

**FACTORS INFLUENCING PEDAGOGICAL INTEGRATION OF
INFORMATION COMMUNICATION AND TECHNOLOGY IN
TEACHING AND LEARNING IN PUBLIC SECONDARY
SCHOOLS: A CASE OF KEIYO SUB COUNTY, ELGEIYO
MARAkwET COUNTY, KENYA**

By

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DECLARATION

This research project is my original work and has not been presented for an award in any other University.

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DEDICATION

This research project is dedicated to my parents; Joseph Barsulai and Milkah Barsulai who painfully but patiently tasked to see me attain the best education and always propelled my academic desires and dreams and dutifully paid for my fees, may God bless you.

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ABSTRACT

The purpose of the study was to investigate factors influencing pedagogical integration of ICT in teaching and learning in public secondary schools in Keiyo Sub County, Elgeiyo Marakwet County. The research objectives were: To determine how the ICT infrastructure available influences pedagogical integration of ICT in teaching and learning in public secondary schools in Keiyo Sub County ; To establish how access of ICT influences pedagogical integration of ICT in teaching and learning in public secondary schools in Keiyo Sub County ; To determine how learners level of training on ICT influences pedagogical integration of ICT in teaching and learning in public secondary schools in Keiyo Sub County . To assess how the teachers' training in ICT influences pedagogical integration of ICT in teaching and learning in public secondary schools in Keiyo Sub County. The study applied a descriptive survey research design and data was collected using questionnaires. The study targeted public secondary schools that have installed ICT in teaching and learning. In this study, Stratified random sampling and simple random sampling was used in selection of the study sample. The findings of this study indicate that use of ICTs was largely limited to acquisition of basic skills by teachers and learners and availability of infrastructure. More efforts should focus on preparing the teachers and learners to use ICT as instructional tools. Thus, the use of ICTs in schools should focus more on the way ICTs can be used to enhance teaching and learning rather than basic computer skills. The study concludes that the potential that ICTs hold in pedagogy can only be attained if key challenges identified as influencing the use of ICTs in supporting teaching and learning are handled. These factors include availability of ICT infrastructure, lack of skills on how to integrate ICTs in teaching and learning, poor connectivity, Poor electricity supply and lack of technical assistance. Based on the findings the researcher proposes further research on attitude and perception towards integration of ICT in teaching and learning and the extent of adoption of ICT in selected urban and rural schools.

TABLE OF CONTENTS

	PAGE
DECLARATION	ii
DEDICATION	iii
ACKNOWLEDGEMENTS	iv
ABSTRACT	v
LIST OF TABLES	xi
LIST OF ABBREVIATIONS AND ACRONYMS	xiii
CHAPTER ONE	1
INTRODUCTION	1
1.1 Background to the Study.....	1
1.2 Statement of the Problem.....	5
1.3 Purpose of the Study	6
1.4 Objectives of the Study.....	7
1.5 Research Questions.....	7
1.6 Significance of the Study.....	8
1.7 Delimitation of the Study.....	8
1.8 Limitations of the study	8
1.9 Basic assumption of the study	9
1.10 Definition of Significant Terms as Used in the Study	9
1.11 Organization of the study.....	10

CHAPTER TWO	11
LITERATURE REVIEW	11
2.1 Introduction.....	11
2.2 The concept of ICT and Pedagogy	11
2.3 Historical development of ICT in schools	12
2.4 Integration of ICT in Teaching and Learning in Kenya	13
2.5 ICT infrastructure available for Teaching and Learning.	15
2.6 Level of accessibility of ICT Infrastructure in Teaching and Learning	16
2.7 Level of training of the learners for Pedagogical integration of ICT in Teaching and Learning Process.....	18
2.8 Training of teachers in pedagogical integration of ICT.....	20
2.9 Theoretical Framework.....	22
2.10 Conceptual Framework.....	24
2.11 Summary.....	27
CHAPTER THREE	29
RESEARCH METHODOLOGY	29
3.1 Introduction.....	29
3.2 Research design	29
3.3 Target population.....	29
3.5 Data collection Instruments	32
3.6 Validity of the Research instruments.....	33

3.7	Reliability of the Research Instruments	33
3.8	Data Collection Procedures	34
3.9	Data analysis techniques	35
3.10	Operational definition of variables	35
3.11	Ethical considerations of the Study	37
3.12	Summary	37
CHAPTER FOUR.....		38
DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION OF FINDINGS.....		38
4.1	Introduction.....	38
4.2	The Questionnaire return rate.	38
4.3	Demographic Characteristics of the Respondents.	39
4.3.1	Gender of the respondents.....	39
4.3.2	Age bracket of the Respondents.....	41
4.3.3	Educational level of Principals and teachers.....	43
4.3.4	Principals’ and teachers working experience.....	44
4.4	Responses to the research questions	45
4.4.1	ICT Infrastructure Available For Use In Teaching And Learning.....	45
4.4.2	The ICT Infrastructure Available for use in Teaching and Learning.....	53
4.4.3	Accessibility of the ICT	57
4.4.7	Extent to which the learners are trained in pedagogical integration of ICT.	66
4.4.8	Extent to which teachers have been trained in the pedagogical integration of ICT in teaching and learning.	69
4.4.10	Extent to which the principals have been trained in the pedagogical integration of ICT in teaching and learning	75
4.4.11	Learner’s response on challenges facing ICT Integration in teaching and learning.	77
4.4.12	Teacher’s response on challenges facing use of ICT in teaching and learning.....	78

4.4.13 Principals response on Challenges facing use of ICT in teaching and learning.....	80
4.4.14 Suggestions and solutions on the ways of enhancing the use of ICTs in teaching and learning.	81
CHAPTER FIVE	83
SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS.....	83
5.1 Introduction.....	83
5.2 Summary of the findings.....	83
5.3 Conclusions.....	86
5.4 Recommendations.....	87
5.5 Suggestion for further research.....	88
REFERENCES	89
APPENDICES	95
APPENDIX A: LETTER OF INTRODUCTION	95
APPENDIX B: QUESTIONNAIRE FOR LEARNERS USING ICT IN TEACHING AND LEARNING.	96
APPENDIX C: QUESTIONNAIRE FOR TEACHERS USING ICT IN TEACHING AND LEARNING	101
APPENDIX D: QUESTIONNAIRE FOR PRINCIPALS USING ICT IN TEACHING AND LEARNING	109
APPENDIX E: DETERMINING SAMPLE SIZE FROM A GIVEN POPULATION	115
APPENDIX F: LETTER FROM THE INSTITUTION.	116
APPENDIX G: RESEARCH PERMIT	117

LIST OF FIGURES

Figure1: The structure of An Activity System Theory.....	23
Figure 2: Conceptual Framework	25

LIST OF TABLES

Table 3.1: Simple random sampling of the sample population.....	31
Table 3.2: Operational definition of variables table.....	36
Table 4.1: Questionnaire return rate.....	38
Table 4.2: Gender of the respondents.....	39
Table 4.3: Age bracket of the Respondents.....	41
Table 4.4: Education level of Principals and teachers.....	43
Table 4.5: Principals' and teachers working experience	44
Table 4.6: Availability of computers in the school.....	46
Table 4.7: Location of computers in the school.....	47
Table 4.8: The purpose of computers in the school.....	49
Table 4.9: ICT infrastructure available in the school.....	50
Table 4.10: Number of hours allocated for use of ICT in teaching and learning.....	51
Table 4.11: Usage of ICT in schools.....	52
Table 4.12: Areas of Computer technology that enhance better performance.	54
Table 4.13: Where ICT is used in schools for teaching and learning.....	56
Table 4.14: Number of hours of computer accessibility.....	57
Table 4.15: Purpose of ICT in schools	58
Table 4.16: Duration of computer usage	60
Table 4.17: How schools offer ICT courses/Computer education	62
Table 4.18: Function of ICT in the schools.....	63
Table 4.19: Influence of ICT usage by teachers in classrooms.....	65
Table 4.20: How did learners know how to use computers.....	67
Table 4.21: The level of expertise in computer usage.....	68

Table 4.22: How teachers learned to use computers.....	70
Table 4.23: The level of expertise in computer usage	71
Table 4.24: Perceived enjoyment of ICT in teaching and learning	72
Table 4.25: Influence of ICT on class environment	73
Table 4.26: Level of training of principal's for pedagogical integration of ICT	75
Table 4.27: Influence of integration of ICTs for teaching and learning.....	76
Table 4.28: Learner's response on challenges facing ICT Integration in teaching and learning.....	77
Table 4.29: Teachers response on challenges facing use of ICT teaching and learning.....	78
Table 4.30: Principals response on challenges facing use of ICT in teaching and learning.....	80

LIST OF ABBREVIATIONS AND ACRONYMS

CAL	Computer Assisted Learning
CD-ROM	Compact Disk-Read Only Memory
CFSK	Computer for Schools-Kenya
EFA	Education For All
GOK	Government of Kenya
ICT	Information Communication and Technologies
KICD	Kenya Institute of Curriculum Development
MDGs	Millennium Development Goals
UNESCO	United Nations Educational, Scientific, and Cultural Organization

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study.

Information Communication and Technologies has been defined by several authors. These include diverse set of technological tools and resources used to communicate, to create, disseminate, store and manage information (Gulati, 2003). United Nations Educational, Scientific, and Cultural Organization (UNESCO, 2004) has defined ICT in educational context as a set of combined technologies that enables not only information processing but also its transmission for purposes of learning and educational development. These technologies include computer, the internet, broadcasting technologies radio, television and telephone.

According to Encarta, (2009), the relationship between teaching and learning, what and how teachers teach, and how and what learners learn has long been a subject of controversy. The two, sometimes extreme positions adopted by those who engage in it can be loosely described as, on the one hand, traditional and, on the other, progressive. The traditional position starts from the assumption, taken to be so obvious as not to be open to question, that the purpose of teaching is to ensure that those taught acquire a prescribed body of knowledge and set of values. Both knowledge and values are taken to reflect a society's selection of what it most wants to transmit to its future citizens and requires its future workforce to be able to do so. An important characteristic of this traditional view is that it seeks to convey what is already known and, at some level, approved. The learner is seen as the person who does not yet have the required knowledge or values and the teacher as the person who has both and whose function it is to convey them to the learner.

Watkins & Mortimore (1999) in a review of research literature on pedagogy asserts that pedagogy is the art of science of being a teacher. The term generally refers to strategies of instruction, or a style of instruction. Pedagogy is sometimes referred to as the correct use of teaching strategies. Alexander (1992) identifies teaching methods and pupils organization as the two facets of pedagogy. This suggests that pedagogy of ICT should be understood within the framework of educational practice. The researcher asserts that illuminating good practice in teaching and learning with ICT will require examining teachers' ideas, beliefs, values and the thinking that leads to observable elements in practice.

Carter(2002) notes that the use of ICT with regard to productive pedagogies enhances the concept of connectedness through linking classrooms and schools as well as linking knowledge and practice to future work places. Many researchers have demonstrated that technologies are likely to have greater influence when integrated into teaching and learning providing several benefits such as better mastery of basic competencies, the technologies themselves, skills in preparation for the knowledge society and higher motivation for school learning and advancement to higher learning. As a classroom tool, the computer has captured the attention of the education community. This instrument can store, manipulate, and retrieve information and it has the capability not only of engaging students in instructional activities to increase their learning, but also of helping them solve complex problems to enhance their cognitive skills (Ramesh et al, (2005).

The Ministry of Education and with the help of the private sector and Non-Governmental Organizations (NGOs) have helped the schools to acquire computers with an aim of improving education through their utilization in teaching and learning. A national curriculum on computer

studies has been developed and is currently in use with computer studies being an examinable subject in Kenya Certificate of Secondary Education, Alexander (1992).

Information and Communication Technology (ICT) has become, within a very short time, one of the basic building blocks of modern society. Many countries now regard understanding ICT and mastering the basic skills and concepts of ICT as part of the core of education, alongside reading, writing and numeracy Wadi, (2012). ICT permeates the business environment, it underpins the success of modern corporations, and it provides governments with an efficient infrastructure. At the same time, ICT adds value to the processes of learning, and in the organization and management of learning institutions. The Internet is a driving force for much development and innovation in both developed and developing countries. Countries must be able to benefit from technological developments World Bank, (2006).

To be able to do so, a cadre of professionals has to be educated with sound ICT backgrounds, independent of specific computer platforms or software environments. The use of ICT cuts across all aspects of economic and social life and the technological developments in ICT is very rapid. Technology quickly becomes obsolete requiring new skills and knowledge to be mastered frequently. Adaptation is only possible when based on a sound understanding of the principles and concepts of ICT.

Williamson (1999) defines education as the knowledge or abilities gained through being educated. Education is one of the key social services provided by the Government of Kenya to its citizens. It gives education special attention because of the social and economic benefits that accrue to the individuals and society as a result of investing in education. Kenya Education Commission Report (Republic of Kenya, 1964) viewed education as a vehicle for development in that, it prepares a human being to change for the better by making him/her more productive

and eventually contributing to social and economic development of a country. Thus education is provided to an individual with intentions of transforming him or her positively. It is intended to prepare individuals to accept and realize their responsibilities as good citizens at all ages and levels.

Williamson (1999) states that secondary education is the stepping stone to tertiary education and labour market. Cuadra & Moreno (2005) pointed out that, depending on the system adopted in a country, schools education at secondary level maybe called secondary schools, high schools, middle schools, gymnacea, vocational schools or lyceums. Secondary education occurs mainly during teenage years.

The purpose of secondary education is to provide common knowledge and prepare individuals for either higher, vocational education or to train directly to a profession. Provision of youngsters with a dynamic education at the global level is one of the best investments a country can make especially when it is equally available for all regardless of gender, income or ethnic group (Williamson, 1999). He also said, in an effort to improve on the level of education in a country, any government is faced with two major challenges. These are to increase access to secondary education and to improve the quality and relevance of secondary education. These challenges must be met and addressed in a constantly changing environment of globalization and technology based knowledge society.

Secondary education is important in a country if a certain level of development is to be achieved. Private returns are however, considerably higher than social returns because of public subsidization of education. Williamson (1999) observed that there is undisputable and universal correlation between education and earnings which can be interpreted in many ways. From research carried out, researchers have confirmed that education continues to be the number one

investment priority in many countries. Social and private returns at all levels generally decline with the level of a country's per capita income (Psacharopoulos, 2000).

1.2 Statement of the Problem

In developing countries, particularly Sub-Saharan Africa, the quality of education has been affected by conflict, and HIV/AIDS, to mention a few. The high levels of debt in these countries have also aggravated the low level of development, particularly in education. The basic instructional tool in most primary and secondary schools is the blackboard and chalk (Alade, 2005).

According to Gakuu & Kidombo, (2008), studies on integration of ICT in teaching and learning at secondary school levels in Africa show that although some secondary schools in Kenya have ICT facilities supplied by either the donor community, 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. There is a significant body of information available on developmental learning and student-centered classrooms. However, if education systems are to motivate teachers to move in this direction, professional development is key in providing experiences that are informative and practical. With tight budgets professional development is often one of the first things to be cut. But if teachers are to become comfortable with the technologies that will reshape schools, they must receive both pre-service training during their college years and in-service training during their careers. They need after-school workshops and time off from their classes to learn how technology is being used elsewhere. They also need to be able to observe their colleagues' classrooms and talk with them so that they can do away with old practices and build new ones. In the long run, for technology to succeed, as

much time and money must be invested in teachers as is invested in the actual hardware and software.

While ICT continues to advance in Western and Asian countries, African countries still experience a lag in its implementation, and that continues to widen the digital and knowledge divides. In a recent study by Kiptalam et.al (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 schools, but of what instructional value are they for teaching and learning? In light of these issues, this study was of great importance and examined the factors influencing pedagogical integration of ICT in teaching and learning in public secondary schools in Keiyo Sub County, Elgeiyo Marakwet County.

1.3 Purpose of the Study

The purpose of this study was to establish the factors influencing pedagogical integration of ICT in teaching and learning in public secondary schools in Keiyo Sub County, Elgeiyo- Marakwet County.

1.4 Objectives of the Study

This study was guided by the following objectives:

1. To determine how the ICT infrastructure available influences pedagogical integration of ICT in teaching and learning in public secondary schools in Keiyo Sub County ;
2. To establish how access to ICT influences pedagogical integration of ICT in teaching and learning in public secondary schools in Keiyo Sub County ;
3. To determine how learners level of training on ICT influences pedagogical integration of ICT in teaching and learning in public secondary schools in Keiyo Sub County ;
4. To assess how the teachers' training in ICT influences pedagogical integration of ICT in teaching and learning in public secondary schools in Keiyo Sub County ;

1.5 Research Questions

The study focused on the following questions:

1. How do ICT infrastructures available for use influence pedagogical integration of ICT in teaching and learning in public secondary schools in Keiyo Sub County?
2. How does the level of accessibility of ICT influence pedagogical integration of ICT in teaching and learning in public secondary schools in Keiyo Sub County?
3. How does the level of the learners' training in ICT influence pedagogical integration of ICT in teaching and learning in public secondary schools in Keiyo Sub County?
4. How the level of training of teachers' in ICT does is influence pedagogical integration of ICT in teaching and learning in public secondary schools in Keiyo Sub County?

1.6 Significance of the Study

The study was conducted in hope that it may benefit the Government of Kenya (GOK) and especially the specialized units like KICD, on the way the pedagogical integration of ICT is being implemented in a specific case.

The findings may give insight into the availability of materials, selection and preparation, and how these influence the integration of ICT in teaching and learning. Moreover, the knowledge gained may contribute to better understanding of the role secondary school administration plays in making teaching and learning through ICT operational. Furthermore, this study may be of benefit to education researchers who may gain in-depth knowledge that may enhance further studies in integration of ICT in teaching and learning.

Lastly it may have a positive influence on the enrichment of the teaching and learning resources because of the internet development and online facilities.

1.7 Delimitation of the Study

This study targeted the public secondary schools in Keiyo Sub County that are integrating ICT for teaching and learning. The study also targeted school principals, teachers and form three and form four students because of their relatively longer experience in use of ICT in school.

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 study. There might have been cases of biased information given by the teachers, Principals and students. Before the questionnaires were distributed, a briefing was done to the respondents for them to understand the purpose of this research. The briefing was therefore used to develop rapport with the respondents thereby minimizing dishonest responses and fear of victimization

1.9 Basic assumption of the study

In carrying out the study, the researcher assumed that;

The respondents were willing to participate in the study and not take it as additional pressure.

Also, it was assumed that the data was to be collected very objectively to allow for valid observations and recommendation to be made from the results of this study.

1.10 Definition of Significant Terms as Used in the Study

These following terms were defined in the context of the study;

Accessibility of ICT: This refers to the ability to interact and use ICT tools and the period of allocation

ICT Integration: This refers to the application of computers and internet in teaching and learning.

ICT Infrastructure: This refers to equipment and technologies used for teaching and learning.

Pedagogy: The term generally referred to strategies of instruction.

Teaching and Learning: This is the process of imparting knowledge and skills that will influence change of behavior and attitudes.

1.11 Organization of the study

This study was organized into five chapters:

Chapter One dealt with the Introduction, Background to the Study, Statement of the Problem, Purpose of the Study, Objectives, Research Questions, Significance of the Study, Delimitations Limitations, Basic Assumptions of the Study, Definition of Significant Terms as used in the Study and Organization of the Study. Chapter Two covered Literature Review which consisted of the concept of ICT and pedagogy, Historical development of ICT in schools, ICT infrastructure available for teaching and learning, Level of accessibility of ICT infrastructure, Integration of ICT in teaching and learning in Kenya, Training of the learners of pedagogical integration of ICT in teaching and learning and Training of the teachers in pedagogical integration of ICT.

Chapter Three described the research methodology used in the study, including: Research Design, Target Population, Sample Size and Sampling Procedures , Research Instruments, Data Collection procedures and analysis techniques and summary. Chapter Four contains Data Analysis, Presentation, Interpretation and Discussion of the Findings of the Study. Chapter Five contains Summary of findings, Conclusions, Recommendations and suggestions for Further Research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter discussed literature related to the study. The literature included: The concept of ICT and pedagogy, Historical development of ICT in schools, ICT infrastructure available for teaching and learning, Pedagogical Integration of ICT in teaching and learning in Kenya, Level of accessibility of ICT infrastructure, Level of training of the learners for Pedagogical integration of ICT in teaching and learning and Training of the teachers in pedagogical integration of ICT; theoretical framework; the conceptual framework and a summary.

2.2 The concept of ICT and Pedagogy

As much technological change occurs in schools around the world, educators and parents increasingly are looking at new information and communications technologies (ICT) to provide new models for teaching and learning. The internet is viewed by many educators as a new and potentially powerful teaching medium, but the effectiveness of its use in classrooms depends on the quality of the teaching and not the technology. Professional knowledge about student learning, curricular and classroom organization should be matched with other information on effective computer use (Adams, Carlson & Hamm, 1990; Duffy & Cunningham, 1996; Jonasson, 1994; OECD, 1987). In this way, the internet can be viewed as a tool for realizing many educational reforms.

Further, the use of computer networks has the potential to transform physical and psychosocial classroom environments in either negative or positive ways. With such huge amounts of money

currently being spent for the implementation of new information technologies throughout the world, educational administrators and bureaucrats are also expecting returns in the form of greater educational productivity from students (Zandvliet & Straker, 2001). To date, success with the classroom implementation of computers has been largely related to the dedication of experienced teachers willing to experiment with new teaching methods. Despite the potential of using information technology, there is currently little evidence that the large amount of money spent on these new technologies is returning a change in the quality of the education it is intended to support.

2.3 Historical development of ICT in schools

How technology influences learning has been at the centre of recent debates over educational inputs. In 1994, the Israel state lottery sponsored the installation of computers in many elementary and middle schools. These programmes provide an opportunity to estimate the influence of computerization on both the instructional use of computers and pupil achievement. Results from a survey of Israel school-teachers show that the influx of new computers increased teacher's use of computer-aided instruction CAI but evidences show that CAI does not appear to have had educational benefits that translated into higher test scores. President Clinton on 5th June 1998 at the East Somerville Community School hoped that every child in America deserve a chance to participate in the information revolution. He had the desire that education could be made available 24 hours a day, seven days a week, that people could literary have a whole different attitude towards learning.

Politicians, educators, parents and researchers have long looked upon technology to improve schools. One of the earlier advocates for technology in the classroom was Thomas Edison, He predicted in 1922 that motion pictures would revolutionize education and be significant in the

common school. He funded educational films, though he also complained about lack of teacher interest and high production cost. In the 1950's, Psychologist B.F. Skinner published a series of papers predicting that "teaching machine" would make learning dramatically more efficient. Skinner's writing reflects a modern-sounding emphasis on the constant interchange between programmes and student" (Encarta, 2009). Recent years have seen renewed and even more intense interest in classroom, computer use including interest in the use of computers in schools in less-developed countries, casing point being Kenya where the Government through the Ministry of Education has rolled e-learning programmes in district schools by providing computers, installation and instructional materials provided by the KICD.

2.4 Integration of ICT in Teaching and Learning in Kenya

The pedagogical integration of ICT in Kenyan schools has been driven to a large extent by the corporate social responsibility efforts of organizations that initially made donations of old refurbished computers to schools and diffusion of ICT skills in the labour market. In addition, access to electricity and internet connectivity, introduction of other technologies such as the mobile phone, Nepad e-schools project, Computers For Schools, Kenya (CFSK), popularization of computers by government through removal of duty, thus, making them affordable, and more recently, the entrenchment of ICT integration in education through the launch of the National ICT Strategy in Education (2006) and the launch of the National ICT Integration and Innovation Centre at the Kenya Science Campus in Nairobi have created awareness of the place of ICT in education(Nderitu et al,2012) .

Acquisition of a limited number of computers initially by schools for management purposes appears, to have created the conditions necessary to introduce, albeit gradually, integration of

ICT in teaching and learning. As such, even without a plan or designed way of integration, some teachers with the inclination and interest in ICT end up finding innovative ways of using it to enhance their teaching capacities. Initially it may be used for recording and analyzing marks, typing lesson plans and eventually actual teaching and learning by searching for information and displaying learning content. Learners, equally, given the opportunity and access, are able to use ICT to enhance their learning. After several years of effort, Kenya promulgated a National ICT Policy in January (2006) that aims to “improve the livelihoods of Kenyans by ensuring the availability of accessible, efficient, reliable and affordable ICT services.” The national policy has several sections, including information technology, broadcasting, telecommunications, and postal services. However, it is the section on information technology that sets out the objectives and strategies pertaining to ICT and education. The relevant objective in this section states that government will encourage “...the use of ICT in schools, colleges, universities and other educational institutions in the country so as to improve the quality of teaching and learning.” The related strategies, under the heading “E-Learning,” are to: Promote the development of e-learning resources, Facilitate public-private partnerships to mobilize resources in order to support eLearning initiatives, Promote the development of an integrated e-learning curriculum to support ICT in education and Promote distance education and virtual institutions, particularly in higher education and training ,National ICT Strategy in Education (2006).

The Ministry of Education developed a Kenya Education Sector Support Programmes (KESSP) in (2005) that featured ICT as one of the priority areas with the aim of mainstreaming ICTs into the teaching and learning process. The National ICT Policy embedded this intent as a national priority and provided the impetus for the ministry to develop its sector policy on ICT in Education. The ministry moved quickly and, in June (2006), introduced the National ICT

Strategy for Education and Training. This document, referred to as the ICT policy for the education sector, consists of the following components: ICT in education policy, Digital equipment , Connectivity and network infrastructure , Access and equity, Technical support and maintenance, Harnessing emerging technologies, Digital content and Integration of ICT in education.

Another key part of the implementation strategy is the Kenya ICT Trust Fund, formed in 2004, with the aim of spearheading ICT initiatives in education. Membership is open to public sector organizations such as ministries and other government institutions, private sector companies, donor partners, civil society, as well as academic and other educational institutions. In general, the objective is to facilitate public-private partnerships (PPPs) that will mobilize and provide ICT resources to Kenyan public schools and community resource and learning centres.

2.5 ICT infrastructure available for Teaching and Learning.

According to Dron (2007), multimedia has had an enormous influence on education. For example, medical schools use multimedia-simulated operations that enable prospective surgeons to perform operations on a computer-generated 'virtual' patient. Similarly, students in engineering schools use interactive multimedia presentations of circuit design to learn the basics of electronics and to immediately implement, test, and manipulate the circuits they design on the computer. Even in elementary schools, students use simple yet powerful multimedia authoring tools to create multimedia presentations that enhance reports and essays. In recent years, technologies such as blogs, wikis, LinkedIn, Facebook and Twitter have been causing the next wave in technology facilitated learning. The new technologies allow unprecedented sharing and collaboration between users. Dron (2007) notes that one of the most distinctive features of social software is that control and structure can arise through a process of communication and group

interaction. A mix of media each consisting and serving a specific purpose can teach. This means that, a strong print component can provide much of the basic instructional in the form of course text, as well as readings, the syllabus and the day to day schedules. Interactive audio/ video conferencing can provide real time face to face(or voice to voice interaction) while Computer conferencing or electronic mail can be used to send messages, assignment feedback and other targeted communication to one or more class members. In addition, pre-recorded videotapes can be used to present class lectures and visually oriented content. Fax on the other hand can be used to distribute assignments, last minute announcement, to receive student's assignments and provide timely feedback.

2.6 Level of accessibility of ICT Infrastructure in Teaching and Learning

A review of studies on use of ICT in secondary schools and other educational institutions in Kenya and elsewhere consistently revealed significant differences in the accessibility and use of ICT in these institutions. As shown by Makau, (1990), most computer-assisted lessons were observed to be in mathematics and the sciences. However, it was also found out that in the majority of computer-assisted lessons teachers tended to be passive, thus leaving students to do whatever they chose to do. The research found out that some students regarded both formal and informal sessions on the computer as time for relaxation as opposed to serious learning. This approach to computer-assisted lessons was explained as being a result of the perception of the computer as an object of study; more exciting and potentially more rewarding than integration of the technology into the existing curriculum. He found out that computer studies lessons were conducted in the computer laboratory, thus they seemed to have priority over computer-assisted lessons in other subjects. In an attempt to investigate availability and access to the Internet, Kenya School Net (2003) found that email was yet to be recognized as a tool for collaboration

among students and teachers. It affirmed that in the schools surveyed, access to the Internet was severely limited and when available was only for administrative use. The study found out that almost 40% of these schools had less than 10 computers, and were therefore inadequate for teaching and learning. More than 20% had less than 5 computers, indicating that the computers were mostly for administrative use. Only a third of schools studied had dedicated computer laboratories.

Another study by Wims .et al (2007) looked at the implementation of ICT projects in selected educational institutions with a view to making recommendations on how such projects can be deployed and supported. The findings were from two secondary schools – St. Patrick’s High School and Singore Girls’ Secondary School in Keiyo Sub County – and an Agricultural Training College, Baraka Agricultural Training College in Transzoia District. The ratios of students to computers in the institution surveyed were: St. Patrick’s, 25:1; Singore, 32:1 and Baraka, 4:1. In St. Patrick’s, the computer laboratory had 16 working computers, with an average of 1.5 students per computer. Singore had a laboratory of 10 computers, and an average class size of 15, or a ratio of 1.5 students per computer. These findings indicated that these schools had a limited number of computers and that the number was insufficient to cover the student’s population.

2.7 Level of training of the learners for Pedagogical integration of ICT in Teaching and Learning Process.

Todd,(1995) posits that there is no good evidence that most users of computers significantly improve teaching and learning, yet district schools are cutting programmes-music, art, physical education that enrich children's lives to make room for this dubious nostrum and the Clinton administration has embraced the goal of "Computers in every classroom" with credulous and costly enthusiasm.

Students constitute a significant group within this social system, and their perspectives play an important role in framing the activity that takes place in school settings. Indeed, it has been argued that young people should be seen as active participants in shaping social and educational processes rather than being viewed as passive recipients (Tann, 1993).They further demonstrate that, from an early age, young people are capable of insightful and constructive analysis of their experience of learning in school and are able to comment on teaching approaches and contexts that are helpful in their learning (Brown & McIntyre, 1993; Harris et al., 1995; McCallum et al., 2000; Rudduck & Flutter, 2000). A key component in acquiring such understanding may be attention to the 'pupils' voice' (Keys, 1993). (Rudduck,1996) maintain that we need to tune into what pupils can tell us about their experiences and what they think will make a difference to their commitment to learning and, in turn, to their progress. He found out that pupils' perspectives in the UK has been linked either to the development of school-based strategies based on consultation with pupils on effective classroom practice, or to aspects of curricular evaluation though few studies have focused specifically on secondary pupils' views on their current classroom use of ICT in teaching and learning. Where students' perspectives have provided the

focus for such inquiry in other educational settings for example the Canadian technology-enhanced Secondary Science instruction, pupils' enhanced participation in learning activities and their development of successful learning strategies were attributed to the combined influences of – and interactions between – the technologies employed and the pedagogical and social milieu of the classroom (Pedretti et al., 1998). The popular image of young people – the 'screenagers' referred to by Rushkoff, (1997) growing up in an increasingly technology-dependent society, connected by sophisticated telecommunication networks in a culture mediated by television and computer, is that of natural computer users from a 'digital generation'. Recent studies (Holloway & Valentine, 1999; Becta, 2001; Facer et al., 2001; Wellington, 2001) have begun to examine the nature and extent of young people's use of ICT outside school and the influence that it may have upon their learning with ICT in school. Whilst results indicate that some children often those who use computers extensively at home are capable of integrating their use of ICT in balanced and sophisticated ways (Furlong *et al.*, 2000), the indications are that this further accentuates inequities between such young people and their peers who lack similar access to these technologies. Findings also show that whilst boundaries between home knowledge and school knowledge are being eroded, learners' experience of ICT takes on a different characteristics depending upon the context of its use. He found out that at home, young people tend to control their own time, how they use technology and the content of what they do. In school, however, the locus of control lies elsewhere; emphasis is on learning activities managed by the teacher, metered by timetable constraints, designed to meet curriculum criteria and attainment targets and incorporate the mandatory use of ICT.

High dropout rates are a common feature in schools in developing countries. ICT can be used to make the school curriculum more interesting. Studies by Hepp et al., (2004): Osin, (2003) found

out that children enjoy learning using technology. Gomez and Martinez (2001) shows how using internet in education programmes for street children in Columbia enticed a higher than usual number of the children back to school.

ICT can also play a significant role in providing teachers and students with access to educational content and updated resources (Wims & Lawler, 2007). Open and distance learning methods, which have traditionally been used to reach learners in remote geographical areas, can be improved through ICT. This would be appropriate for learners in the conflict zones of Africa, such as Somalia, South Sudan, Chad and Sierra Leone.

2.8 Training of teachers in pedagogical integration of ICT.

Ramsden (2003) argues that the main role of teachers is to make learning possible. Learning is a social as well as a cognitive process, and human knowledge comprises an ever changing accumulation of social practices Wengler, (1998). According to Encarta (2009), Plato a student of Socrates was convinced that knowledge is attainable. He was also convinced of two essential characteristics of knowledge that it is certain and it must have as its object that which is genuinely real as centralized with that which is an appearance only

According to Encarta (2009), Plato's own theory of knowledge is found in the *Republica*, particularly in his discussion of the image of the divided line and the myth of the cave. In the former, Plato distinguishes between two levels of awareness: opinion and knowledge. Claims or assertions about the physical or visible world, including both commonsense observations and the propositions of science, are opinions only. Some of these opinions are well founded and some are not; but none of them counts as genuine knowledge. The higher level of awareness is knowledge, because there reason, rather than sense experience, is involved. Reason, properly used, results in intellectual insights that are certain, and the objects of these rational insights are

the abiding universals, the eternal Forms or substances that constitute the real world (Encarta, 2009).

The success of ICT in all sectors requires sufficient and competent human resources that are developed and equipped in the education training sector (GOK,2005).Teacher education is vital for equipping educators with the necessary skills for using ICT in the classroom and for helping them to develop more positive attitudes towards technologies. In Kenya, the ICT plans of the ministry recognize a current deficit in terms of human resource capacity to lead and support the implementation of the plan.

The need for training of school managers and teachers is widely recognized and is being addressed, but the challenge is huge and will take time (Farrel, 2007). Teachers may resist the implementation of ICT into the classroom for various reasons: their unfamiliarity with the technologies, lack of adequate time to update their skills, the additional time and effort necessary for their professional role and image. Various competencies must be developed throughout the education system for ICT integration to be successful. Teachers' professional development should have five foci: skills with particular application; integration into existing curricular; curricular changes related to the use of ICT (including changes in instructional design); changes in teacher roles and underpinning educational theories.

Squires,(1997) asserts that these should be addressed in pre-service teacher training and developed in in-service. The use of ICT in education would require students to have a great level of motivation and engage in mostly self-directed learning, This would appear difficult and close to impossible. The anxiety over being replaced by technology or losing their authority.

2.9 Theoretical Framework

This study uses Activity Theory to examine complex pedagogical, social, and technological issues in ICT integration process at the classroom level. According to Engeström, (1987), Activity Theory posits a sociocultural perspective which supports the idea that ICT must be studied within the learning environment and the broader context in which it is situated. By using Activity Theory as a framework it points out the intimate mechanisms that link ICT, learning and their sociocultural settings (Lim & Hung, 2003; Lim, 2002).

Within this general context, Engeström (1987) proposed a model (Figure 1) on page 23 that conceptualizes all purposeful human activity as the interaction of the elements: subject, object, tools, community, rules, and division of labour. In this model of an activity system, the subject refers to the individual or group whose point of view is taken in the analysis of the activity. The object (or objective) is the target of the activity within the system. Tools refer to internal or external mediating artifacts which help to achieve the outcomes of the activity. The community is comprised of one or more people who share the objective with the subject. Rules refer to the explicit and implicit regulations, norms and conventions that constrain actions and interactions within the activity system. The division of labour discusses how tasks are divided horizontally between community members as well as referring to any vertical division of power and status (Centre for Activity Theory and Developmental Work Research, 2003).

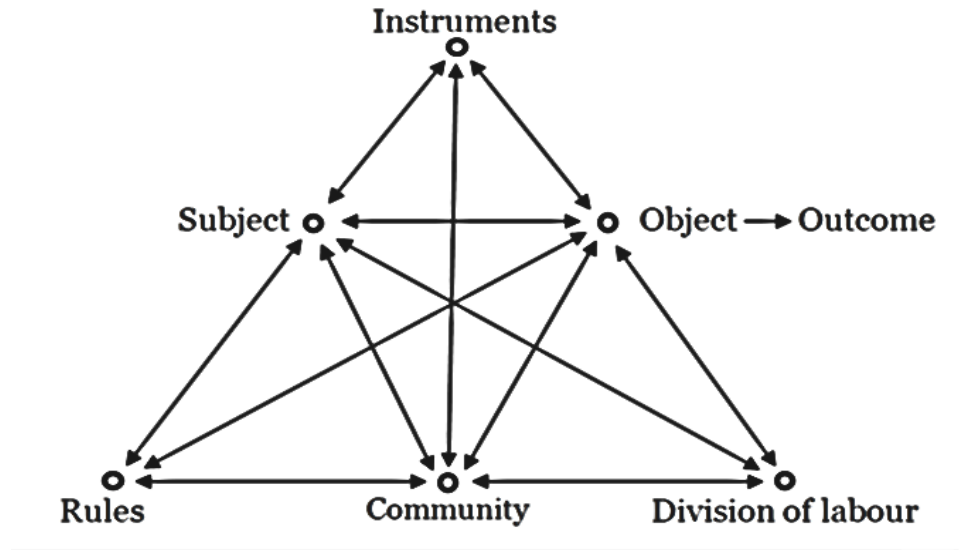


Figure 1. The structure of An Activity System Theory. (Centre for Activity Theory and Developmental Work Research, 2003)

Using this model to analyze the ICT integration, the elements can be mapped as follows:

Subject: Teacher (teaching experience, teaching approach, the personal, administrative and instructional use of ICT, the place of ICT in daily life, the necessity of knowledge and skills related to ICT).

Object: The goals of using ICT in teaching-learning process (knowledge and skills acquisition, and problem solving).

Tools/Instruments: ICT and the tools other than ICT, methods which are used, problems which are encountered.

Rules: The evaluation criteria, expectations of the teacher, rules of the school.

Community: Students, teachers, school administration, ICT coordinator.

Division of labour: The roles and responsibilities of students and teachers, cooperation among teachers, the support of administration.

Outcome: The reflection of the use of ICT in teaching-learning process to the learning of students and instruction (Demiraslan, 2005).

Activity Theory, with its emphasis on society, culture, and development, offers a set of concepts for capturing the context of use and taking it into account in the design, evaluation, and deployment of interactive technologies.

2.10 Conceptual Framework

The research study conceptualized that factors that influence pedagogical integration of ICT in teaching and learning are ICT infrastructure available for use for example computers, accessibility of the infrastructure, learners and teachers level of ICT experiences. Computer resources being the physical equipment both hardware and software required to enable a network to function can affect integration of ICT in pedagogy. Schools lacking computer labs, computers, digital learning aids and even storage devices may not be able to carry on with ICT integration in pedagogy. On the other hand schools well-endowed with all required infrastructure would be expected to be in a better position to take advantage of the new technology in pedagogical integration.

To moderate this setback, MOEST developed in its ICT policy a policy to provide adequate infrastructure at all levels of education and training by stakeholders. The government reduced tax on ICT to reduce internet access rates and allocated 13billion to the ministry of education to purchase mobile computer laboratories in each constituency for both primary and secondary.

Technical support availability or non-availability can affect ICT integration in teaching and learning. Effective technical support enables the integration and implementation of ICT to

function effectively and efficiently. The schools need to have technical support provided for; this support involves installation, operation and maintenance of technical equipment and network.

Finally attitude is a very powerful variable because it determines whether all the other variables will be embraced by all stakeholders. The ability to use technology is basically driven by attitude. The provision of machines which may never be used due to lack of interest, or even technical know-how leads to slow or no integration of ICT in many schools.

The study conceptualizes that if schools integrate ICT in teaching and learning by investing in computer resources, ICT skills, ICT Technical support and positive attitudes towards ICT, the efficiency would be achieved in pedagogical integration of ICT in teaching and learning in public secondary schools

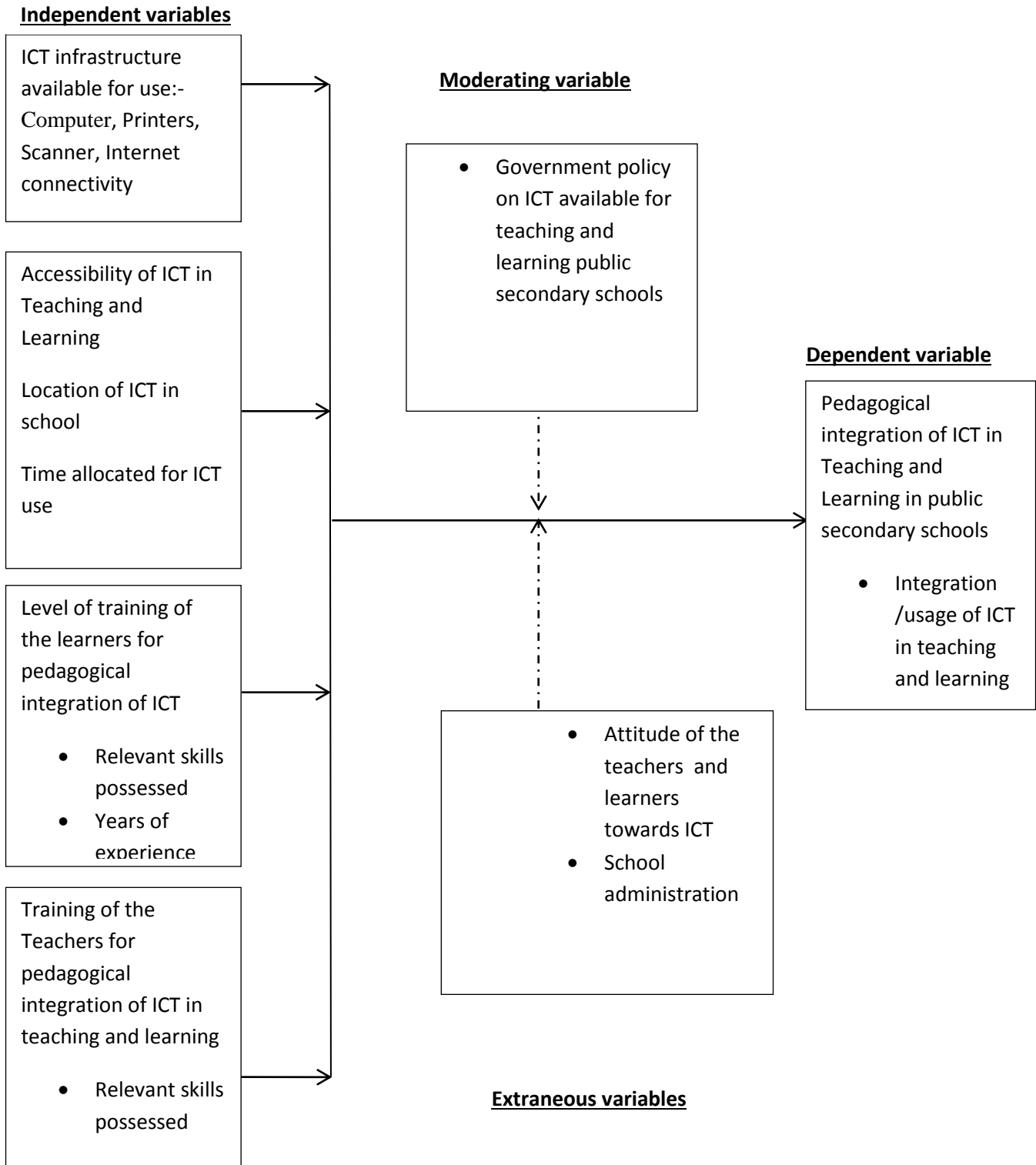


Figure 2: Conceptual framework.

The conceptual framework indicates how different variables influence on the use of ICT to enhance teaching and learning in public secondary schools. Teachers' awareness, training, motivation and confidence for the use of ICT in teaching and learning greatly influence the extent to which ICT will be used in pedagogy. The kind of technical support and Government policy available to institutions will determine the extent to which ICT are integrated in the classroom environment. Further, students' readiness for use of ICT in learning activities such as research, collaborative learning, information gathering, distribution and analysis, peer sharing and tutoring, delivery of educational resources and access to global information base will determine the benefits that accrue from the use of ICT in teaching and learning.

2.11 Summary

This chapter on literature review focus on literature related to the factors influencing integration of ICT in teaching and learning; ranging from the concept of ICT and pedagogy which illustrates the dynamics of integration of ICT in teaching and learning. Secondly, it points out an historical development of ICT in schools and the ICT infrastructure available for teaching and learning. In addition, the level of accessibility of ICT infrastructure for teaching and learning and Integration of ICT in teaching and learning in Kenya are unveiled. Lastly, the literature review focuses on the orientation of both teachers and learners in pedagogical integration of ICT. The chapter also gives us the theoretical framework that the study is founded on, which is the Activity Theory. It also contains the conceptual framework of the study which has; ICT infrastructure for use, accessibility of ICT in teaching and learning, training of teachers and level of training of learners as the independent variables. The moderating and extraneous variables are Government policy on ICT available for teaching and learning public secondary schools and Attitude of the teachers

and learners towards ICT respectively. Pedagogical integration of ICT in teaching and learning as dependent variable.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research design, target population, sample size and sampling procedure, the research instruments, research instruments to be used in the study together with their validity and reliability, data collection procedures, data analysis techniques to be used in the study.

3.2 Research design

The study attempted to investigate the factors influencing pedagogical integration of ICT in teaching and learning in public secondary schools in Keiyo Sub County. A descriptive survey research was adopted in this study. According to Best & Khan (2008), the descriptive survey design is preferable in gathering data from a relatively large number of cases at a particular time. The design was not concerned with characteristics of individuals as individual, but with generalized statistics that resulted when data is abstracted from a number of cases. The descriptive survey design is considered suitable because it allows the researcher to seek response from a relatively large number of respondents. The design also enabled generalization of data to establish the factors that influence the pedagogical integration of ICT in secondary schools in Keiyo Sub County.

3.3 Target population

According to the District Education Office Keiyo (MoE, 2012), there are 21 public secondary schools in the district. The target population of this study was from the public secondary schools that have installed and use ICT in teaching and learning. In this case the target population was secondary school teachers and their students in the selected secondary schools. The study

targeted students in Form Three and Four because of their relatively longer experience in use of ICT in public secondary schools. According to the information received from the DEO's office, Keiyo, the study targeted 21 schools with 21 principals, 259 teachers and 2,848 students.

The target population refers to the population to which a researcher wants to generalize results of a study (Mugenda & Mugenda, 2003). Principals were chosen because they are pivotal in strategy and policy formulation for ICT use in their schools. Teachers play a key role in integrating and implementing the use of ICT in teaching and learning as well as initiating students to use ICT. Students' experience in use of ICT in learning was important to the study by investigating how they use, interact and benefit from ICT in the classroom environment.

3.4 Sample Size and Sampling Procedure

Best & Khan (2008) defined a sample as a small proportion of the population that is selected for observation and analysis. In this study, the Krejcie and Morgan (1970) table in Mulusa (1990) was used to determine the sample size for the principals, teachers and students. There were 21 principals, 259 teachers and 2848 students in the sample schools. According to the Krejcie and Morgan (1970) table, a sample for 21 principals was 19, a sample for 259 teachers was 155 and a sample for 2848 students was 341. Therefore the sample size was; 19 principals, 155 teachers and 341 students.

Stratified random sampling was also employed to select the study sample. A stratified random sample is a population sample that requires the population to be divided into smaller groups, called 'strata'. Random samples can be taken from each stratum, or group. This method was preferred because it ensured the inclusion of all the sub groups in the population. The researcher opted for one third of the sample population to be female and three quarter to be male. In

stratified random sampling the sample population is first sub-divided into various strata and the random sampling is drawn from each stratum.

Table 3.1: Simple random sampling of the sampled population

CATEGORY	SAMPLED	SAMPLE	
	POPULATION	MALE	FEMALE
Principals	19	13	6
Teachers	155	104	51
Students	341	128	113
Total	515	245	170

Therefore, the sample size comprised of 13(68.4%) male Principals, and 6(31.6%) female Principals, 104(67.1%) male teachers and 51(32.9%) female teachers and lastly 128(37.5%) male students and 113(33.1%) female students thus it ensured inclusion of the subgroups in the research. To select the schools, the researcher used simple random sampling. The names of the schools were written on small pieces of paper which were folded and placed in a basket. The researcher then mixed the folded papers before picking the required sample randomly.

In each of the sampled schools, two grade levels were considered to provide for the study of the factors influencing ICT integration in teaching and learning. Form three and form four classes were studied. In each case, both have been in school longer and so have experienced the variables be examined longer.

3.5 Data collection Instruments

Data for this study was collected using three sets of questionnaires. According to Mugenda & Mugenda (2003), a questionnaire is a written set of questions to which subjects respond in writing. The researcher preferred a questionnaire because it ensures anonymity of the respondents, thus is expected to enhance their honesty. Questionnaires are also advantageous in that it allows for the administration to a large sample within a short time. The target population was also largely literate and were unlikely have difficulties responding to questions.

The questionnaires were for principals, teachers and students. These instruments attempted to answer research questions developed by the researcher. Items in the questionnaire were designed based on the objectives of the study, and on the literature review. The questionnaires were divided into four sections. Whereas Section A contained items on the demographic information of the respondents, section B contained questions focusing on the availability of ICT infrastructure for teaching and learning; section C queried on the accessibility of the ICT for teaching and learning; section D touched on the extent to which the learners and the teachers were trained in pedagogical integration of ICT, lastly section E and F focuses on the challenges facing pedagogical integration of ICT in teaching and learning and its possible solutions respectively.

3.6 Validity of the Research instruments

Validity is the degree to which results obtained from the analysis of the data actually represent the phenomenon under study (Mugenda & Mugenda, 2003). It is the degree to which it measures what is intended by the researcher (Borg & Gall, 1989). The researcher also tested for content validity as the extent to which a measuring instrument provided adequate coverage of the topic under study. The researcher arrived at content validity through the results and comments of the pilot study to be done in two secondary schools. Items that failed to measure the variables they were intended to measure will be modified or discarded completely. The instruments were also be reviewed by experts from the university and specialist in the area of study.

3.7 Reliability of the Research Instruments

Data collected from the pilot study was used to compute the reliability of the instruments' items. Cronbach's coefficient alpha method was used to determine internal consistency of the items.

This method was considered appropriate owing to the fact that it requires only one administration of the test (Cohen & Swerdlik, 2005). It is also appropriate where items have got choices (Cozby, 2003). In this study, the items were considered reliable if they yield a reliability coefficient of 0.70 and above. The Principals, teachers and students who were not included in the sample were administered with questionnaires, which were then analyzed using split-half method and scored separately. Using Spearman Brown prophecy formula a correlation co-efficient of 0.72 was obtained and thus considered high enough to judge the instrument as reliable for the study.

$$R_e = \frac{2r}{1+r}$$

Where: R_e =reliability of entire test

r = coefficient for half of the instrument

(Ary et al., 2006:261)

This figure is usually considered desirable for consistency levels (Fraenkel & Wallen, 2000).

3.8 Data Collection Procedures

The research permit was obtained from the Ministry of Education Science and Technology before undertaking the data collection in the field. The researcher then distributed the questionnaires to all participants to fill in the sample groups and undertook actual discussion with the heads of institutions. However there was need for the researcher to employ tactics in the approach before the questionnaire were distributed, he therefore briefed the respondents and assured them of the confidentiality and complete freedom in answering of questions.

The researcher also explained the importance of the information and how it will be helpful enhancing integration of ICT in teaching and learning in the district and that the information will be useful to the policy makers and society in general. The questionnaires were collected after one week for final analysis from all the schools that participated in giving the information of the data.

3.9 Data analysis techniques

Analysis of data started with editing in order to identify errors made by the respondents such as spelling mistakes and any other wrongly answered or un-responded to items. Quantitative data to be derived from the demographic sections of the questionnaires and other closed questions was analyzed using descriptive statistics and included the use of percentages and frequencies. The data was computed using the Statistical Package for Social Sciences (SPSS).

3.10 Operational definition of variables

An operational definition is a detailed specification of how to measure a given variable; it is tied to the theoretical constructs under study (Borg & Gall, 1989). The theory behind the research often clarifies the nature of the variables involved and therefore would guide the development of operational definitions that would tap the critical variables. The conceptual framework depicted that integration of ICT in teaching and learning would be achieved if necessary ICT infrastructure is put in place and is accessible for teaching and learning this include; email services, teleconferencing and internet. On the other hand, the orientation and equipment of both the teachers and the learner will enhance the integration process this include the relevant skills that they possess in ICT. Good Government policy will promote the integration of ICT in teaching and learning. Furthermore, a positive attitude of both the teacher and the learner will promote pedagogical integration of ICT in teaching and learning.

The operational definitions are illustrated by the indicators as below:

Table 3.2: Operational definition of variables

Objectives	Variables	Indicators	Measurement	Type of analysis
To evaluate how the ICT infrastructure available is influencing the pedagogical integration of ICT in teaching and learning in Public secondary schools	ICT infrastructure available	Presence of ICT infrastructure in schools i.e. Computers, Projectors and printer	Number of computers and their usage.	Descriptive statistics
To establish how access of ICT is influencing pedagogical integration of ICT in teaching and learning	Accessibility of ICT	ICT use and duration of use	<ul style="list-style-type: none"> ▪ Hours allocated for computer usage ▪ Location of the computers in the school 	Descriptive statistics
To investigate how the learners level of training is influencing pedagogical integration of ICT in teaching and learning	Level of training on ICT0	Knowledge of ICT skills	Number of learners who take ICT in form 3 and 4	Descriptive statistics
To investigate how the teachers level of training is influencing pedagogical integration of ICT	<ul style="list-style-type: none"> ▪ Prior computer training ▪ Teaching experience 	Level of training on pedagogical integration ICT	Number of teachers who use ICT in teaching and learning purposes.	Descriptive statistics
	Dependent variable: Pedagogical integration of ICT in Teaching and Learning	•Integration /usage of ICT in teaching and learning	Level of integration of ICT in teaching and learning	Descriptive statistics

3.11 Ethical considerations of the Study

To protect the participants in view of the information they divulged, informed consent of the respondents was sought. Permission was also sought from the heads of schools which were selected to take part in the study and from the district education office under whose jurisdiction all schools in the district lie. The respondents' confidentiality was also assured that no names were taken. Effort was made to make available the results of the study to the participating schools and that the results of the study will not be used for any other purpose other than that stated.

3.12 Summary

This chapter focuses on the research methodology that was be used in the study and the rationale for choice of the method of study. The research design for the study will fall under descriptive survey design for it is suitable to gathering data from a relatively large number of cases at a particular time. On the other hand, the sample size was determined using the Kregjcie & Morgan (1970) table of determining the sample size. In addition, the target population of this study was from the public secondary schools that have installed and use ICT in teaching and learning and data will be collected using questionnaires and observation. Lastly the split-half method will be used to determine the reliability of the research instruments and their validity will be measured by carrying out a pilot study and a review by experts in the field of study.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION OF FINDINGS.

4.1 Introduction

This chapter presents the analysis of research findings. The first part deals with demographic information, while the second part deals with the research questions. Data are presented in both descriptive and tabular form.

4.2 The Questionnaire return rate.

The Questionnaire return rate is the proportion of the sample that participated in the study as intended in all research procedures. The questionnaire was admitted to a sample of 19 principals, 155 teachers and 341 learners. Out of these, all the principals, 123 teachers and 318 learners dully filled and returned the questionnaires. The questionnaire return rate is shown in Table 4.1.

Table 4.1: Questionnaire return rate.

Respondents	Sample Population	Returned	Percentage %
Principals	19	19	100 %
Teachers	155	123	79.3 %
Learners	341	318	93.2 %

This shows that the return rate was 100% for principals, 79.3% for teachers and 93.2% for learners. The average questionnaire return rate was 90%. The questionnaire return rate in this study was therefore satisfactory and deemed adequate for the study. This good response rate was attributed to the inter alia where the participants were informed well in advance of the purpose and objectives of the research.

4.3 Demographic Characteristics of the Respondents.

The demographic information of the respondents was based on their gender, age, level of education and their level of experiences. They were analyzed and presented as follows.

4.3.1 Gender of the respondents

The study sought personal information from the respondents on gender as shown in Table 4.2.

Table 4.2: Gender of the respondents

Respondents	Male	%	Female	%
Principals	14	73.7	5	26.3
Teachers	73	59.3	50	40.6
Learners	218	68.5	100	31.5

Data in table 4.2 indicates that out of the 19 principals who filled the questionnaires 14(73.7%) were males and 5(26.3%) were females. Accordingly out of the 123 teachers who filled the questionnaire 73(59.3%) were males and 50(40.6%) were females. Out of the 318 learners who returned the questionnaire 218(68.5%) were males and 100(31.5%) were females. This data indicates that most secondary schools are headed by males. This is in line with the real situation

in Kenya where most schools are headed by male principals. On the other hand, there were more male than teachers than females suggesting that limited access to education to the girl child eventually has negative influence on female teachers being part of pedagogical integration of ICT in teaching and learning. Lastly there were more male learners (68.5%) as compared to girls this portrays that the number of boys joining secondary education in Keiyo Sub County is higher than those of the girls. Also being technical in nature most students do not take computer as an examinable subject.

4.3.2 Age bracket of the Respondents

The respondents were asked to indicate their age. The responses are presented in Table 4.3.

Table 4.3: Age of the Respondents

Respondent	Age bracket	Frequency	Percentage %
Principals	26-30	-	-
	31-35	-	-
	36-40	2	10.5
	41-45	6	31.5
	46-50	10	52.6
	Over 50 years	1	5.3
Total		19	100.0
Teachers	21-25	10	8.1
	26-30	20	16.3
	31-35	26	21.1
	36-40	35	28.5
	41-45	28	22.8
	46-50	3	2.4
	Over 50 years	1	0.8
Total		123	100.0
Learners	15-16	118	37.1
	17-18	128	40.3
	19-20	66	20.8
	Over 20 years	6	9.7
Total		318	100.0

Data in Table 4.3 indicates that 2(10.5%) of the principals were in the age bracket of 36-40,6(31.5%) in the bracket of 41-45 years,10(52.6%) in the bracket of 46-50 years while 1(5.3%) was in the age bracket of 51-55 years. Out of the 123 teachers, 10(8.1%) were of the age group 21-25 years, 20(16.3%) were of the age bracket of 26-30 years,26(21.1%) were of the age bracket of 31-35 years whereas 3(2.4%) were of the age bracket of 46-50 years. The study revealed that 118 (37.1%) learners were of the age bracket of 15-16 years, 128(40.3%) were between 17-18 years and 6(1.9%) were aged over 20 years. The findings indicate that majority of the principals have the experience to guide schools towards pedagogical integration of ICT in teaching and learning. Furthermore, majority of the teachers were of the age bracket 36-40 thus suggesting that they are well positioned to incorporate the emerging technologies in pedagogical integration of ICT in teaching and learning.

4.3.3 Educational level of Principals and teachers

The study sought to find out the education level of respondents. The principals and the teachers were asked to indicate their level of education. The results are tabulated in the Table 4.4

Table 4.4: Education level of Principals and teachers

Respondent	Response	Frequency	Percentage
Principals	M.Ed.	8	42.1
	B.Ed.	10	52.6
	BA/BSC with PGDE	1	5.3
Total		19	100.0
Teachers	M.Ed.	22	17.9
	B.Ed.	96	78
	Diploma in Education	3	2.4
	Higher Diploma Education	2	1.6
	Total	123	100.0

The study revealed that majority of the principals (10(52.6%) had a bachelor's degree 8(42.1%) had attained a master's in education degree, and 1(5.3%) had a B.sc with PGDE degree. Further the study found out that 22(17.9%) of teachers had attained a masters qualification, 96(78%) had a bachelor's degree, 3(2.4%) had a diploma whereas 2(1.6%) had a higher diploma. These findings indicate that secondary schools are run and managed by individuals with relevant

professional qualifications and can therefore adapt to changes posed by the adoption of ICTs in teaching and learning. Furthermore, a high number of teachers have attained a bachelor's degree and master's degree this suggests that they are well positioned for pedagogical integration of ICT for teaching and learning.

4.3.4 Principals' and teachers working experience

The study sought to find out the period the respondents had served in the position of principal.

Table 4.5 shows the results of the responses.

Table 4.5: Principals' and teachers working experience

Respondents	No of years	Frequency	Percentage
Principals experience	0-5	2	10.5
	6-10	8	42.2
	11-15	4	21
	16-20	5	26.3
Total		19	100.0
Teachers experience	0-5	13	10.6
	6-10	20	16.3
	11-15	66	53.7
	16-20	24	19.7
Total		123	100.0

The study revealed that 2 (10.5%) had been principals for between 0-5 years, 8 (42.2%) between 6-10 years, 4 (21%) between 11-15 years whereas 5 (26.3%) between 16-20 years. The principals' responses varied from one principal to the other, majority had served beyond five years as principals, meaning that they had adequate qualification and experiences to provide leadership towards pedagogical integration of ICT in teaching and learning. According to the table, the study revealed that majority of the teachers 66 (53.7%) had taught between 11-15 years, 13 (10.6%) of the teachers had taught between 0-5 years whereas 20(16.3%) had taught between 6-10 years. This data indicates that all the teachers had valuable experience that would enable them adopt ICTs in teaching and learning in classroom environments.

4.4 Responses to the research questions

The respondents were asked several questions that touched on ICT infrastructure available in the schools, Level of their accessibility and the level of training of both the learners and teachers for integration of ICT in teaching and learning. This section reports on the findings, which was gathered from the field to answer the questions.

4.4.1 ICT Infrastructure Available For Use In Teaching And Learning

When the learners were asked whether their schools had computers. The responses they gave are illustrated in Table 4.6.

Table 4.6: Availability of computers in the schools.

Availability of computers	Frequency	Percentage
Yes	278	87.4
No	40	12.6
Total	318	100.0

The findings reveal that 87.4% of the students agree that they have computers in their school while 12.6% decline that they don't have computers at school. Therefore it is evident that majority of schools have made a greater step towards incorporating computers into the schools. This portrayed that majority of the schools had the necessary infrastructure for pedagogical integration of ICT in teaching and learning.

Location of computers in the school.

It was necessary for the study to determine where specifically the computers are located in the schools. The findings are shown in the Table 4.7.

Table 4.7: Location of computers in the school.

Respondents	Location of computers	Frequency	Percentage
Students	classroom	65	20.4
	Library	54	17.0
	Computer lab	199	62.6
Total		318	100.0
Teachers	Teachers' lounge	60	48.8
	In my office	10	8.1
	Computer laboratory	20	16.2
	Science lab	10	8.1
	Administration office	8	6.5
	classroom	15	12.2
Total		123	100.0
Principals	Teachers' lounge	4	21.1
	Computer lab	3	15.7
	Library	2	10.5
	Administration office	10	52.6
Total		123	100.0

The findings shows that computers are mostly used in computer lab with a representation of 62.6%, other places were; classroom 20.4%, and library 17%. The results strongly indicate that access to and proximity of computers for use in teaching and learning is an important indicator on the extent to which ICT enhances teaching and learning. For instance location of computers in the computer laboratories, Library and classroom enable teachers and learners to access them hence easy interactivity. The results of this activity concurs with the recommendations of World bank, (2006) which asserted that placing computers in classrooms rather than separate locations enables much greater use of ICTs for attaining 'higher order' skills. The researcher further found out that a small number of computers in classrooms may enable more actual use than a greater number of computers located in separate rooms. The findings also shows that 6.5 % of the teachers use computers in their office, 8.1% use in science laboratory, 48.8% use in teacher's longue and administrative office takes 6.5% respectively and only 12.2% uses computers in the classrooms. The findings reveal that 52.6% of the principals are revealed that they use computers in the administrative office, 21.1% use computers in the teacher's Longue, 15.7% use computers in the school computer laboratory while only 10.5% use computers in the library. This suggests that majority of the principals; teachers and students have access to computers thus enhance the integration of ICT in teaching and learning.

The purpose of computers in the school.

The study further sought to find what functions the computers serve in the school. The findings are shown in the Table 4.8.

Table 4.8: The purpose of computers in the school.

Purpose for computer	Yes	NO
Word Processing	58 (63.7%)	12(13.2%)
Social Media (Facebook Twitter, etc.)	20 (22.0%)	49(53.8%)
Spreadsheet (Excel)	49 (53.8%)	17(18.7%)
Presentation (Power Point)	52 (57.1%)	13(14.3%)
Database (Access)	56 (61.5%)	9(9.9%)
Internet Access	32(35.2%)	34(37.4%)
Downloading music	19(20.9%)	50(54.9%)
Playing Games	29(31.9%)	40(44.0%)
Total	315	224

The findings indicate that 58% of the students suggested that they use computers for word processing, 12% used it for social media i.e. Facebook, twitter, 49% used computers for spreadsheet (Excel), 52% used it for PowerPoint presentation, 56% used it for database purposes

i.e. access, 32% used computers for internet access, 19% for downloading music and 29% used it for playing music. This findings suggests that ICT infrastructure available in that is accessible to the teachers and learners who use them for various applications which promote pedagogical integration of ICT in teaching and learning.

ICT infrastructure available in the school.

The respondents were asked whether the following devices are found in their schools. The findings are shown in the Table 4.9.

Table 4.9: ICT infrastructure available in the school.

ICT infrastructure available in the school	Yes	No
Computer	80(87.9%)	8(8.8%)
Scanner	27(29.7%)	46(50.5%)
Printer	59(64.8%)	19(20.9%)
Projector	51(56.0%)	23(25.3)
Total	303	96

The findings indicate that 87.9% of the students agreed that they used the computers, 29.7% indicated that they used scanner, 59% showed that they use printer while 51% indicated that they used projectors. These finding reveals that computer is still a common device at school which is

used by majority of students and the ICT infrastructure available in the schools is suitable for enhancing pedagogical integration of ICT for teaching and learning.

Number of hours allocated for use of ICT in teaching and learning.

The duration for ICT use in secondary schools is very important in enhancing pedagogical integration of ICT in teaching and learning therefore the study sought to find the hours that is allocated for teaching and learning purposes in the school for the students. The findings are shown in the Table 4.10.

Table 4.10: Number of hours allocated for use of ICT in teaching and learning.

Response	Frequency	Valid Percent
1 HOUR	230	72.3
2 HOURS	40	12.6
3 HOURS	28	8.8
4 HOURS	20	6.3
Total	318	100.0

The findings show that time for learning and teaching is always allocated 1 hour with a percentage of 72.3%, 4 hours 6.3%, 2 hours 12.6% and 3 hours 8.8%. The findings indicates that majority of the learners 72.3% use the ICT infrastructure for one hour and only 6.3% used it for at least 4 hours. This suggests that enough time is not allocated for the learners to access and interact with the ICT infrastructure available in the school thus hampering integration of ICT in teaching and learning. This concurs with Becta (2001) who asserts that the number of hour's

teachers and learners are exposed to ICT facilities greatly influence how well they make use of ICT opportunities available to improve pedagogy. The amount of time allocated determines the thrust to which ICTs provide potential opportunities of improving learner's achievement as a result of the additional support gotten from the use of ICTs

Usage of ICT in schools.

The respondents were asked on how they use ICT in their schools. The findings are shown in the Table 4.11.

Table 4.11: Usage of ICT in schools

Usage of technologies	YES	NO
Usage of internet in schools	48(15.1%)	273(87.7%)
Do you have an email account	242(76.1%)	76(23.9%)

The study reveals on how the students used the internet at school 15.1% agreed that they used the internet while 87.7% said that they don't use internet at school. They stated the reasons why they don't access internet is because there is no computer studies, Internet installation is expensive for the school, others stated that students are restricted from accessing internet to avoid accessing pornographic sites while others noted that they don't access internet to discourage their addiction to computers. Study conducted to confirm if the students had an email, 76.1% stated that they have an email while 23.9% revealed that they don't have an email.

This suggests that majority of the learners do not have a means of online communication and most of them do not use the internet services thus hampering integration of ICT in teaching and learning.

4.4.2 The ICT Infrastructure Available for use in Teaching and Learning

When study sought to know if the teachers use computers at work, 97.0% agreed that they used computers at work while 3.0% indicated that they don't use computers. For those who use computer at work, when asked to state the purpose of their computers, they suggested that they used them for school management and administration for instructional purposes, store information concerning school, quick access to information, typing accounting and teaching. This findings suggest that majority of the teachers use computers for administrative and evaluation purposes. This indicates that less of ICT infrastructure available is used for pedagogical integration of ICT in teaching and learning.

Areas of Computer technology that enhance better performance.

The respondents were to areas of computer technology that enhance better performance. The findings are shown in the Table 4.12

Table 4.12: Areas of Computer technology that enhance better performance.

Respondents	Areas of ICT	Frequency	Percentage
Teachers	Internet access	30	24.4
	Spread sheet	20	16.3
	Word Processing	41	33.3
	Databases	12	9.8
	PowerPoint	20	16.3
Total		123	100.0
Principals	Internet access	13	68.4
	Spread sheet	1	5.3
	Word Processing	4	21.1
	Databases	1	7.7
Total		19	100.0

Findings also shows that 24.4% of the teachers use computer technology for internet access, 33.3% uses computer for word processing and power point representation takes 16.3%, 9.8% uses computer for database purposes and only 16.3% use computers for spreadsheets. The results of this analysis reveal that there are many benefits of using ICT in pedagogy. For instance,

teachers can use different draft to assess how work is progressing and what input is needed. Some software is able to assess the student's work and provide useful information. Further, using a large screen as overhead projector, the teacher can focus on the students' attention on different aspects of the text. The study indicates that 68.4% of the principals use internet access for their ICT better performance. 5.3% used word processing, and 21.1% represents both the usage of spread sheet. These findings reveal that the principals use different areas of computer technology to enable better performance.

How ICT can be developed in schools for teaching and learning.

Moreover, the teachers were asked to give their opinion on how ICT can be developed into school their responses were as shown in Table 4.13.

Table 4.13: Where ICT is used in schools for teaching and learning.

Response	Agreed	Disagreed
I believe that education should be focused at encouraging the integration of ICT into learning	27 (51.0%)	18.2(36%)
I believe that schools should identify activities to prioritize the actions and required resources for ICT use in pedagogy	23 (69.7%)	10(30.3)
I believe ICT planning is an integral part of school planning.	18 (54.5%)	12(36.4%)
I believe there is need to train and retrain my teachers on ICT use in teaching and learning	29(87.9%)	3(9.1% [^])
I believe that the school management should define central objectives of ICTs use in education and identify a plan of action	23 (69.7%)	7(21.2%)
believe my school will perform better if ICTs is fully integrated in teaching and learning	23 (69.7%)	10 (30.3%)

The findings show that 51% strongly agreed and 18.2 agreed that education should be focused at encouraging the integration of ICT into learning, 69.7% strongly agreed while 30.3 agreed that schools should identify activities to prioritize the actions and required resources for ICT use in pedagogy likewise, 54.5% strongly agreed while 36.4% agreed that ICT planning is an integral part of school planning.87.9% strongly agreed and 9.1% agreed that there is need to train and retrain my teachers on ICT use in teaching and learning, In addition, 69.7% strongly agreed and 21.2% agreed that the school management should define central objectives of ICTs use in

education and identify a plan of action and finally 69.7% strongly agreed and 30.3% agreed that school will perform better if ICTs is fully integrated in teaching

4.4.3 Accessibility of the ICT

Regarding the schools which have embraced the use of ICT, teachers were asked to indicate the number of hours per week the school computers are accessible. This is shown in the Table 4.14

Table 4.14: Number of hours of computer accessibility.

Period	Frequency	Percent
Below 10 hours	40	32.5
10 -20 hours	23	18.7
21- 30 hours	10	8.1
31-40 Hours	19	15.4
41-50 hours	1	0.8
Above 50 Hours	30	24.4
Total	123	100.0

The study showed that the hours per week in which school computers is accessible is less than 10 hours, 24.4% revealed that it is accessible for above 50 hours, 18.7% for 10-20 hours, 15.4% for 31-40 hours while only 0.8% of the teachers revealed that their computers are accessible for 41-50 hours.

Purpose of ICT in schools.

Regarding the purpose of ICT in schools, teachers were asked to indicate what they use the ICT for. This is shown in the Table 4.15

Table 4.15: Purpose of ICT in schools.

Response	Often	Seldom	Never
Teaching Learning for specific Objectives	27.3(28.1%)	54.5(56.3%)	12.1(12.5%)
Teaching Computer Skills	9.1(9.1%)	39.4(39.4%)	45.5(45.5%)
Findings/Accessing information and educational materials	17(51%)	4(12%)	4(12%)
Making presentation/lectures	12(36.4%)	8(24.2%)	9(27.3%)
Preparing lessons	9(27.3%)	5(15.2%)	9(27.3%)
Communicating with students	9(27.3%)	8(24.2%)	11(33.3%)
Monitoring and Evaluation student's progress reports	17(51.5%)	2(6.1%)	1(3.0%)
Preparing reports	14(42.4%)	13(39.4%)	6(18.2%)

It is observed that 28.1%, 56.3% and 12.5% of the teachers often, seldom and never used computers respectively in teaching–learning for specific subjects. It is also given that 9.1%, 39.4% and 45.5% of the teachers, often, seldom and never respectively use ICT application in teaching learning skills. It is also noted that on how ICT application is used in finding/accessing

information and educational materials, 51% indicated often while 12% each indicated seldom and never. It is also noted that 36%, 24.2% and 27.3% indicated that they often, seldom or never respectively use ICT application in making presentation or lectures. Further 27.3% indicated they often or never use ICT application in preparing lessons, while 15.2% showed that they seldom use ICT application in preparing lessons. In investigating how ICT application is used in communication with the students, 27.3%, 24.2% and 33.3% indicated as often, seldom and never respectively. In determining how ICT application is used in monitoring and evaluation, 51.5%, 6.1% and 3.0% stated as often, seldom and never in each respect. Finally findings on how ICT application is used in preparing reports, 42.4%, 39.4% and 18.2% indicated that they often, seldom and never respectively. This result correspond with findings by Keys and Fernandez(1993) who asserts that teachers have confidence in their ICT skills use in presentation of lessons. These resources add immediacy and currency to lessons, enlivens the classroom environment and enhances learner engagement.

Duration of computer usage.

The study further investigated on how long the Principals, teachers and students had been using computer. This is shown in the Table 4.16.

Table 4.16: Duration of computer usage.

Respondents	Years	Frequency	percentage	
Principals	Below 3 years	4	21.1	
	4-7years	7	36.8	
	8-11 years	3	18.8	
	12-15 years	2	10.5	
	Above 16 years	3	15.8	
	Total		19	100.0
Teachers	Less than 1 year	32	26.0	
	2-4 years	34	27.6	
	4-8 years	16	13.0	
	More than 8 years	41	33.3	
	Total		123	100.0
Learners	Below 1 years	64	20.1	
	1-2 years	40	12.6	
	More than 2 but less than 4 years	200	62.9	
	4-6 years	14	44.0	
	Total		19	100.0

The study shows that 33.3% of the teachers have been using computers for more than 8 years, 13.0% for 4-8 years, 27.6% for 2.4 years and 26.0% for below 1 year. The findings suggests that majority of the teachers have accessed ICT infrastructure for a long period of time to enhance its use in learning. The result form from the study shows that majority of the students 62.9%, have been using computer for a period between 2 – 4 years, 12.6% for a period of 1-2 years and 4 -6 years was 4.4%. Finally it is revealed that 20.1% have been using computers for a period less than 1 year. This shows that most of the students have been using computer for quite some time in their lives and are familiar with the computer. The finding reveals that 36.8% have been using computer for 4-7 years, 15.8 % for 8-11 years while 15.8% have been using computers for 16 and more years. These findings reveal that the principals have been using computers for quite some time. It shows that 36.8% have been using computer for 4-7 years, 15.8 % for 8-11 years while 15.8% have been using computers for 16 and more years.

4.4.6 How schools offer ICT courses/Computer education

The study investigated how schools offer ICT courses/Computer education; the findings are indicated in the Table 4.17.

Table 4.17: How schools offer ICT courses/Computer education

How schools offer ICT courses/Computer education	Frequency	Percentage
As a separate subject	3	15.7
Integrated with other subjects	8	42.1
As an elective	7	36.8
Integrated with elective subjects	1	5.3
Total	19	100.0

The study investigated how the school offers ICT course/computer education to the students. On how the study is offered, 36.8% offer it as an elective subject, 15.7% offer it that it is offered as both separate subject and integrated with other subjects. 42.1% indicated that it is integrated with elective subjects. These results reveals that apart from using computers to teach, all learners, including those who are not taking computer studies as a subject, are expected to be taught basic computer literacy skills. This concurs with Kiptalam et al (2010) who asserts that learners are

being taught about computers as schools narrow down the pedagogical integration of ICTs in education.

Function of ICT in the school.

Regarding the function of ICT in schools, principals were asked to indicate what they use the ICT for. This is shown in the Table 4.18

Table 4.18: Function of ICT in the school.

How the school uses ICT	Frequency	Percentage
Remedial leaning	6	31.6
Learning enrichment / new learning	2	10.5
Regular Instruction and Training for developing computer skills	2	10.5
Accessing information and conducting research through the Internet	2	10.5
Communicating with others	3	15.7
As teaching learning tools for teaching specific subjects	2	10.5
Using in test administration, scoring and analysis	2	10.5
Total	19	100

The following are the results of the purpose of ICT in schools 31.6% indicated that it is used for remedial learning, 10.5% uses for learning enrichment/new learning, regular Instruction and Training for developing computer skills and accessing information and conducting research through the Internet. Moreover, 15.7% use communicating with others, as teaching learning tools for teaching specific subjects and using in test administration, scoring and analysis.

Influence of ICT usage by teachers in classrooms

On the other hand the study investigated how ICT relates to teachers in classroom. The findings are indicated in the Table 4.19.

Table 4.19: Influence of ICT usage by teachers in classrooms

Response	Strongly Agreed	Agreed	Strongly Agreed	Disagree	Strongly Disagree
Teachers know which teaching/learning situations are suitable for ICT use	8(42.1%)	1(5.2%)	5(26.3%)	3(15.8%)	2(10.5%)
Teaching using ICT tools makes learning interesting.	4 (21.1%)	5(26.3%)	6(31.5%)	2(10.5%)	2(10.5%)
Teachers can find useful educational resources in the Internet	3(15.8%)	4(21.1%)	2(36.8%)	6(31.6%)	4(21.1%)
Teachers find ICT suitable for giving program instruction even in their absence	3(42.1%)	4(21.1%)	4(21.1%)	5(26.3%)	3(15.8%)
Teachers find ICT suitable for giving program instruction even in their absence	3 (15.8%)	3(15.8%)	4(28.6%)	6(31.6%)	3(15.8%)
Student grasp content better when ICT applications are used in teaching	2(10.5%)	10(52.6%)	0(0%)	5(26.3%)	4(21.1%)

The study reveals that 42.1%, 5.2%, 26.3%, 15.8%, 10.5% strongly agreed, agreed, disagreed and strongly disagreed respectively that teachers know which teaching/learning situations are suitable for ICT use. It is also revealed that 21.1%, 26.3%, 31.5%, 10.5% and 10.5% strongly

agreed, agreed, disagreed and strongly disagreed respectively that teaching using ICT tools makes learning interesting. It is also shown that 15.8%, 15.8%, 28.6%, 31.6% and 15.8% strongly agreed, agreed, disagreed and strongly disagreed that teachers can find useful educational resources in the Internet. 42.1%, 21.1%, 21.1%, 6.3% and 15.8% strongly agreed, agreed, disagreed and strongly disagreed respectively with the opinion that teachers find ICT suitable for giving program instruction even in their absence. Moreover, 15.8%, 15.8%, 28.6%, 31.6% and 15.8% strongly agreed, agreed, disagreed and strongly disagreed respectively that teachers find ICT suitable for giving program instruction even in their absence. Finally, 10.5%), 52.6%), 0%), 26.3% and 21.1% strongly agreed, agreed, disagreed and strongly disagreed respectively that student grasp content better when ICT applications are used in teaching.

4.4.7 Extent to which the learners are trained in pedagogical integration of ICT.

The level of training of learners for ICT use in teaching and learning is important in understanding the extent of use of ICTs in teaching and learning in schools. The learner's preparedness determines the interaction between learners and teachers.

How learners knew how to use computers.

On the other hand the study investigated how the learners knew how to use computers. The findings are indicated in the Table 4.20.

Table 4.20: How did learners know how to use computers.

How did you Learn Computers	Frequency	Percentage
Own Initiative	64	20.1
My Friends	41	12.9
Other Students	92	28.9
My teachers	109	34.3
Others	12	3.8

Total	318	100.0
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The study also indicates how the respondents reacted when asked how they learnt computer. From the findings of the study, it is evident that majority of the students, 34.3% learnt computer through their teachers, 20.1% learned through own initiative, 12.9% through their friends, 28.9% indicated that they learned through other students and finally 3.8% indicated that they learned through others means such as relatives, parents and internet.

Level of training of learners for ICTs use

The study investigated the level of training of learners for ICT use. The findings are indicated in the Table 4.21.

Table 4.21: The level of expertise in computer usage.

Rate you level of expertise in computer	Frequency	Percentage
No expertise	20	6.3
Fair-able to operate basic computer functions and a word processing application	143	45
Good-able to operate at least Ms Office applications (Ms word, Excel, Power Point) and use these for school assignments	78	24.5
very good-all the skills used for school including the regular use of internet services	46	14.5
Excellent- all of the above including use of internet; development of web pages, participation in e-learning and online classes	31	9.7
Total	318	100.0

The study further sought to know the expertise of the students to the computer. The findings shows that majority are fair-able to operate basic computer functions and a word processing application 45%, 24.5% are good-able to operate at least Ms Office applications. (Ms word, Excel, Power Point) and use these for school assignments, 14.5% are very good in all the skills used for school including the regular use of internet services while 9.7% are excellent in all including use of internet; development of web pages, participation in e-learning and online classes. These results reveal that apart from using computers to teach, all learners, including those who are not taking computer studies as a subject, are expected to be taught basic computer literacy skills. This concurs with Kiptalam et al (2010) who asserts that learners are being taught about computers as schools narrow down the pedagogical integration of ICTs in education.

4.4.8 Extent to which teachers have been trained in the pedagogical integration of ICT in teaching and learning.

Teachers are the most direct link between learners and ICT facilitated learning and therefore are forces in the success of any ICT in education programmes. The study sought to find out how teachers learnt to use computers. This was deemed important because the teachers' level of training for use of ICTs in pedagogy determines the extent to which ICTs are used for classroom purposes. 72.7% revealed that they are trained on the usage of computer while 27% stated that they are untrained on the use of computers. These results therefore suggest that majority of teachers are competent and are trained therefore are able to pass skills effectively to the students.

How teachers learned how to use computer

Further findings on how the teachers learnt the computers are shown on the table 4.22.

Table 4.22: How teachers learned how to use computer

	Frequency	Percent
Teacher	40	32.5
Self	203	18.7
colleagues	54	44
Relatives	6	4.9
Total	123	100.0

The study reveals that 32.5% learnt computers through teachers and colleagues respectively, 18.7% stated that they learnt through themselves while 4.9% stated that they learnt the computer through their relatives. The findings imply that teacher training on the use of ICTs should focus on enabling teachers to attain the required knowledge and skills to use in ICTs in pedagogy.

The results of this analysis concur with UNESCO (2004) which asserts that teacher training programmes for use of ICTs in pedagogy often focus on computer literacy, but lack of proper emphasis on integrating technology with pedagogy. This implies that teacher training on use of ICTs in pedagogy should equip teachers with the ability to facilitate interactive ICT assisted teaching and learning in the classroom.

Level of expertise in computer applications.

Findings on the level of expertise of teachers in computer applications are shown on the table 4.23.

Table 4.23: Level of expertise in computer applications.

Use	Excellent	Very Good	Good	Fair
Word Processing	63(51.2%)	20(16.3%)	36(29.3%)	4(3.2%)
Spreadsheet (Excel)	36(29.3%)	20(16.3%)	4(3.2%)	63(51.2%)
Presentation (Power Point)	42(34.1%)	28(22.8%)	37(30.1%)	16(13%)
Database (Access)	17(13.8%)	8(6.5%)	26(21.1%)	72(58.5%)
Internet Access	101(82.1%)	6(4.9%)	7(5.7%)	9(7.3%)

The findings show that 51.2% rate word processing as excellent, 16.3% as very good, 29.3% as good and 3.2% as fair. 29.3% rate spreadsheet as excellent, 16.3% very good, 3.2% as good and 51.2% as fair. 34.1% rate power point presentation as excellent, 22.8% rate both very good and 30.1% as good and 13% rate it fair. 13.8 % rate the database as excellent, 6.5% as very good and 21.1% as good while 58.5% rate it as fair.82.1% rate internet access as excellent, 4.9% as very good, 5.7% as good and 7.3% as fair.

Investigation on if the teachers were trained in use of ICT in teaching and learning, it was revealed that 63% have not been trained and only 33.3% are the trained ones. On which subject they used ICT in teaching, the teachers stated, Sciences, Mathematics, geography and music.

Perceived Enjoyment of ICT in teaching and learning.

The study sought to find out factors that determine teachers’ are prepared for use of ICT in teaching and learning. The respondents were thus asked to indicate their level of agreement on whether they are prepared for use of ICT in teaching. The findings are indicated in Table 4.24.

Table 4.24: Perceived Enjoyment of ICT in teaching and learning.

Response	Agree	Disagree
Perceived enjoyment		
I find using ICT the best way to model pedagogy to learners	236 (9.7%)	9(27.3%)
I find using ICT the best way to achieve confidence and motivation in learners.	13 (39.4%)	19 (57.6%)
I find that most of my students prefer being taught using ICT than talk and chalk teaching	9 (27.3%)	17 (51.5%)
Use of ICT attracts full attention of my students	7 (21.2%)	20 (60.6%)
Total	265	65

69.7% strongly agreed while 27.3% agreed that they find using ICT as the best way to model pedagogy to learners. 39.4 strongly agreed while 57.6 agreed that using ICT is the best way to achieve confidence and motivation in learners. 27.3% strongly agreed while 51.5% agreed that most of my students prefer being taught using ICT than talk and chalk teaching and finally, 21.2% and 60.6% strongly agreed and agreed respectively that the use of ICT attracts full attention of the students.

These findings indicate that learners' confidence and motivation is one of the factors that necessitate the integration of ICTs in teaching and learning. This concurs with Hepp et al (2000) who asserts that the use of ICTs in teaching and learning would require learners to have a great level of motivation to engage in self-motivated learning.

Influence of ICT on class environment

An enabling class environment is an essential element of teaching using ICTs. The constructivist theorists advocate that the class environment should be favorable such that it encourages learner-centered instruction because learning occur as learners exercise, test and discovers things themselves. This is possible through discussion, dialogue, communication, collaboration, information gathering and interaction with others (Holmes, et, al, 2000; Steffe and Gale, 1995 and Laurillard, (2005). The researcher modeled questions to elicit responses as follows. The findings are indicated in Table 4.25.

Table 4.25: Influence of ICT on class environment

Class Environment	Agree	Disagree
ICT Make it easy to interact with students	10 (30.3%)	23 (69.7%)
students are actively engaged in Learning Through ICT	9 (27.3%)	20 (60.3%)
ICT enhances active participation in class	10 (30%)	18 (54.5%)
ICT Improves self-expression among students	13 39.4%)	15 (45.5%)
ICT improve information sharing among students	14 (42.4%)	17 (51.5%)
Total	93	56

The study further investigated the on the use of ICT in social and class environment. It is noted that 30.3% strongly agreed and while 69.7 agreed that ICT make it easy to interact with students. 27.3 strongly agreed while 60.3 agreed that students are actively engaged in learning through the

use of ICT. Moreover, 30% strongly agreed and 54.5 agreed that ICT enhances active participation in class. 39.4 strongly agreed and 45.5 agreed that ICT improves self-expression among students. And finally 42.4% strongly agreed and 51.5% agreed that ICT improves information sharing among students.

An enabling class environment is an essential element of teaching using ICTs. The activity theory advocates that the class environment should be favourable such that it encourages learner-centered instruction because learning occur as learners exercise, test and discover things themselves. This is possible through discussion, dialogue, communication, collaboration, information gathering and interaction with others Zandliet & Straker, (2001).

Teaching and learning using ICTs is an interactive process between teachers and learners. Thus the findings concur with Wengler, (1998) who asserts that due to the interactive nature of ICTs in the classroom lessons have become more interesting, more diverse and have improved the presentations of materials for lessons hence making the lessons more fun with the classroom environments.

The findings indicate that ICTs provide an avenue through which learners express themselves. This concurs with Hollaway. et al (1999) who asserts that one of the implications of use of ICT in classroom teaching is that when learners work collaboratively in small groups, ICT can be used effectively to support talk, improve discussion hence self-expression. This is because the ICT environment allows students' participation and active engagement.

The results on whether ICTs improve information sharing among learners reveal that learners are influenced by the use of ICTs in the classroom, Laurillad (2007) has asserted that learners are influenced by what their teachers enable them to do with ICTs; how confident and new

competencies such as being able to work independently, search for information, collaboration and communication with peers is enhanced in the classroom.

4.4.10 Extent to which the principals have been trained in the pedagogical integration of ICT in teaching and learning

The study further investigated if the principal have been trained in the pedagogical integration of ICT in teaching and learning, the findings are indicated in the Table 4.26.

Table 4.26: Level of training of principals for pedagogical integration of ICT

Where Principals learnt		
How to use computers	Frequency	Percentage
School	4	31.6
College	7	21.1
University	3	47.4
Total	19	100

The study indicates that 92.9% are trained on how to use computer while 7.1 are not. The study also indicates that 21.1% leant computer through college, 47.4% through university and 31.6% through high school.

Influence of integration of ICTs for teaching and learning in public secondary schools.

The Table 4.27 reveals the findings on the influence of ICT in education.

Table 4.27 Influence of integration of ICTs for teaching and learning in public secondary schools.

Response	Strongly Agreed	Agreed	Disagreed	Strongly Disagreed
I believe that education should be focused at encouraging the integration of ICT into learning.	14(73.3%)	5(26.3%)	0	0
I believe that schools should identify activities to prioritize the actions and required resources for ICT use in pedagogy	8(42.1%)	5(26.3%)	1(5.2%)	5(26.3%)
I believe ICT planning is an integral part of school planning.	8(42.1%)	6(31.6%)	3(15.8%)	2(10.5%)
I believe there is need to train and retrain my teachers on ICT use in teaching and learning.	7(36.8%)	5(26.3%)	4(21.1%)	3(15.8%)
I believe that the school management should define central objectives of ICTs use in education and identify a plan of action	7(36.8%)	5(26.3%)	3(15.8%)	4(21.1%)
I believe my school will perform better if ICTs is fully integrated in teaching	4(21.1%)	8(42.1%)	3(15.8%)	4(21.1%)

73.7% strongly agreed and 26.3% agreed that education should be focused at encouraging the integration of ICT into learning. 42.1% strongly agreed while 26.3% agreed that the schools should identify activities to prioritize the actions and required resources for ICT use in pedagogy. 42.1% strongly agreed and 31.6% agreed that ICT planning is an integral part of school planning. 36.8% strongly agreed while 26.3% agreed that there is need to train and retrain my

teachers on ICT use in teaching and learning. 36.8% strongly agreed while 26.3% agreed that the school management should define central objectives of ICTs use in education and identify a plan of action. Finally 42.1% agreed and 21.1% strongly agreed that school will perform better if ICTs is fully integrated in teaching.

4.4.11 Learner’s response on challenges facing ICT Integration in teaching and learning.

The degree of participation in the use of ICTs in teaching and learning could be affected by a myriad of challenges. The study sought to find out what challenges secondary schools faced in the use of ICTs in teaching and learning. The results are presented in Table 4.28.

Table 4.28: Challenges facing ICT Integration in teaching and learning

Response	Frequency	Percentage
Inadequate skills	34	30.0
Lack of enough computers	63	57.3
Power Black out	46	41.9
Shorter period	56	51.0
Computer programs complex (inaccessible)	23	21.0
Increasing number of computers	54	49.1
Buy modern computers	62	56.4
Integrate the use of internet	51	46.4

Concerning the challenges facing ICT integration in teaching and learning, 34% of the student suggested that inadequate skills to aid the students is a major challenge. 63% indicated that lack of enough computers for student operations during lessons leads to crowding of students into one computer and affects the concentration. 46% also suggested that Power blackout resulting hinders their lessons and sometimes enforce them to skip them without compensation for the

lesson. 56% indicated that the short time for using computers and lessons is not always adequate. 23% indicated that some programs in the computer were either complex or inaccessible. Majority of the students accepted that computers are addictive and therefore is a major challenge to them while 43% complained that prolong hours into computers screen leads into damage of eyesight. Finally 23% suggested that their schools still use obsolete computers since they were slow to execute programmes. This concurs with Farrel (2007) in a study on ICT in education who states that in some instances most schools cannot afford to employ a full time computer technician to be in charge of activities involving use of ICT in teaching and learning.

4.4.12 Teacher’s response on challenges facing use of ICT in teaching and learning

The study further investigated the teacher’s opinion concerning the challenges facing ICT teaching and learning in schools. The findings of the study are shown in the table 4.29.

Table 4.29: Teacher’s response on challenges facing use of ICT in teaching and learning

Response	Agree	Disagreed
The startup cost for ICT prohibits ICT use in Schools	9(27.3%)	21(63.6%)
Insufficient number of computers hinders pedagogy using ICT	19(57.6%)	11(33.3%)
Most teachers lack confidence to use ICT in pedagogy	13(39.4%)	13(39.4%)
The school management has not set clear policies and strategies for use of ICT in pedagogy	9(27.3%)	22(66.7%)
There are not enough training opportunities for teachers to attain skills for ICT use in pedagogy	16(48.5%)	10(30.3%)
Teachers have resisted the change towards use of ICT as it is perceived to threaten their jobs and traditional classroom roles	6(18.2%)	8(24.2%)
The use of ICT is affected by technical problems such as network failure and power failure	8(24.2%)	21(63.6%)
The available ICT tools are not accessible to teachers and students	11(33.3%)	14(42.4%)

The findings show that 27.3% strongly agreed while 66.6% agreed that the startup cost for ICT prohibits ICT use in schools. 57.6% strongly agreed and 33.3% agreed that insufficient numbers of computers hinders pedagogy using ICT. It is further revealed that 39.4% both strongly agreed and agreed that most teachers lack confidence to use ICT in pedagogy. 27.3% strongly agreed while 66.3% agreed that the school management has not set clear policies and strategies for use of ICT in pedagogy. Further, 16% strongly agreed and 10% agreed that there are not enough training opportunities for teachers to attain skills for ICT use in pedagogy. Moreover, 8% strongly agreed while 21% agreed that the use of ICT is affected by technical problems such as network failure and power failure. Finally, 33.3% strongly agreed while 42.4% agreed that the available ICT tools are not accessible to teachers and students.

The results of this analysis strongly indicate that there are various challenges facing the integration of ICT in teaching and learning in public secondary schools. The results concur with Fowler et al (2000) who asserted that cultural context of ICT adoption, perceived difficulty in the integration of ICT in education is based on the belief that technology use is challenging, its implementation requires extra time, technology skills are difficult to learn and the cost of training and maintaining resources is prohibitive.

4.4.13 Principals response on Challenges facing use of ICT in teaching and learning

The study further investigated the challenges facing the use of ICT in teaching and learning. The outcomes of the study are indicated in the table 4.30.

Table 4.30: Principals response on Challenges facing use of ICT in teaching and learning

Response	Strongly Agreed	Agreed	Neutral	Strongly Disagreed
Teacher' lack of competencies, knowledge and skills	9(60.0%)	4(26.7%)	2(13.3%)	0
Difficulty in Integrating ICTs in instruction	2(13.3%)	12(80.0%)	1(6.7%)	0
Lack of Technical now-How of teachers	2(14.3%)	7(50.7%)	3(21.4%)	2(14.3%)
Insufficient Electricity Supply	3(20.0%)	5(33.3%)	4(26.7%)	2(13.3%)
Resistance by teachers	2(13.3%)	4(26.7%)	2(13.3%)	2(13.3%)
Running cost prohibitive	3(20.0%)	4(26.7%)	4(26.7%)	2(13.3%)
Lack of support from school board	2(14.3%)	2(14.3%)	5(35.7%)	3(14.3%)
Financial Bottleneck	1(6.7%)	10(66.7%)	1(6.7%)	1(6.7%)

60.0%, 26.7% and 13.3% strongly agreed, agreed, and strongly disagreed respectively that teacher's lack of competencies, knowledge and skills is a major challenge. 13.3%, 80.0% and 6.7% strongly agreed, agreed, neutral and strongly disagreed respectively that difficulty in integrating ICT. Moreover 20.0%, 33.3%, 26.7% and 13.3%, strongly agreed, agreed, neutral and strongly disagreed respectively indicated that the running cost prohibitive. 14.3%, 14.3%, 35.7% and 14.3% strongly agreed, agreed, were neutral and strongly disagreed respectively that lack of support from school board is a challenges and finally, 66.7% agreed while 6.7% strongly agreed, disagreed and strongly disagreed that financial bottleneck is a challenge.

The results concur with UNESCO, (2004) report that indicates that key problem in the use of ICTs in teaching and learning is availability of finance to purchase the infrastructure. Secondly, Teachers may resist the integration of ICTs in classroom practice because of the perceived outcomes such as loss of jobs, interference with usual teaching procedures and changes in teachers' roles either forced by technology itself or more actively steered by teachers. The implication of this is that teachers need to have positive attitudes towards ICTs by realizing its value for learning through more experienced and embedded use.

4.4.14 Suggestions and solutions on the ways of enhancing the use of ICTs in teaching and learning.

The study sought to establish the factors that would enhance the use of ICTs in teaching and learning in secondary school. Relevant questions and responses from the head teachers, teachers and students were sought analyzed. Four Principals(16.7%) suggested that in-service training of teachers on how ICTs can be used to enhance teaching and learning should be encouraged whereas 10(41.7%) indicated that purchasing more computers was key in enhancing ICTs use in pedagogy.

Five (20.8%) indicated that developing a clear ICT in education policy for individual schools would go a long way in improving use of ICTs in teaching and learning. Further, 5(20.8%) Principals advocated for proper incorporation of ICTs in the curriculum.

Majority teachers 114(50.4%) identified teacher training on the effective pedagogical use of ICTs in teaching and learning as an important factor in enhancing the use of ICTs in pedagogy. 45(17.7%) identified availability of infrastructure for both teachers and students as a factor that would enhance the use of ICTs in supporting teaching and learning. Fifty two teachers (23.0%)

identified proper planning in schools whereas 22(9.7%) identified budgetary allocation for ICTs in education as a key factor. The study further reveals the solutions given by the teachers on how ICT can be improved in the school. The findings shows that in terms of access to computers, the teachers suggested that the administration should Increase the number of computers which are new in the market and internet sufficiency, Should be accessible to both teachers and students, network the computers and finally ICT room be accessible throughout the school hours.

Finally in terms of ICT Management in the school, the school Administration should enhance Training of teachers, set up computer department, Develop effective strategies for managing ICT, Regular servicing of computer and Develop regulations that binds to all users of the computers

Further 124 students (39.9%) indicated the availability of more computers for use in pedagogy will enhance the use of ICTs in teaching and learning, 62(19.5%) indicated that allocation of more time for use of computer room will enhance pedagogy. However, 40 students (12.6%) stated that having more practical lessons will enhance the use of ICTs in pedagogy. Concerning the solutions to access to computers, 54% of the students noted that increasing the number of the computers to school is the answer. 62% stated that the school should buy modern computers while 51% suggested that the school integrate the use of internet into the school.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction.

This chapter presents the findings of the study and presents the summary of the findings, conclusions, recommendations and suggestions for further research.

5.2 Summary of the findings

The purpose of the study was to elucidate factors influencing pedagogical integration of ICT in teaching and learning in public secondary schools in Kenya: a case of Keiyo Sub County, Elgeiyo Marakwet County.

Four research questions were formulated to guide in the study. Research questions one aimed at establishing what ICT infrastructure are available for use that is influencing pedagogical integration of ICT in teaching and learning. Research question two aimed at examining how the level of accessibility of ICT influences pedagogical integration of ICT in teaching and learning. Research question three sought to establish how the level of learners training in ICT influences pedagogical integration of ICT in teaching and learning. Research question four aimed at finding out how the level of teacher training in ICT influences pedagogical integration of ICT in teaching and learning in Keiyo Sub County, Elgeiyo Marakwet County.

Literature was reviewed on what information and communication technologies, pedagogy and classroom practice entails, ICT in education in Kenya, Historical development of ICT in schools, Level of accessibility of ICT infrastructure to both learners and teachers and the infrastructure available for teaching and learning. The study was based on activity theory as espoused by

Engestrom (1987). The study applied a descriptive survey design. The target population was the public secondary schools which had installed and use ICTs in teaching and learning. The sample consisted of 19 principals, 155 teachers and 341 students from the secondary schools. Data was collected through the use of questionnaires for principal, teachers and students.

The findings revealed that secondary schools had to some extent established ICT infrastructure for use in teaching and learning at varying degrees. For instance, principal (48.8%) indicated that they had computers available in the teachers' lounge and offices. Further, the study revealed that schools had computers located in the computer laboratories, science laboratories and offices. Eighteen principal (57.0%) indicated that over 75% of students in their schools had access to ICT facilities. Further, 78 students (24.5%) indicated that most of the ICTs were inadequate for their needs. Teachers also had access to the ICTs for use in teaching their subjects. For instance, majority 40(32.5%) of the teachers indicated to have access to computers for up to 24 hours per week.

The findings also revealed that majority of the teachers had basic computer skills but lacked skills for advanced use of ICTs in enhancing teaching and learning. For instance 72.7 % teachers indicated they had attended training either in computer colleges or in-service training funded by the school. The research revealed that these courses were on basic literacy skills and basic computer programmes. However, majority of teachers rated their expertise in use of e-mail, and internet as good.

The findings further revealed that there was relative use of ICTs in enhancing teaching and learning. Majority of the teachers 66.70% indicated that they use ICTs to teach science subjects such as biology, chemistry, physics, and mathematics. Further, the teachers indicated that this is

confined to practical lessons whereby ICTs are used to facilitate learning and make it enjoyable. There was minimal use of ICT to teach humanities such as history, agriculture and geography as well as languages such as English.

The study revealed that students were prepared to use ICTs in pedagogy. Majority 188(59.1%) of the students indicated that they have been taught about computers and that they have been taught about computers and that they are capable of using basic computer applications. The research revealed that majority of the students had a perceived enjoyment towards the use of ICTs in teaching and learning. The students reported that they were able to use ICTs for accessing information that can be used in the classroom.

The use of ICTs in teaching and learning in secondary schools is faced by a myriad of challenges. The study identified lack of ICT infrastructure as one of the major challenges. The responses from the principals, teachers and students indicated that other challenges included poor connectivity from internet service providers (ISPs), poor strategy and policy for ICTs in education, teachers' resistance, perceived challenge of integration and lack of technical assistance. The findings revealed that lack of ICT infrastructure posed as key challenge to the integration of ICTs in pedagogy.

The study findings also indicated that several factors enhance the use of ICTs in teaching and learning in secondary schools. Respondents identified factors such as teacher training, availing more computers, proper planning and budgetary allocation as some of the factors to enhance the use of ICTs. The study further revealed that the extension of the number of hours students are exposed to ICTs; purchasing more computers and encouraging all students to use important factors towards enhancing the use of ICTs in pedagogy.

5.3 Conclusions

The apparent immense educational potential of ICTs has captivated stakeholders in education around the world. There is widespread belief that ICT can and will empower teachers and learners and transform teaching and learning processes from being highly teacher-dominated to student-centered. This transformation will result in increased learning gains for students, creating and allowing for opportunities for learners to develop their creativity, problem solving abilities, informational reasoning skills, communication skills and higher-order thinking skills. The research findings in this study reveal that ICTs has the potential of improving the quality of teaching and learning in secondary schools if fully exploited.

The influence of ICTs in learning cannot be dealt with in isolation. For technology to be effective, it must be availed to learners at the right time and place. There is need to be effective, it must be availed to learners' proximity; that is in classrooms or supposed learning environments.

Majority of the teachers have basic ICT skills and competencies. However, there is need to ensure that teachers are abreast of knowledge of complex computer skills for use in teaching and learning. These skills include PowerPoint presentation and database access.

The findings of this study also indicated that use of ICTs was largely limited to acquisition of basic skills by teachers and learners. More efforts should focus on preparing the teachers and learners to use ICT as instructional tools. Thus, the use of ICTs in schools should focus more on the way ICTs can be used to enhance teaching and learning rather than basic computer skills.

The study concludes that the potential that ICTs hold in pedagogy can only be attained if key challenges identified as affecting the use of ICTs in supporting teaching and learning are

handled. These factors include availability of ICT infrastructure, lack of skills on how to integrate ICTs in teaching and learning, poor connectivity, Poor electricity supply and lack of technical assistance. The study also identified enabling factors for ICT use such as employing ICT teachers or technicians, teacher in service training on use of ICTs, proper planning and provision of adequate computers for use.

5.4 Recommendations

Based on the research findings, the researcher makes the following recommendations.

- i. Teachers should be motivated to attend training on ICTs so as to attain the required skills for use of ICTs in teaching and learning. They should also be encouraged to use ICTs in pedagogy. It is important for school management to impress upon them on the need to use ICTs in pedagogy so as to improve quality of education. The gulf between teachers using the conventional teaching methods and those ready to embrace ICTs and become techno-savvy should be bridged so as to attain maximum benefits from use of ICTs in pedagogy.
- ii. School management should focus on increasing their ICTs infrastructure by provision of computers, building computer laboratories and encouraging public-private partnership so as to help in internet connectivity and provision of basic infrastructure. Capacity building is an important initiative that helps in ensuring that the benefits that accrue from use of technology in education are maximized.
- iii. Additionally, students should be provided with technical assistance to use ICTs in teaching and learning. They should be guided on all ICTs applications with necessary expertise to enable them acquire ICT skills for use in pedagogy. This can be done by

ensuring that students are made to realize the new innovations in educational technology and be prepared and equipped with skills for the technology era.

5.5 Suggestion for further research

Based on the findings of the study the researcher makes the following suggestions for further research:

- i. A study on teachers' attitude and perceptions towards the integration of ICTs in teaching and learning.
- ii. A study on the use of computer-assisted learning in the teaching and learning of mathematics and science subjects.
- iii. A case study on the extent of adoption of ICTs in selected urban and rural schools

REFERENCES

- Adams, Carlson and Haman (1990). *Studies in educational learning environments: An international perspective*. Singapore: World Scientific Publishers.
- Alade, E.B. (2005). *Technology enhanced primary education: Initiative in Kenya. Education in the digital world*. Viva Books Private Limited. New Delhi
- Alexander, (1992). Why we need education: [http://www.ezine_articles.com/?expert=Alexander R](http://www.ezine_articles.com/?expert=Alexander_R)
Approach, Taylor and Francis, New York
- Becta (2007) Diffusion of Innovations (5th Edition). New York: Free Press.
- Best and Khan, (2008). *Educational Research: An Introduction*, (4th edition), Longman Publishers; New York
- Blatchford (1996) the Elementary School Principal as a Change Facilitator in ICT Integration,
- Brown and McLyntre (1993) A Theoretical Extension of the Technology Acceptance
- Carter (2002). *Fitting the task to the man: A textbook of occupational ergonomics*
- Centre for Activity Theory and Developmental Work Research (2003). The activity system.
- Cohen, P. S. (2003). *Value Leadership: The 7 Principles That Drive Corporate Value in Any Economy*. San Francisco: Jossey-Bass.
- cozby. (2003). *Research Methods in Education*. 5th edition. Routledgefalmer. London and New York.
- Demiraslan, Y. (2005). *Analyzing the integration of information and communication technologies into teaching-learning process according to activity theory*. Unpublished dissertation. Ankara: Hacettepe University.
- Dron, J. (2007). *Control and Constraint in e-learning: Choosing when to choose*. Hershey: Idea Group Publishing

Duffy, T. M, Lowyck, J. & Jonassen, D.H, (1993).*Designing Environments for Constructivist Learning*. Berlin: Springer-Verlag Education, Training and Research, Nairobi

Engestrom, Y. (1987). Learning by expanding: An activity-theoretical approach to developmental research. [Viewed 5 Mar 2005, verified 11 Aug 2008]

Face et al (2001), "User acceptance of computer technology: A comparison of two theoretical models", *Management Science* 35: 982–1003

Farrell, Glen (2007) *Survey of ICT and Education in Africa: A Summary*

Fowler et al (2000) Predicting and Changing Behaviour: The Reasoned Action

Fowler, C .J, & Mayes, T .J, (2000). Learning Relationships from Theory to Design.

Fraenkel, J. R. & Wallen, N. E. (2006). *How to Design and Evaluate Research in Education*. 6th edition. Boston McGraw-Hill.

Gakuu & Kidombo (2008) *Pedagogical integration of ICT in selected Kenyan secondary schools: application of Bennett's hierarchy*. The Journal for Continuing and Distance Education Vol 1(2010).

Gomez and Martinez (2001).*The Role of ICT in the economic development of Africa: The case of South Africa. International Journal of Education and Development using ICT, Vol 2, No 4*

Gulati,S.(2008). *Technology enhanced learning in developing nations: a review*

Hepp et al (2000) the moral imperative of school leadership. Thousand Oaks, CA: Corwin.

Hollaway & Valentine (1999) ICT implementation and school leadership: Case studies of ICT integration in teaching and learning, *Journal of Educational Administration*, v. 41 n. 2, p. 158-170, available at <http://hdl.handle.net/10722/42273>

<http://communication.ucsd.edu/LCHC/MCA/Paper/Engestrom/expanding/toc.htm>

Jonasson, (2009) *The master communicator*,p.5, Jaico Publisher

Kenya School Net, (2003). *The Role of Secondary School Inspector in Kenya*: Oxford University Press *occupational ergonomics* (5th Ed.). London: Taylor and Francis.

Keys and Fernandes (1993) *Teacher leadership and school improvement: a case study of teachers*

Kiptalam et. al (2010) *Accessibility and utilization of ICT among secondary school teachers*

Kothari, C.R. (2003).*Research Methodology: Methods and Techniques*. New Delhi: Gupta

Kroemer, K., & Grandjean, E. (1997).*Fitting the task to the human: A textbook of*

Laurillard. (2007) *ICT Leadership in School Education*, Australian Catholic University

Lim, C. P. & Hung, D. (2003). An activity theory approach to research of ICT integration in

Lim, C. P. (2002). A theoretical framework for the study of ICT in schools: A proposal. *British Journal of Educational Technology*, 33(4), 411-421.

Makau,(1990).*A Framework for Integrating ICT in the teaching and learning process in Secondary Schools in Kenya*. MSc. Thesis University of Nairobi, School of Computing Studies

Mc Callum et al (2000) *Leadership and Learning with ICT: Voices from the profession*, Australian

Microsoft ® Encarta ® 2009. © 1993-2008 Microsoft Corporation.

Microsoft ® Encarta ® 2009. © 1993-2008 Microsoft Corporation; *the Republic*

Mugenda, O.M., & Mugenda, A.G,(2003).*Research Methods: Quantitative and Qualitative Approaches*. Nairobi: Acts Press

NCST(2010) *Pan African Research Agenda on the Pedagogical Integration of ICT in Education in Africa*, available at www.observatoiretic.org

OECD (1987). *Approaches to sustainable e-learning in Africa*, in German Development Co-operation. Retrieved on December 30, 2012

Osin, P, (1998) *Computers in education in developing countries: Education and Technology series 3(1) pp.1-14* participating in the teacher leadership network with a regional education service centre. Doctor of Philosophy dissertation Presented to the Graduate Council of Texas State University-San Marcos.

Pedrettriet(1998) A study of selected elementary school principals' use of computers for administrative purposes. (Doctoral dissertation, Northern Illinois University, 1992). *Dissertation Abstracts International, 53 (06A), 1760.* (UMI No. AAG9230727).

Piaget, J. (1971). *Genetic Epistemology*. New York: W.W. Norton

Pollard & Tann (1993).*The changing Face of Learning Technology*. Cardiff University of Wales Press.

Psacharopoulos, (2000). *Education for Development. Analysis of Investment choice*: Oxford University Press

Ramesh C. S., Mishra, S. & Pulist, S.K. (Ed.) (2005).*Education in the Digital World*. VinoodVasishtha Books, New Delhi.

Ramsden, P. (2003). *Learning to teach in higher education*. New York: Routledge-Palmer Press
Report, Based on 53 Country Surveys. Washington, DC: infoDev / World Bank. Available at <http://www.infodev.org/en/Publication.353.html>

Republic of Kenya (2005) Sessional Paper No. 1 of 2005, A Policy Framework for

Republic of Kenya, (1964).The Education Commission Report. Nairobi: Government Printer

Republic of Kenya, (2005).*National ICT Policy*. Ministry of Information and Communication

Rudduck & Flutter (2000).Classroom climate and individual learning. *Journal of Educational Psychology, 59, 414–419.*

Rushkoff (1997) ICT integration in the classroom: Challenging the potential of a school policy, Available online at www.sciencedirect.com, *Computers & Education* 51 (2008) 212–223
Shanker Institute.

Singapore schools. *Computers & Education*, 41(1), 49-63.

Squires, D, (1997). *A framework for Reviewing Teacher Professional Development Programmes in IT*. Retrieved on February 17, 2013, from: <http://www.unesco.org/education/eduprog/educt.pdf>
The Technology Source, Available online at
<http://ts.mivu.org/default.asp?show=article&id=1034>

Todd, (1995) Five Common but Questionable Principles of Multimedia Learning. In Mayer, R. (Ed.) *Cambridge Handbook of Multimedia Learning*. Cambridge: Cambridge, University Press.

UNESCO, (2005). *Informatics for Secondary Education: A curriculum for schools*, Paris.

UNESCO, 2004; Gregoire, Bracewell & Laferriere (1996). *Priorities and strategies for education: A UNESCO review*.

Wadi. D.H, (2012) *ICT for Education; An overview*

Watkins & Mortimore (1999). *Rhizomatic Education: Community as Curriculum*.

Wellington (2001) *Building a new structure for school leadership*. Washington, DC: Albert

Wengler, E, (1998). *Communities of Practice: Learning and Identity*. London: Pinter Press

Williamson. B, (1999). *Education structure and Development*. London: Macmillan Publishers.

Wims, P. & Lawler, M. (2007). *Investing in ICT in educational institutions in developing countries: an evaluation of their influences in Kenya*. *International Journal of education and development using ICT* Vol.3., No 1 Open journal systems.

World Bank, (2006). Kenya data profile. <http://www.devdata.worldbank>.

Zandliet & Straker (2001).*Constructivism in Education*. New Jersey: Lawrence Erlbaum Associates.

APPENDICES

APPENDIX A: LETTER OF INTRODUCTION

Barsulai Kipkorir,
School of Continuing and Distance Education,
Department of Distance studies,
University of Nairobi,
P.O BOX 30197,
NAIROBI

Dear Sir/Madam,

RE: LETTER OF INTRODUCTION

I am a postgraduate student in the department of Distance Studies, University of Nairobi. I am currently carrying out a research on; **the factors that influence pedagogical integration of ICT in teaching and learning in public secondary schools of Keiyo Sub County , Elgeiyo-Marakwet County, Kenya**. You have been randomly selected to participate in this study.

The attached questionnaire is designed to assist the researcher gather data from the respondents for purpose of the research. Please respond to the questions asked honestly. I would like to take this opportunity to assure you that the information you provide here will not be used anywhere else beyond this study. Therefore maintain confidentiality and do not indicate your name or the name of your school on this questionnaire.

Thank you.

KIPKORIR BARSULAI

APPENDIX B

APPENDIX B: QUESTIONNAIRE FOR LEARNERS USING ICT IN TEACHING AND LEARNING.

This questionnaire is designed to gather information on the factors that influence pedagogical integration of information communication technologies in teaching and learning in secondary schools in Keiyo Sub County . Do not write your name on the questionnaire. All the information given in this questionnaire will be treated with confidentiality. Please mark the correct information (choice) with a tick [√]

SECTION A: DEMOGRAPHIC INFORMATION

Please tick [√] where applicable

1. Please indicate your gender. Male [] Female []
2. What is your age bracket?
13-14 years [] 17-18 years [] Over 20 years []
15-16 years [] 19 -20 years []
3. In which class are you currently?
Form 3 [] Form 4 []

SECTION B: TO INVESTIGATE HOW THE ICT INFRASTRUCTURE AVAILABLE IS INFLUENCING PEDAGOGICAL INTEGRATION OF ICT IN TEACHING AND LEARNING IN PUBLIC SECONDARY SCHOOLS IN KEIYO SUB COUNTY ;

(Please tick [√] where applicable)

4. Do you use computers at school? Yes [] No []
5. If yes, in 4 above where do you use computers in school?
Classroom [] Computer Lab []

Library [] Laboratory []

Others, Please specify _____

6. What do you use ICT infrastructure for? Please tick [√] where applicable

NO	USE	YES	NO
1	Word processing		
2	Social media (Facebook, Twitter)		
3	Spreadsheet (Excel)		
4	Presentation of tools(PowerPoint)		
5	Databases (Access)		
6	Internet access		
7	Downloading music		
8	Playing Games		

9. Others , please specify _____

7. Do you use the following devices? Please tick [√] where applicable

	YES	NO
i. Computer	[]	[]
ii. Scanner	[]	[]
iii. Printers	[]	[]
iv. Projector	[]	[]

SECTION C: TO ESTABLISH HOW ACCESS OF ICT IS INFLUENCING PEDAGOGICAL INTEGRATION OF ICT IN TEACHING AND LEARNING IN PUBLIC SECONDARY SCHOOLS IN KEIYO SUB COUNTY ;

8. How many hours are allocated by the school for using computers in a week for teaching and learning purposes? Please tick [√] where applicable

1 hour [] 3 hours []

2 hours [] 4 hours []

9.

a) Do you use the internet at school? YES [] NO []

b) If YES, what do you use the internet for? _____

c) If No, explain why _____

10. a) Do you have an e-mail address? YES [] NO []

b) If NO to the above, why not? Please explain

SECTION D: TO INVESTIGATE HOW LEARNERS LEVEL OF TRAINING ON ICT INFLUENCES PEDAGOGICAL INTEGRATION OF ICT IN TEACHING AND LEARNING IN PUBLIC SECONDARY SCHOOLS IN KEIYO SUB COUNTY ;

Please tick [] where applicable

11. How many years in your life time have you been using computers?

Less than 1 year []

1 – 2 years []

2- 4 years []

4-6 years []

12. How did you learn how to use ICT infrastructure?

Own Initiative [] My teachers []

My Friends [] My parents []

Other students [] Others, please specify _____

13. How would you rate your overall level of expertise in computer use?

SCALE	INDICATE WITH A [√]
EXCELLENT	
VERY GOOD	
GOOD	
FAIR	
NONE	

14. Using the scale given, please indicate [√] your response to the following statements.

Strongly agree =5 Agree =4 neutral =3 Disagree =2 Strongly disagree=1

	Scale	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
A	It is very important for me to work with a computer					
B	I use a computer because I am interested in it					
C	I lose track of time of time when working with a computer					
D	The computer allows you to learn at own pace					
E	Learning with computers is more interesting than learning with the teacher					
F	Computer programme explanations is more easier to understand than the teachers					
G	Using computers wastes valuable study time					
H	Learning with computers is best for revision					

SECTION E: CHALLENGES FACING PEDAGOGICAL INTEGRATION OF ICT IN TEACHING AND LEARNING IN PUBLIC SECONDARY SCHOOLS IN KEIYO SUB COUNTY ;

15. As a learner, what challenges do you face as you make use of computers?

i).....

ii).....

iii).....

SECTION F: SOLUTION FOR CHALLENGES FACING PEDAGOGICAL INTEGRATION OF ICT IN TEACHING AND LEARNING IN PUBLIC SECONDARY SCHOOLS IN KEIYO SUB COUNTY ;

16. As a learner, what solutions do you propose to overcome the above challenges?

i).....

ii).....

iii).....

Thank you for your co-operation

APPENDIX C

APPENDIX C: QUESTIONNAIRE FOR TEACHERS USING ICT IN TEACHING AND LEARNING

This questionnaire is designed to gather information on the factors that influence pedagogical integration of information communication technologies in teaching and learning in secondary schools in Keiyo Sub County . Do not write your name on the questionnaire. All the information given in this questionnaire will be treated with confidentiality. Please mark the correct information (choice) with a tick [√]

SECTION A: DEMOGRAPHIC INFORMATION

1. Please indicate your gender. Male[] Female []
2. What is your age bracket?
21-25 years [] 26-30 years [] 31-35 years [] 36-40 years []
41-45 ears [] 46-50 years [] Over 51 years[]
3. What is your educational level?
Master's degree [] Higher diploma [] others specify _____
Bachelor's degree [] Diploma []
4. Which classes do you teach? _____
5. Which subjects do you teach? _____

SECTION B: TO INVESTIGATE HOW THE ICT INFRASTRUCTURE AVAILABLE IS INFLUENCING PEDAGOGICAL INTEGRATION OF ICT IN TEACHING AND LEARNING IN PUBLIC SECONDARY SCHOOLS IN KEIYO SUB COUNTY ;

6.

a) Do you use ICT infrastructure at your work place? YES [] NO []

b) If yes, what work do you do with the infrastructure? Please explain; _____

7. Where do you use computers in school? Please tick [√] where applicable

- | | | | |
|--------------------------|-----|---------------------------|-----|
| i. Teacher's lounge | [] | v. Library | [] |
| ii. In my office | [] | vi. Administrators office | [] |
| iii. Computer laboratory | [] | vii. Classrooms | [] |
| iv. Science laboratory | [] | | |

viii. Others, please specify _____

8. Which of the following areas of computer technology enables you to perform better as a teacher? Please tick [√] where applicable

- a. Internet access [] b. word processing []
- c. Spreadsheets (Excel) [] d. Databases (Access) [] e. Power point software []

9. Does your school have an ICT development plan? Yes [] No []

10. Please indicate the extent to which you agree or disagree with the following statements.

Please tick [√] where applicable

SA-Strongly Agree, A-Agree, N-Neutral, D-Disagree, SD-Strongly Disagree

Statement	SA	A	N	D	SD
I believe that education should be focused at encouraging the integration of ICT into learning.					
I believe that schools should identify activities to prioritize the actions and required resources for ICT use in pedagogy					
I believe ICT planning is an integral part of school planning					
I believe there is need to train and retrain teachers on ICT use in teaching and learning					
I believe the school management should define central objectives of ICT use in education and identify a plan of action					
I believe my school will perform better if ICT is fully integrated in teaching and learning					

SECTION C: TO ESTABLISH HOW ACCESS OF ICT IS INFLUENCING PEDAGOGICAL INTEGRATION OF ICT IN TEACHING AND LEARNING IN PUBLIC SECONDARY SCHOOLS IN KEIYO SUB COUNTY;

11. How many hours per week are your school’s computers accessible to you? ___ hours.

12. How often do you use ICT applications for the following purposes? Please tick [] where applicable

Frequency	Very often	Often	Seldom	Never
Teaching-Learning for specific subjects				
Teaching computer skills				
Finding/accessing information and educational materials				
Making presentations/lectures				
Preparing lessons				
Communicating with students				
Monitoring and evaluating student’s progress reports				
Preparing reports				

Other, please specify_____

13. How long has your school had ICT infrastructure? Please tick [] where applicable

Less than a year []

2-4years []

1-2 years []

4-8 years []

More than 8 years []

SECTION D: TO INVESTIGATE HOW LEARNERS LEVEL OF TRAINING ON ICT INFLUENCES PEDAGOGICAL INTEGRATION OF ICT IN TEACHING AND LEARNING IN PUBLIC SECONDARY SCHOOLS IN KEIYO SUB COUNTY ;

Please tick [] where applicable

14. a) Have you been trained on how to use ICT infrastructure? YES [] NO []

b) If yes, where did you learn how to use the infrastructure ? _____

c) If no, how did you learn how to use ICT infrastructure? _____

15. How many years have you been using ICT? _____

16. Are you trained in pedagogical integration of ICT in teaching and learning? Please tick [] where applicable

Yes [] NO []

(a) If YES what level? _____

(b) If NO; what might have been the reasons behind this? _____

17. Please rate your level of expertise with the following. Please tick [√] where applicable

NO	Level	Excellent	Very good	Good	Fair	No capacity
1	Word processing					
2	Spreadsheets(Excel)					
3	Presentation tools(PowerPoint)					
4	Internet use					
5	Database management(Access)					

18. Please indicate the extent to which you agree or disagree with the following statements regarding enjoyment in using ICT for teaching and Learning and the learning environment. Use tick [√] against the scale as appropriate

Strongly agree =5 Agree =4 neutral =3 Disagree =2 Strongly disagree=1

NO	2. Social/class environment	SA	A	N	D	SD
1	ICT make it easy to interact with students					
2	Students are actively engaged in Learning through ICT					
3	ICT enhances active participation in class					
4	ICT improves self-expression among students					
5	ICT improve information sharing among students					

NO	1. Perceived enjoyment	SA	A	N	D	SD
1	I find using ICT the best way to model pedagogy to learners					
2	I find using ICT the best way to achieve confidence and motivation in learners					
3	I find that most of my students prefer being taught using ICT than talk and chalk teaching					
4	Use of ICT attracts full attention of my students					

SECTION E: CHALLENGES FACING PEDAGOGICAL INTEGRATION OF ICT IN TEACHING AND LEARNING IN PUBLIC SECONDARY SCHOOLS IN KEIYO SUB COUNTY ;

19. As a teacher, what challenges do you face as you make use of computers?

- i).....
- ii).....
- iii).....

SECTION F: SOLUTION FOR CHALLENGES FACING PEDAGOGICAL INTEGRATION OF ICT IN TEACHING AND LEARNING IN PUBLIC SECONDARY SCHOOLS IN KEIYO SUB COUNTY ;

20. As a teacher, what solutions do you propose to overcome the above challenges?

- i).....
- ii).....
- iii).....

Thank you for your co-operation

APPENDIX D

APPENDIX D: QUESTIONNAIRE FOR PRINCIPALS USING ICT IN TEACHING AND LEARNING

This questionnaire is designed to gather information on the factors that influence pedagogical integration of information communication technologies in teaching and learning in secondary schools in Keiyo Sub County . Do not write your name on the questionnaire. All the information given in this questionnaire will be treated with confidentiality. Please mark the correct information (choice) with a tick [√]

SECTION A: DEMOGRAPHIC INFORMATION

Please tick [√] where applicable

1. Please indicate your gender. Male[] Female []
2. What is your age bracket?
21-25 years [] 26-30 years [] 31-35 years [] 36-40 years []
41-45 years [] 46-50 years [] Over 51 years[]
3. What is your educational level?
Master's degree [] Higher diploma [] others specify _____
Bachelor's degree [] Diploma []
4. Indicate your experience as the Principal.
Less than a year [] 2-4years []
1-2 years [] 4-8 years [] More than 8 years []

SECTION B: TO INVESTIGATE HOW THE ICT INFRASTRUCTURE AVAILABLE IS INFLUENCING PEDAGOGICAL INTEGRATION OF ICT IN TEACHING AND LEARNING IN PUBLIC SECONDARY SCHOOLS IN KEIYO SUB COUNTY ;

Please tick [] where applicable

5.

- a) Do you use ICT infrastructure at your work place? YES [] NO []
- b) If yes, what work do you do with the infrastructure? Please explain; _____

6. Where do you use computers in school?

- i. Teacher's lounge [] v. Library [
ii. In my office [] vi. Administrators office [
iii. Computer laboratory [] vii. Classrooms [
iv. Science laboratory []

viii. Others, please specify _____

7. Which of the following areas of ICT enables you to perform better as a principal? Please tick [] where applicable

- a. Internet access [] d. word processing [
b. Spreadsheets [] c. Databases [] e. Power point software [

8. Does your school have an ICT development plan? Yes [] No [

SECTION C: TO ESTABLISH HOW ACCESS OF ICT IS INFLUENCING PEDAGOGICAL INTEGRATION OF ICT IN TEACHING AND LEARNING IN PUBLIC SECONDARY SCHOOLS IN KEIYO SUB COUNTY ;

Please tick [] where applicable

9. Are your teachers trained in use of ICT in teaching and learning? YES [] NO []

10. How does your school offer ICT courses/computer education and ICT-based lessons/activities?

As a separate subject []

As an elective []

Integrated with other subjects []

Integrated with elective subjects []

11. For what purposes does your school use ICTs Please indicate with a tick [] whether YES or NO?

NO	PURPOSE	YES	NO
1	Remedial teaching		
2	Learning enrichment		
3	Communicating with others		
4	Regular instruction and training for developing computer skills		
5	Accessing information and conducting research through the internet		
6	As a teaching and learning tool for specific subjects		
7	Using in test administration, scoring and analysis		
8	Helping in school administration and management		

12. In the table below, respond by ticking [√] the extent to which you agree or disagree with the statements. **SA-Strongly Agree, A-Agree, N-Neutral, D-Disagree, SD-Strongly Disagree**

Statement	SA	A	N	D	SD
Teachers know which teaching/learning situations are suitable for ICT use					
Teaching using ICT tools makes learning interesting					
Teachers can find useful educational resources in the internet					
Teachers find ICT suitable for giving programmed instruction even in their absence					
Students grasp content better when ICT applications are used in teaching					

SECTION D: TO INVESTIGATE HOW PRINCIPALS LEVEL OF TRAINING ON ICT INFLUENCES PEDAGOGICAL INTEGRATION OF ICT IN TEACHING AND LEARNING IN PUBLIC SECONDARY SCHOOLS IN KEIYO SUB COUNTY ;

Please respond with a tick [√] where applicable

13. a) Have you been trained on how to use computers? YES[] NO[]

b)If yes, where did you learn how to use computers?_____

c)If no, how did you learn how to use computers_____

14. How many years have you been using computers? _____

15. Are you trained in use of ICT in teaching and learning? YES [] NO []

16. What subject do you teach using ICT? _____

17. Please indicate the extent to which you agree or disagree with the following statements.

Please tick [√] where applicable

Statement	SA	A	D	SD
I believe that education should be focused at encouraging the integration of ICT into learning.				
I believe that schools should identify activities to prioritize the actions and required resources for ICT use in pedagogy				
I believe ICT planning is an integral part of school planning				
I believe there is need to train and retrain my teachers on ICTs use in teaching and learning				
I believe the school management should define central objectives of ICTs use in education and identify a plan of action				
I believe my school will perform better if ICTs is fully integrated in teaching and learning				

SECTION E: CHALLENGES FACING PEDAGOGICAL INTEGRATION OF ICT IN TEACHING AND LEARNING IN PUBLIC SECONDARY SCHOOLS IN KEIYO SUB COUNTY ;

18. As the Principal, what challenges do you face as you make use of computers?

i).....

ii).....

iii).....

SECTION F: SOLUTION FOR CHALLENGES FACING PEDAGOGICAL INTEGRATION OF ICT IN TEACHING AND LEARNING IN PUBLIC SECONDARY SCHOOLS IN KEIYO SUB COUNTY ;

19. As the Principal, what solutions do you propose to overcome the above challenges?

i).....

ii).....

iii).....

Thank you for your co-operation

APPENDIX E

APPENDIX E: DETERMINING SAMPLE SIZE FROM A GIVEN POPULATION

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	35	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	60000	382
210	123	1000	285	100000	384

Note: S is sample size and N is population size

Source: R.V.Krejcie and D. Morgan, "Determining sample size for Research Activities", Educational and Physiological Measurement, Vol. 30 No 3 1970 p.608

APPENDIX F

APPENDIX F: LETTER FROM THE INSTITUTION.



UNIVERSITY OF NAIROBI
COLLEGE OF EDUCATION AND EXTERNAL STUDIES
SCHOOL OF CONTINUING AND DISTANCE EDUCATION
DEPARTMENT OF DISTANCE STUDIES

Telegram: "CEES"
Telephone: KARURI 32117/32021/9
Fax: 254 066 33135

P.O. Box 30197 NAIROBI
or P.O. Box 92, KIKUYU KENYA
Email: info_cees@uonbi.ac.ke

Ref: L45/69826/2011

17th June 2013

TO WHOM IT MAY CONCERN

RE: **BARSULAI KIPKORIR TITUS- L45/69826/2011**

The above named is a registered student in the School of Continuing and Distance Education, College of Education and External Studies, University of Nairobi where he is pursuing a Masters course in Distance Education.

He is currently carrying out a research project entitled:-

"Factors influencing Pedagogical Integration of ICT in Teaching and learning in Public Secondary Schools in Kenya: A Case of Keiyo District, Elgeiyo Marakwet County".

The student has identified your organization for data collection to understand and practice of distance learning. The information given will be treated with strict confidentiality and will only be used for academic purposes.

Any assistance given to him as he collects data will be appreciated.

A handwritten signature in black ink, appearing to read 'Anne Nderitu'.

Dr. Anne Nderitu
CHAIRMAN
DEPARTMENT OF DISTANCE STUDIES

/mk

APPENDIX G

APPENDIX G: RESEARCH PERMIT