years of service, academic qualifications access to a computer and internet services, in-service training on ICT for training and learning, etc. which affected the integration of ICT into teaching and learning in public secondary schools.

5.4 Conclusion of the study

Based on the findings of the research, the following were points to be noted and action to be taken appropriately. The research concludes that emails are used in the sampled schools. There was fair maintenance of ICT equipment, and the schools did not show concern for the welfare of the equipment.

According to the findings of the research, the researcher found out that most of those who were supposed to be the key players in implementing use of ICT in teaching and learning had not received any form of ICT training.

Among the factors influencing the level of teachers, ICT knowledge and skills as per the analyses of the questionnaires administered were lack of finances to train on the use of ICT. Programs, insufficient amount of pre-service training on ICT and lack of time due to tight work and study schedules.

It was found that most of the teachers and few principals had fear of technology. This shows that for ICT integration to be effective, it is important to improve this by focusing more on growing the skills at those who are involved in implementing it that is, the

teachers and the students. The findings of this study, therefore, show that lack of proper mechanisms of equipping the teachers with skills to handle ICT has contributed to the state of ICT integration in our classrooms.

5.5 Recommendations

In view of the findings discussed in this study, the following recommendations were made:

- i) Teachers and students should all first and foremost be thoroughly trained on how to use the ICT equipment to avoid guesswork which may lead to breakdown of the equipment.
- ii) The policy makers and managers/Administrators should use the finding of this study to formulate teacher training programmes
- iii) These research findings may also be used to determine both initial, and in-service education and training (INSET) need for teachers in this 21st Century.
- iv) The government should along with the equipment offer a standard measure across all schools on the requirements for the set up of the ICT equipment along with the training content to be used.

5.6 Suggestions for Further Research

The researcher recommends a similar research to be conducted in other areas of Lamu County and other counties of the Republic of Kenya.

REFERENCES

- Abagi and Odipo, (2007). Teachers attitude towards technology. In S. McNeil, J. D. Price, S. Boger-Mehall, B. Robin, and J. Willis (Eds), *Proceedings of the Society for Information Technology and Teacher Education 9th International Conference*. Charlottesville: Association for the Advancement of Computing in Education
- Afshari, E. (2009). Research report for Gessometa review of ICT in education phase two. Retrieved on 8 December 2010 from <http://www.gesci.org/assets/files/Research/meta-researchphase2.pdf>
- Agarwal, R., & Prasad, J. (2007). *The Role of Innovation Characteristics and Perceived*
- Ajzen, I. (2009). *The Theory of Planned Behavior. Organizational Behavior and Human*
- Ananiadou, K & Rizza, C, (2010) *ICT in initial teacher training: First findings and*
- Andoh, B. (2012). An exploration of Teachers' skills, perceptions and practices of ICT in teaching and learning in the Ghanaian second-cycle schools, *Contemporary education technology* 3(1) 36-49
- Barnes, J. (2006). Planning strategically for technology integration. Conference proceedings of the Association for the Advancement of Computing in Education.
- Becta P. V. (2008). How to address Integration of ICT in Teaching Practice? Research on Factors influencing the use of ICT in Education. *Education in a technological world: communicating current and emerging research and technological efforts*. Mendez-Vilas (Ed.)
- Best and Khan, (2008). *Educational Research: An Introduction*, (4th edition) Longman publishers; New York.
- Birungi and Ngwenyama, (2008). *Towards a knowledge society for African development*. Uganda Library Association (ULA). Kampala, Uganda.

- Bollou and Ngwenyama, (2008). *Are ICT investments paying off in Africa an analysis of total factor productivity in Six West African Countries from 1995 to 2002. Information Technology for Development, 14(4), pp 294-307.*
- Borg, W. R., and Gall, M.D., (1989). *Educational Research; an Introduction*, 5th Ed
- C.M., G, H.J. K. 2008. Closing the Chasm: Are Secondary School Teachers in Kenya Using ICTs Effectively to Deliver Curriculum Content? 30 May eLearning Africa. , Accra, Ghana
- Carnoy, M., & Rhoten, D. (2002). What Does Globalization Mean for Educational Change? A Comparative Approach. *Comparative Education Review, 46(1), 1.*
- Chen, J. (2011). The effects of education compatibility and Technological expectancy on e-learning acceptance. *Computer & Education vol.53 (2011)*
- ChenYen, N. (2003). Cultural issues in the design of technology-enhanced learning systems. *British Journal of Educational Technology, 30(3), 217–230.*
- Cogill, J. (2003). „The use of interactive whiteboard in the primary school: Effects on Pedagogy. A Report of ICT Research Bursaries 2003.
conclusions of an OECD study, proceedings of EDULEARN 10 conference, 5th-7th july 2010, Barcelona, Spain.
Decision Process, 52 (2), 179-211
- Dexter, S.L. (2000). School Technology Leadership: Incidence and Impact (Teaching, Learning, and Computing: 1998 National Survey Report 6).
- Dowes, L. (2000). *First connections: Teachers and the national grid for learning Computers and Education* UK Chapman and Hall

- Dowes, M. (2003). E-learning technologies and its application in higher education: A descriptive comparison of Germany, United Kingdom and United States (Unpublished doctoral dissertation). Maximilians-Universität Munchen.
- Drent, M. & Meelissen, M. (2008) Which factors obstruct or stimulate teachers educators to use ICT innovatively? *Computers & Education* 51 (1) 187-199
- Farrel, G.M. (2007). ICT in Education in Kenya" Survey of ICT an Africa: Kenya Country Report. www.infodev.org
- Fishbein, M. & Ajzen, I. (1975). *Belief, Attitude, Intention and Behavior* Reading, MA: Addison. Wesley Publishing Company, Inc.
- Fullan, M. (2001). *The New Meaning of Education Change*. London: Routledge Falmer.
- Gakuu, C. M. (2006), An analysis of the factors and attitudes that influence lecturers' readiness to adopt the use of ICT. PhD. Dissertation University of Nairobi, Kenya. (Unpublished)
- Gay L. R. & Airasian, P (2003): *Educational Research; Competencies for Analysis and Applications*. Merrill Prentice Hall, Person Education, Upper Saddle River, New Jersey
- Gilbert R., C. (2000). Technology infusion and higher education: Changing teaching and learning. *Innovative Higher Education*, 24(3).
- GOK (2005) *Session Paper No.1 of 2005 on a policy Framework for Education, Training, and Research*; Government printer, Nairobi Kenya
- GOK, (2007) *4 globally Competitive and Prosperous Kenya. Vision 2030*
- GOKO.A.K,(2012) *Factors Affecting the use of Information and Communication Technology in Teaching and Learning in Secondary Schools in Kangema-Murang'a county*. Unpublished MEd project, Kenyatta University.

- Gulbahar, Y., & Guven, I. (2008). *A Survey ICT Usage and the perceptions of social studies Teachers in Turkey*. *Educational Technology & Society* 11(3),37-51
- Gunga P.C. (2007). *Implementing computer technologies: Teachers' perceptions and practices*. *Journal of Technology and teacher education*, vol. 14,no.1, pp. 173-207.
- Gunga, S. O.,and Ricketts, I. W (2006). *Facing the Challenges of e-learning in African Universities* *British Journal of Education Technology*. Malden, U.S.A: Blackwell Publishing Co.
- Hennessy, S. (2010) *Developing the use of Information and Communication Technology to enhance teaching and learning in East African schools: Review of the Literature* Aga Khan University Nairobi Kenya
- Higgins, S. & Moseley, D. (2011) *Teachers' thinking about ICT and learning: believes and outcomes*. *Journal of Teacher Development* 5 (2) 191-21
- Hsu, C. & Chin, M. (2004). *Teachers' beliefs and integration of information and communications technology in Italian schools*. *Journal of Information Technology for Teacher Education*, 10(1&2), 63-8
- Huang, A. Y., Liaw, A., (2008). *Cultural issues in the design of technology-enhanced learning systems*. *British Journal of Educational Technology*, 30(3), 217–230.
- IPS, (2003). *Teacher Training on ICT use in Education in Asia and the Pacific: Overview from Selected Countries*. Bangkok: UNESCO.
- Isaacs S, Broekman, I and Mogale, T. (2003). *Africa and the Information Age. Chapter1 Contextualizing Education in Africa: The Role of Information and Communication Technologies in Africa: Vol. 3* IDRC Publications.
- Jensen, M. (2002). *Information and Communication Technologies (ICTs) in Africa –A Status Report: UN ICT Task Force “Bridging the Digital Divide in the 21 century*

Presented to the Third Task Force Meeting United Nations-Headquarters” <http://www.um'cttaskforce.orthkdmeeting/documents/iensen%20v6.htm>

Jimoyiannis, A. & Komis, V. (2007) Examining teachers' beliefs about ICT in education: implications of a teacher preparation program, *Teacher Development, An international journal of teachers' professional development*, 11(2) 149-173

Kamau George Kamau (2008) Constraints on the use of ICT in teaching – learning processes in secondary schools in Nyandarua South district, Nyandarua county, Kenya

Kamel, M., & Yadollahi, S. (2007). Computer Anxiety and ICT integration in English classes among Iranian EFL teachers. *Procedia Computer Science*, 3, 203-209.

Kamel, T., & Weigler, D., (2001). *Designing Constructivists“ Learning Environments*, Springer-Verag.

Kandiri, M. (2012) *A survey on ICT Access and use in Kenya secondary schools*. Summit strategies ltd, Nairobi, Kenya

Keengwe, J. & Onchwari, G. (2011) Computer Technology integration and student learning: Barriers and promise, *Journal of Science Education and Technology* 17(2011) 560-570

Keiyoro P (2010) factors influencing integration of ICT in teaching science curriculum; published thesis , Nairobi

Kibos and Ongunniyi, R. (2003). ICT and educational reform in developed and developing countries. Paris: OECD. Retrieved on 12 November 2011 from http://download.intel.com/education/ws/ICT_Education_Reform_Economic_Growth.pdf

- Kiboss, P. & Ogunniyi, M. J. (2003). Technological pedagogical content knowledge: A new framework for teacher knowledge. *Teachers College Record*
- Kidombo and Gakuo (2008). Closing the Chasm: are the secondary school teachers in Kenya using ICT effectively to deliver curriculum content? University of Nairobi school of continuing and Distance Education.
- Kiptalam K.& Rodrigues, A.J (2010). Accessibility and utilization of ICTS among secondary school teachers in Kenya retrieved from <http://www.ictworks.org/2011/09/12/12-challenges-facing-computer-educationkenyan-schools>.
- Kirkup, G., & Kirkwood, A. (2005). Information and communications technologies (ICT) in higher education teaching, a tale of gradualism rather than revolution. *Learning, Media, & Technology, 30(2)*, 185-199.
- Kombo .D.K. and Tromp, D.L.A. (2006)*Proposal and Thesis Writing: An Introduction. Nairobi: Paulines Publications Africa. "*
- Korte K. H. & Husing H. (2007). Barriers to the Introduction of ICT into Education in Developing Countries: The Example of Bangladesh. Vol.5, No.2. E-ISSN: 1308-1470, 1694-609x. *International Journal of Instruction*.
- Kothari K. (2004). *Research Methodology, Methods & Technique: New Age International Publishers, New Delhi.*
- Kozma, R, & Wagner, D. (2006). *Reaching the most disadvantaged with ICT: what works*. In R: Sweet & D. Wagner (Eds.), *ICT in non-formal and adult education: Supporting out-of-school youth and adults*. Paris: OECD.
- Kumar, P. A. (2005). An examination of the factor structures of the Computer Attitude Scale. *Journal of Educational Computing Research, 17(4)*, 341-356.

- Langmia, K. (2005). *The role of ICT in the economic development of Africa: The case of South Africa*. Bowie State University, USA *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 2005, Vol. 2, Issue 4, pp. 144-156.
- Lim, C. P., Sew, K. M., Hew, T., Wong, P., & Shanty, D. (2003). Exploring critical aspects of information technologies integration in Singapore schools. *Australian Journal of Educational Technology*, 19(1), 1-24.
- McDonald, C & Davis, J. (2010): A framework for analysing ICT adoption in Australian primary schools *Australasian Journal of Educational Technology* 2010, 23(4), 559-582. Retrieved on 1st April 2012 from <http://www.ascilite.org.au/ajet/ajet23/way.html>
- MOET. (2008). Directive on Promoting Teaching, Training, and Applying ICT in Education - Period 2008-2012 (55/2008/CT-BGDdT).
- Mugenda, D, M & Mugenda, A.G. (1999): Research methods. Qualitative and quantitative approaches. Nairobi Acts Press
- Mugenda, M. (2006). *University Roles in Meeting Aspirations for ICT and Economic Development Frontier of Knowledge*. University Leaders' Forum. Cape Town, Nov. 19-26th 2006.
- Mugenda, O.M. & Mugenda, A. G. (2003). Research Methods: Quantitative and Qualitative Approaches. Nairobi: Acts Press.
- Muriithi P. (2005). A framework for integrating ICT in the teaching and learning the process in secondary schools in Kenya. MSc. Thesis submitted at the University of Nairobi, School of computing and Informatics.

- Murphy, Anzalone, Bosch and Moulton, (2007). *ICT integration processes in Turkish schools: Using activity theory to study issues and contradictions*. New York: Longman
- Mutaz, R.F. (2000). *Building a new structure for school leadership*. Washington, DC: Albert Shanker Institute.
- Ndirangu, Mwangi. (2006). *The use of Instructional Simulation to Support Classroom Teaching. Journal of Education Multimedia and Hypermedia*. Egerton University: Kenya
- Ndiritu AW, Mburu D, Kimani G. "ICT integration in Early Childhood Development teacher training Curriculum: Need to start from the beginning.". In: 3rd KIE Education symposium. KENYA INSTITUTE OF EDUCATION; 2013.
- Olaleye, F.O. (2011). *Teachers' characteristics as predictors of academic performance of students in secondary schools in Ogun state, Nigeria*. In *European Journal of Educational studies* pg.(30, 2011.
- Oloo B (2009). *Study on ICT Access Gaps in Kenya*. Report Prepared for Communication Commission of Kenya (CCK).
- Omwenga, E. I. (2003) *Pedagogical Issues and E-learning Cases: Integrating ICTs into*
- Omwenga, E., Waema, T., & Wagacha, P. (June 2004). *A model for introducing and implementing e-learning for delivery of educational content within the African context*. *African Journal of Sciences and Technology* 5(1) 35-48.
- Orodho J.A. (2005): *Elements of Education and Social Science Research Methods*, Kanezja Publishers, Kenya
- Posner, G. J. (2008). *Analyzing the Curriculum*. New York: McGraw-Hill.

- Rimyan, S. (2006). Secondary mathematics teachers' responses to computers and their beliefs about the role of computers in their teaching. *MERGA 22 Conference Proceedings*, 404-410.
- Rogers, E.M. (2003). *Diffusion of innovations (5th ed.)*. New York: Free Press.
- Samad A. A. (2009). Enhancing Human Capital through Teacher Education proceedings of the 1st International Conference on Educational Research and Practice (ICERP).
- Scot, R.S. (2011). The integration of instructional technology into public education: Promises and challenges. *ET Magazine*, 42(1), 5-13
- Scrimshaw, P. (Ed.). (2004). *Enabling teachers to make successful use of ICT*: Coventry: British Educational Communications and Technology Agency.
- Shama, N. (2007). Technology in teacher education in the USA: What makes for sustainable good [7]. *practice? Technology, Pedagogy, and Education*, 12(1), 59-84
- Shunguyia, V. (2010). Technology integration in education in developing countries: Guidelines to policy makers. *International Education Journal*, 6(4): 467-483. Retrieved on 1 December 2011 from <http://ehlt.flinders.edu.au/education/iej/articles/v6n4/jhurree/paper.pdf>
- Simonson A. (2008). ICT Skills and Attitude as Determinants of ICT Pedagogy Integration. *European Academic Research*, 1(3), 316-317. Teaching and Learning process, Available online at http://scholar.google.com/scholar?q=Omwenga+Elijah%2C+thesis&btnG=&hl=en&as_sdt=0%2C5&as_vis=1

- Teo, T. (2012) Pre-service teachers' attitudes towards computer use: A Singapore survey. *Australasian Journal of Educational Technology* 24 (4) 413-424
- Tin K.L. (2002,). *Effective teaching in the information era: fostering an ICT based, integrated learning environment in schools Asia-Pacific Journal for Teacher Education & Development*5(Y):pp. 21-45
- Twig. P. (2001). Teaching and technology in higher education: Student perceptions and personal reflections. *Computers & Education*, 39(3), 207-317.
- UNESCO. (2008). Report of the Experts" Meeting on Documenting Experiences in the use of ICT in Education and Schoolnet Operations. Bangkok: UNESCO Bangkok
- UNHD (2008); *Ministerial Strategic Plan*. Ministry of Information, Communications and Technology. Nairobi. Government Printers.
- Voluntaries in the Acceptance of Innovation Technologies*. *Decision Sciences*, 28 (3), 557-582.
- Von Braak, J. Toney, J. & Valake, M. (2008). Explaining different types of computer use among primary school teachers. *European Journal of Psychology of Education* 19(1)407-422
- William, P. & Massy, M. and Zemslay, J. (2010). Technological pedagogical content knowledge: A new framework for teacher knowledge. *Teachers College Record*, 108(6), 1017-1054.
- Woodrow, J. (2002). The influence of programming training on the computer literacy and attitudes of pre-service teachers. *Journal of Research on Computing in Education* 25 (2) 200-219
- World Bank,(2006). *Information and Communication for Development: Global Trends and Policies* Washington D.C: The World Bank Institute.

APPENDICES

APPENDIX I: LETTER OF INTRODUCTION TO RESPONDENTS

University Of Nairobi
Dept. Of Distance Studies
P. O. Box 92
Kikuyu
14th July 2015

Dear Respondent,

RE: LETTER OF INTRODUCTION TO RESPONDENT

I am a post graduate student at the University of Nairobi pursuing a master in distance education (MDE). I am conducting a study of **Factors Influencing Integration of ICT in teaching and learning. A case of secondary Schools in Lamu County, Kenya.**

I hereby request you to respond to the questionnaire items as honestly as possible and to the best of your knowledge.

The attached questionnaires are designed for this research purpose only; therefore the responses shall be absolutely confidential. Please note that you may not write your name or the name of your institution.

Thank you in advance

Yours sincerely

Priscilla Mutie Daido
MDE Student-University of Nairobi

APPENDIX II: QUESTIONNAIRE FOR THE PRINCIPAL AND THE TEACHER

Kindly answer the following questions. Do not write your name on the questionnaire.

The researcher would like to assure you that the information gathered will be held with utmost confidentiality. Please be as honest as possible and answer the questions appropriately by putting a tick against the appropriate statement or by filling in the blank space.

SECTION 1: Demographic Information

1. What is your gender

Male () Female ()

2. Indicate your age

25years or less () 26 -35 years () 36-45 years () 46-55 years ()

3. Indicate your highest academic level

PhD () Master Degree level () Undergraduate Degree level () Diploma level ()

Other ()

4. For how long have been teaching in this school

Less than a year () 1-5 years () 6-10 years () 11-15 years () More than 15 years ()

Infrastructure availability

5. Do you have an Email Address for your school?

Yes []

No []

6. How is your computer serviced or maintained?

Very well []

Well enough []

Not at all []

We don't have computers at all []

7. Your school is underutilizing the ICT facilities you have. Do you agree?

Strongly agree []

Agree []

Disagree []

Not applicable []

8. The following are statements concerning ICT infrastructural capacity as found in different schools. By use of a tick kindly indicate the extent to which the statement influence the integration of ICT in teaching and learning as pertains your school. Key: SA- Strongly Agree, A- Agree, U- undecided D- Disagree, SD- strongly Disagree

Statement	SA	A	U	D	SD
Inadequate number of computer					
Lack of internet connectivity					
Lack of access to computers					
Insufficient or irregular power supply					
High cost of hardware and software					
Un availability of appropriate software					
Structural arrangements of computer					

Subject Content

Direction

9. Please write your rating on the space before each option which corresponds to your best choice in terms of integration of ICT in teaching and learning of different subjects in your school.

Respond mode rating Description

Very Satisfactory	(5)
Satisfactory	(4)
Fair	(3)
Poor	(2)
Not applicable	(1)

- b) Kindly rate the following subjects based on ICT integration in the subjects

1. Mathematics
2. Biology
3. Chemistry
4. Physics
5. English
6. Kiswahili
7. Geography
8. History
9. RE
10. Agriculture
11. Computer

Level of ICT Training

10. Have you ever received any form of training in ICT

Yes () No ()

11. The following factors influence the level of teachers ICT knowledge and skills.

Indicate the extent to which you agree that the reasons influence the level of teachers ICT knowledge and skills.

Statement	SA	A	U	D	SD
Lack of finance to train on the use of ICT program					
Insufficient amount of pre- service training on ICT					
Lack of time for in – servicing staff on ICT					
Lack of familiarity with good practice rooted on understanding of how learners learn					

Attitudes

12. Do you have a technology or computer phobia? (Fear]

a. Yes they do []

b. Some have []

c. No, they don't []

d. I don't know []

Description	Strongly agree	Agree	Disagree	Strongly disagree
I would use ICT in class all the time if given a chance				
ICT integration is very interesting and a big boost to learning				
ICT wastes a lot of time				
ICT integration is very involving				
Only the young generation can use ICT integration in teaching and learning				

APPENDIX III: QUESTIONNAIRE FOR STUDENTS

Kindly answer the following questions. Do not write your name on the questionnaire.

The researcher would like to assure you that the information gathered will be held with utmost confidentiality. Please be as honest as possible and answer the questions appropriately by putting a tick against the appropriate statement or by filling in the blank space.

Section A: Demographic Information

1. What is your gender?

Male []

Female []

2. Age

14 years () 15 years () 16 years () 17 years () Above 18years ().

Infrastructure availability

3. Does your school have enough infrastructures?

Yes () No ()

4. Are you able to access ICT infrastructure in your school?

Yes () No ()

Training

5. Do you have enough ICT competent teachers?

Yes () No ()

6. Do you think the lack of enough ICT skills in your teachers affect the integration of ICT in teaching and learning?

Yes () No ()

Subject content

7. Do student in this school enjoy ICT lessons and if so to what percentage?

Yes () No ()

		Strongly agree	Agree	Disagree	Strongly disagree
8.	ICT integration in the classroom teaching improves academic standards				
9.	ICT integration waste a lot of time				
10.	The old generation teachers cannot cope with ICT				
11.	ICT integration is very interesting and a big boast to learning				
12.	ICT integration helps schools to cover the syllabus in time				

Attitudes

13. To what extent do the students like using computers in the studies

High extent ()

Moderate extent ()

Low extent ()

14. Are students comfortable using computers in your school?

Yes () No ()

APPENDIX IV TABLE FOR DETERMINING SAMPLE SIZE FOR A GIVEN POPULATION

Table for Determining Sample Size for a Given Population									
N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Note: "N" is population size
"S" is sample size.

Source: Krejcie & Morgan, 1970

APPENDIX V
LAMU WEST SECONDARY SCHOOLS ENROLMENT AND STAFF ESTABLISHMENT JUNE 2015

				Form 1				Form 2				Form 3				Form 4				Teachers			
COUNTY	LAMU				M	F	Total	Classes	M	F	Total	Classes	M	F	Total	Classes	M	F	Total	Classes	M	F	Total
Subcounty	Zone	School	Key station code																				
LAMU WEST	KIONGWE	MPEKETONI	6803	140	0	140	4	135	0	135	4	150	0	150	4	128	0	128	4	20	8	28	
		UZIWA	6814	38	30	68	2	34	28	62	2	43	32	75	2	40	33	73	2	8	1	9	
		KIONGWE SEC.	NEW	31	31	61	1	40	31	71	1	22	13	35	1	16	15	31	1	2	2	4	
		BAHARI SEC.	NEW	39	26	65	2	31	24	55	2	34	29	63	2	43	28	71	2	6	3	9	
	HONGWE	MAJEMBENI	NEW	30	23	53	1	28	31	59	1	27	17	44	1	14	6	20	1	5	0	5	
		LAKE KENYATTA	NEW	73	66	139	3	93	64	157	3	81	69	150	3	60	40	100	2	5	1	6	
		MKUNUMBI	6812	14	21	35	1	16	5	21	1	14	10	24	1	7	2	9	1	5	2	7	
		HONGWE	6808	70	46	116	3	54	40	94	3	97	36	133	3	64	30	94	3	14	2	16	
	AMU	LAMU GIRLS	6802	0	136	136	3	0	144	144	3	0	129	129	3	0	103	103	3	15	11	26	
		MATONDONI	NEW	17	11	28	1	3	7	10	1	12	12	24	1	13	13	26	1	5	1	6	
		WIYONI	NEW	36	25	61	2	67	35	102	2	61	38	99	2	0	0	0	0	5	1	6	
		SHELLA BRIGHT GIRLS	NEW	0	38	38	1	0	24	24	1	0	37	37	1	0	41	41	1	4	3	7	
		MOKOWE	6807	51	44	95	2	48	28	76	2	42	33	75	2	37	41	78	2	10	5	15	
		LAMU BOYS	6801	59	0	59	3	75	0	75	3	64	0	64	3	105	0	105	3	17	9	26	
		HINDI	6811	42	39	81	2	45	44	89	2	21	32	53	1	25	29	54	2	10	0	10	
	WITU	WITU MJINI	6813	22	29	51	1	32	20	52	1	28	15	43	1	33	12	45	1	7	0	7	
		WITU SECONDARY	6805	39	39	78	2	36	28	64	2	42	30	72	2	54	18	72	2	13	2	15	
		MOA	6816	20	12	32	1	16	15	31	1	22	11	33	1	21	10	31	1	5	1	6	
		TOTAL		721	616	1336	35	753	568	1321	35	760	543	1303	34	660	421	1081	32	156	52	208	