

**FACTORS INFLUENCING TEACHER PARTICIPATION IN
INTEGRATION OF ICT IN TEACHING AND LEARNING IN
PUBLIC SECONDARY SCHOOLS IN MACHAKOS SUB-
COUNTY.**

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DECLARATION

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

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This project has been submitted for examination with our approval as university supervisors.

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DEDICATION

This work is dedicated to my beloved husband; Michael Nduli, and our children Edmund and Gregory.

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I thank the Almighty God His Providence for enabling me to conduct this study. I wish to sincerely appreciate my supervisors; Dr. Redempta Maithya and Dr. Selpher Cheloti for the constant and tireless guidance in this research work. To my dear husband and children, thank you for your support and encouragement granted to me while undertaking this work. Special thanks to all the respondents who participated in the study for the information they gave that enabled the researcher to compile the findings. Finally I wish to appreciate my colleagues at work who tirelessly assisted me in various ways towards achievement of this work.

ABSTRACT

This study was set to investigate the factors influencing teachers' participation in the integration of ICT in teaching and learning in public secondary schools in Machakos Sub County. The study was guided by four objectives and two hypotheses which include; establishing the relationship between teacher competency in the integration of ICT in teaching and learning; to assess the extent to which teachers apply computer skills in teaching and learning; to determine the influence of the availability of ICT facilities on ICT integration in teaching and learning and to establish the relationship between teacher gender and ICT integration in teaching and learning. The study hypotheses were; Ho₁ There is no significant relationship between teacher competency and the integration of ICT in teaching and learning. Ho₂ There is no significant relationship between teacher gender and the integration of ICT in teaching and learning in public secondary schools in Machakos Sub county. The study adopted descriptive survey design. The study used a sample of twenty one (21) secondary school head teachers and one hundred and twenty six (126) teachers. The study used questionnaires to collect data. The instruments were pilot tested and the reliability coefficient was found to be 0.79 for the head teachers and 0.76 for the teachers. Data was analyzed using descriptive and inferential statistics. Data was analyzed using descriptive statistical frequency tables, standard deviation and means and presented in tables. Quantitative data was analyzed using Pearson's chi square and T-test with help of the Statistical Package for Social Sciences (SPSS). The study established among others that majority of the head teachers and teachers had basic ICT literacy while only a few head teachers and teachers integrate ICT in teaching and learning due to their limited competency in ICT skills. Many secondary schools had computer laboratories but inadequate computers. The study findings showed a significant relationship between teacher competency and ICT integration. The findings also established that teacher gender and ICT integration were independent variables. The study recommended among others that there is need for secondary school teachers to be trained in ICT integration in the subject areas in teaching and learning. There is also need for head teachers to provide computers in their schools for use in teaching and learning, while head teachers should encourage teachers to use ICT in teaching and learning. The researcher recommends the Ministry of Education should ensure all teachers train in ICT so as to acquire skills for teaching and learning.

TABLE OF CONTENTS

CONTENT	PAGE
DECLARATION	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
ABSTRACT	v
TABLE OF CONTENTS	v
LIST OF TABLES	x
LIST O FIGURES.....	xii
ABBREVIATIONS AND ACROYNMS	xiii

CHAPTER ONE

INTRODUCTION

1.1Background to the Study.....	1
1.2 Statement of the Problem.....	4
1.3 Purpose of the Study	5
1.4 Objectives of the Study.....	5
1.5 Research Questions.	6
1.6 Hypothesis of the Study	6
1.7 Significance of the Study	6
1.8 Limitations of the Study.....	7
1.9 Delimitations of the Study.	7
1.10 Assumptions of the Study	8
1.11 Operational Definition of Terms.....	9

1.12 Organization of the Study.....	8
-------------------------------------	---

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction.....	10
2.2 Global & Regional Perspective of ICT Integration in Education Curriculum.	10
2.3 Integration of ICT in Education in Kenya	12
2.4. ICT Competencies Among Teachers	12
2.5 ICT Application in Teaching and Learning in Schools.	16
2.6 Availability of ICT Facilities in Schools.	19
2.7 Teacher Gender and ICT Integration in Schools.	22
2.8 Summary of Literature Review.....	37
2.9 Theoretical Framework.....	23
2.10 Conceptual Framework.....	25

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction.....	26
3.2 Research Design.....	26
3.3 Target Population.....	26
3.4 Sampling Procedure and Sample Size.	27
3.5 Methods of Data Collection	28
3.6 Piloting.....	44
3.6.1 Validity of Research Instruments.....	29
3.6.2 Reliability of Research Instruments.....	30

3.7 Data Collection Procedures.....	31
3.8 Data Analysis Procedures.	31
3.9 Ethical Considerations	47

CHAPTER FOUR

DATA ANALYSIS,PRESENTATION AND INTERPRETATION

4.1 Introduction.....	33
4.2 Questionnaire Response Rate	33
4.3 Demographic Information Analysis.....	33
4.3.1 Gender of Respondents	34
4.3.2 Age Brackets of Teachers	34
4.3.3 Teaching Experiences of Teachers and Head Teachers.....	35
4.4 Teachers Competencies in the Integration of ICT in the Teaching and Learning.	37
4.5 Application of ICT in Teaching and Learning.....	50
4.25 Use Computer in Teaching and Learning by Teachers.....	51
4.5 Availability of ICT Facilities in Schools	62
4.6 ICT Integration.....	70
4.6 Hypothesis Testing.....	71
4.6.1 Ho ₁ Teacher Competency and ICT Integration	72
4.6.2 Ho ₂ Teacher Gender and ICT Integration.....	75

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction.....	74
5.2 Summary of the Findings.....	74
5.2 Extent to Which Teachers Competency Influence ICT	74
5.2.2 Extent to Which Teachers Apply Computer Skills in.....	75
5.2.3 Influence of ICT Facilities	77
5.2.4 Gender and ICT Integration	77
5.3 Conclusions.....	78
5.4 Recommendations.....	79
5.5 Suggestions for Further Research	95
REFERENCES.....	79

APPENDICES

APPENDIX I: Letter of Introduction.	89
APPENDIX II: QUESTIONNAIRE FOR HEAD TEACHERS.....	90
APPENDIX III: QUESTIONNAIRE FOR TEACHERS	101
APPENDIX IV: PERMISSION TO COLLECT DATA.....	111
APPENDIX V: RESEARCH PERMIT.....	112
APPENDIX VI: AUTHORIZATION LETTER	111

LIST OF TABLES

1. Sample Size.....	28
2. Demographic Data for Gender of Respondents.....	49
3. Age Bracket of Teachers.....	50
4. Age Bracket for Head Teachers.....	50
5. Teaching Experiences for Teachers.....	51
6. Teaching Experiences for Head Teachers.....	52
7. Level of ICT Training by Teachers.....	53
8. ICT Training for Head Teachers.....	53
9. Areas of ICT Training for Teachers.....	54
10. Areas of ICT Training for Head Teachers.....	55
11. In-service Training Course in ICT in Subject Areas for Teachers.....	55
12. In-service course in ICT in Subject Areas for Head teachers.....	56
13. Usefulness of ICT Training for Teachers.....	57
14. Extent of usefulness of ICT Training to Teachers.....	57
15. ICT Training Usefulness to Head teachers Teaching Career.....	58
16. Extent of Usefulness of ICT Training to Head Teachers Career.....	58
17. Teachers Average Years of Computer Use.....	59
18. Head teachers' Average Years of Computer Use.....	59
19. Teachers Confidence on Use of Computers.....	60
20. Head Teachers' Confidence on Use of Computers.....	61
21. Extent to Which Teacher Competencies Influence Computer Use.....	62
22. Head Teachers Competencies Influence on Use of Computers.....	64
23. Frequency of Computer Use by Teachers.....	66
24. Computer Use in Teaching and Learning by Teachers.....	67
25. Frequency of Computer Use by Head Teachers.....	67
26. Computer Use in teaching and Learning by Head Teachers.....	67
27. Frequency on Use of Computers in Various Tasks.....	68

28. Frequency of Computers Use by Head Teachers in Various Tasks...	69
29. Teachers Responses on ICT Policy in Schools.....	70
30. Head Teachers' Responses on ICT Policy in Schools.....	70
31. Teachers Use of Technology in Teaching and Learning.....	72
32. Head Teachers' Use of Technology in Teaching and Learning.....	73
33. Teachers Rating of Computer Use in Teaching and Learning.....	74
34. Head Teachers Rating on Use of Computers.....	75
35. Teachers Views on Barriers to ICT Integration in Schools.....	76
36. Head Teachers' Views on Barriers to ICT Integration in Schools.....	77
37. Availability of Computer Laboratory in Schools.....	78
38. Head Teacher's Responses on Availability of Computer Laboratory.....	79
39. Teachers Responses on Number of Computers in Schools.....	79
40. Head Teachers' Opinions on Availability of Computers.....	80
41. Adequacy of Computers for Teaching and Learning in Schools.....	81
42. Computers Available for Administration and Learning Purposes.....	81
43. Teachers Opinions on Availability of ICT Facilities in Schools.....	83
44. Opinions of Head Teachers on Availability of ICT Facilities.....	85
45. ICT Integration in Schools.....	86
46. Relationship Between Teachers' Competency and ICT Integration.....	87
47. Mean Differences on ICT Integration Based on Gender.....	88
48. T-test Analysis for Independence.....	89

LIST O FIGURES

1. Conceptual Framework For the Study.....	24
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ABBREVIATIONS AND ACROYNMS

ASAL	Arid & Semi-arid Land
AVU	African Virtual University
CEPK	Computers in Education Projects in Kenya
GeSci	Global e-School Communities Initiative
ICT	Information Communication Technology
KICD	Kenya Institute of Curriculum Development
KIE	Kenya Institute of Education
MDG's	Millennium Development Goals
MOE	Ministry Of Education
MOHEST	Ministry of Higher Education Science and Technology
NEPAD	New Partnership for African Development
ODEL	Open Distance and Electronic Learning
SEKU	South Eastern Kenya University
UN	United Nations
UON	University of Nairobi
UPE	Universal Primary Education

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Education is an important basis upon which development and economic growth can be built. With this realization world governments have created millennium development goals (MDGs) with universal primary education (UPE) being given a priority (MDG report, 2008). Information Communication Technology (ICT) is an enabler and an enhancer of teaching and learning process in the realization of the MDGs. ICT and its continuous innovations have improved work efficiency in modern living (MDG report, 2008).

Educational ICT software helps in simplifying difficult concepts, making learning fun and easy (Simkins, Cole, Tavalin & Means, 2003). It also helps learners carry out practical tasks such as experiments and presentations (ibid). With all the efficiencies of ICT and its continuous innovations for the teaching and learning process, it is expected that all learners have access to benefit from these efficiencies. Full access to the benefits of ICT for teaching and learning is limited by the unavailability and inability to purchase relevant resources particularly in developing countries.

Some case studies done on ICT integration in Finland indicate that knowledge creation, technological innovativeness, organizational networking and knowledge sharing can support both sustained economic growth and social development (Kozma, 2005). Singapore and Finland have come up with national plans for ICT integration in their schools which specify the hardware, software, the networking to be implemented, the technical support and the training of teachers

(Kozma,2005). The national plans in these countries authorize and fund specific programs and projects by providing the resources needed for ICT integration in their schools.

Efforts to achieve universal primary education (UPE) and the integration of ICT in the school curriculum have been established universally by multinational institutions and in continental structure. At multinational level the global e-school communities initiative (GeSci) emphasizes on deployment of ICT in schools so as to improve teaching and learning in developing countries (GeSci, 2009).In Africa, New Partnership for African Development (NEPAD) has established the e-school with the objectives of providing computers to all schools in the African continent (The NEPAD e-African Commission, 2010).Through this initiative NEPAD undertakes to advance ICT skills to primary and secondary school students and education. NEPAD as well coordinate ICT curriculum and content development in all schools in Africa which will advance teaching and learning across the African continent. Many African countries envision being industrialized by the year 2030 and Kenya is no exception.Vision 2030 states that teachers are expected to possess high technical skills so as to impact on learners if the African nations are to be industrialized .The increasing complexity of teaching methodologies and the need for creative, divergent and expected solutions to national and school situation require new profound approach to the field of education (Kenya Institute of Education, 2009).

The regulations of the Teachers Service Commission (TSC,2007) in Kenya outline the functions of secondary school teachers in enhancing the necessary skills and training among the students. The functions of a school teacher as provider of education to students are enormous, challenging and require technology in order to operate effectively and efficiently. It is therefore important for ICT to be integrated in school teaching to improve efficiency.The Kenya

government has seen the need to include technology in teaching as supported by the Kenya National ICT Strategy for Education and Training (MOE,2008).Through this strategy, it is noted that although the impact of ICT on education goals is still inconclusive, reported observations include rapid expansion of knowledge, improved examination outcomes, enhanced communication and technical efficiency. Davies (2002) observes that the success of ICT rests on proactive school teachers who give timely support to the integration of ICT in school operations.

The integration of ICT in the curriculum aims at promoting educational change, improve skills of learners and prepare them for the global economy and information society (Haddad & Draxler 2002; Kozma & Wagner 2005; Mcnaram 2003). ICT integration improves access to delivery of education by improving learners understanding and quality of education hence increases impact to the economy which is key to realization of the MDGs (Haddad, 2002). ICT facilities are important and need to be productively integrated into the curriculum if they are to make a positive impact in education (Mlitwa, 2010). Integration of ICT into the curriculum means proper alignment of educational technologies with pedagogy.

One of the most relevant barriers to the effective diffusion of ICT concerns the cultural and personal attitudes of teachers towards ICT (Afshari,2009). As there is a high rate of failure of ICT initiatives for the creation of development opportunities, a solid understanding of the determinants of user acceptance of particular ICT is crucial not only for theory building but also for effective practice (Park,2009).This study therefore was an investigation on the factors influencing teachers' participation in the integration of ICT in teaching and learning in public secondary schools in Machakos Sub County. The study in particular sought to establish the relationship between teacher competency and ICT integration in

teaching and learning, the extent of ICT application in teaching and learning as well as the influence of availability of ICT facilities in ICT integration in teaching and learning in public secondary schools in Machakos Sub County. The study also set to establish the statistical relationships between teachers' gender and the integration of ICT in teaching and learning in public secondary schools in Machakos Sub County.

1.2 Statement of the Problem.

According to information at Machakos County Education Office, majority of the public secondary schools are not using ICT in teaching and learning. Many third world countries are in the process of conducting surveys, programmes, projects and formulating policies, all aimed at exploiting the ICT potential for social-economic benefits to develop a competitive advantage (Owino, 2013). The Kenyan government has undertaken the initiative of equipping public primary and secondary schools with ICT resources with the aim of improving academic performances and ICT literacy levels among students (MDG report, 2008). This study is therefore an addition to the on-going research efforts to establish the factors that make some secondary school teachers in Kenya not to use ICT in teaching and learning .

The Ministry of Education has also launched a national ICT policy to integrate computer in classroom instruction. Efforts have also been made to introduce computers in secondary school curricula in specific subjects' instruction (Kenya ICT 4E national policy, 2009). The Kenya Institute of Curriculum Development (KICD) has translated the national ICT policy, prepared ICT curriculum and presented it to schools for implementation.

A study by Mwunda (2014) established that the integration of ICT in teaching and learning in secondary schools is still very low in Kenya. Laaria (2013) revealed that despite government's efforts to improve quality of education through ICT

adoption, the National ICT policy on education (2006) has not been effectively implemented. Wambaria (2014) revealed that secondary school teachers perceived ICT to be useful but rarely used it in teaching and learning in Machakos Sub County. It is against this backdrop that the researcher sought to investigate the factors influencing teacher participation in ICT integration in teaching and learning in public secondary schools in Machakos Sub County .

1.3 Purpose of the Study

The purpose of this study was to investigate factors influencing teachers' participation in the integration of ICT in teaching and learning in public secondary schools in Machakos Sub County.

1.4 Objectives of the Study.

The study was guided by the following objectives;

- i) To establish the relationship between teachers competency and the integration of ICT in teaching and learning in public secondary schools in Machakos Sub county.
- ii) To assess the extent to which teachers apply computer skills in teaching and learning in public secondary schools in Machakos Sub County.
- iii) To determine how the availability of ICT facilities influence integration of ICT in teaching and learning in public secondary schools in Machakos Sub county.
- iv) To establish the relationship between teacher gender and ICT integration in teaching and learning in public secondary schools in Machakos Sub County.

1.5 Research Questions

- i) How does teacher competency influence the integration of ICT in teaching and learning in public secondary school in Machakos Sub County?
- ii) To what extent do teachers apply ICT in teaching and learning in public secondary schools in Machakos Sub County?
- iii) To what extent does ICT facilities availability influence ICT integration in teaching and learning in public secondary schools in Machakos Sub County?
- iv) To what extent does teacher gender influence the integration of ICT in teaching and learning in public secondary schools in Machakos Sub County?

1.6 Hypotheses of the Study

Ho₁ There is no significant relationship between teacher competency and the integration of ICT in teaching and learning in public secondary school in Machakos Sub County.

Ho₂ There is no significant relationship between teacher's gender and ICT integration in teaching and learning in public secondary schools in Machakos Sub County.

1.7 Significance of the Study

The findings from the study may be useful to curriculum planners, developers and policy makers by giving information that can contribute to efforts made to improve quality of education. The study would improve insight and understanding of factors and challenges influencing the status of ICT integration in secondary schools in the country so that the curriculum developers can address them. The research findings could also be useful to the Ministry of Education (MOE) and the

curriculum developers in designing a suitable program for preparing secondary school teachers appropriately for the integration of ICT in teaching and learning. The study findings would help curriculum planners to enhance integration of ICT in teaching and learning in secondary schools in Kenya. The study may help secondary school head teachers in motivating their teachers and organizing in-service training for them in order to improve their ICT competence hence achieve improved ICT integration in schools. The study may influence secondary school head teachers to equip their schools with ICT facilities. Other researchers may also use the recommendations of this study to carry out further research in similar or related areas. The findings would add knowledge to the field of research.

1.8 Limitations of the Study

The secondary school head teachers and teachers may give unreliable responses. The researcher included similar items in the questionnaires for both the head teachers and teachers to compare their responses and identify any disparities. The information gathered on the availability of computers in comparison to the number of learners may give a false impression as some computers may be obsolete. The researcher requested to test some computers to verify if they are functional.

1.9 Delimitations of the Study.

The study was delimited to public secondary schools in Machakos Sub County. It was restricted to secondary school head teachers and teachers in public secondary schools in Machakos Sub County. While there could be other factors influencing teacher participation in ICT integration, the study was restricted to investigating factors influencing teachers' participation in the integration of ICT in teaching and learning. In particular, the study was delimited to; the effect of teachers competency on the integration of ICT in teaching and learning, the extent to which teachers apply ICT in teaching and learning, and the influence of

availability of ICT facilities on teaching and learning as well as the effect of teacher gender on ICT integration in public secondary schools in Machakos Sub County.

1.10 Assumptions of the Study

The assumptions for this study were that the head teachers and teachers approached would be willing to provide honest and reliable responses. It also assumed that all head teachers and teachers were willing to make use of ICT facilities in teaching. The study also assumed that the secondary school teachers were qualified and competent to integrate ICT in teaching and learning. Further the study also assumed that ICT facilities were available in public secondary schools for use in teaching and learning.

1.11 Operational Definition of Terms.

ICT integration refers to the process of incorporating or aligning ICT educational technologies with the pedagogy and their usage to enhance teaching and learning.

Teacher competency refers to teachers and learners having knowledge, skills and support needed to integrate ICT in teaching and learning.

Teacher participation refers to the act of taking part in incorporating or aligning ICT educational technology pedagogies in teaching and learning.

Public secondary school teachers refers to teachers teaching in secondary schools owned by the government.

ICT application refers to the use of computers by teachers to teach subject matter.

ICT facilities refer to computers, projectors, application software and internet.

1.12 Organization of the Study.

The study was organized into five chapters. Chapter one included a background to the study, statement of the study problem, purpose, objectives, research questions, hypothesis, significance, limitations, delimitations, assumptions and the operational definition of terms for the study. Chapter two consist of related literature review to the study. Chapter three presents the methodology that was adopted for the study. Chapter four consists of the findings and a discussion of the study. Chapter five presents a summary of the findings, a conclusion and states relevant recommendations for the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section discusses factors influencing teachers' participation in the integration of ICT in teaching and learning in public secondary schools in Machakos Sub County. It presents the literature review on global and regional perspective of ICT integration in education, integration of ICT in secondary schools in Kenya, teacher competencies in use of ICT in schools, the application of ICT in teaching and learning, the availability of ICT facilities and the influence of teacher gender on ICT integration in teaching and learning in schools. The review also includes a theory upon which the study was based and a conceptual framework showing the interrelationships among the variables.

2.2 Global and Regional Perspective of ICT Integration in Education

Curriculum.

ICTs are defined as technologies that facilitate communication and the processing and transmission of information by electronic means. They have an enormous potential as tools for increasing information flows and empowerment of poor people. It is emerging as an important medium for communication an exchange as well as a tool for development. ICTs, whether older ICTs such as telephone, radio and television, or the newer ICTs such as VCDs, computers or the Internet, help in several dynamic ways to bridge gaps in livelihood opportunities by providing localized and relevant information to the community (The Ministry of Information & Communications,2006).

Evidence from developed countries show that ICT plays a dramatic role in enhancing economic and social development by acting as a production sector for economic growth and an enabler for social development (The Ministry of Information & Communications, 2006). ICT applications have enabled countries to make substantial improvements in both productivity and quality in agriculture, manufacturing, infrastructure, public administration and services such as finance, trade, distribution, marketing, education and health. The Government's key objective is to transform the Kenyan economy through ICTs by promoting and facilitating the private sector to serve as the driver for economic development through innovation in the ICT sector. The strategic focus of Kenya's ICT Strategy for Economic Growth targets the development of the ICT sector and its use for employment creation, poverty reduction and a broad-based enabler for economic recovery and the achievement of national developmental goals. Within education, ICT is seen as a way to promote educational change, improve learners skills, and prepare them for the global economy and the information society (Haddad & Draxler, 2002; McNamara, 2003; and Wagner & Kozma, 2005).

Integrating ICT tools in teaching can lead to increased students' learning competencies and increased opportunities for communication (Cashman, 2004). Key findings under Impact (www.becta.org.uk) show that the use of ICT tools in teaching and learning has positive effects on behavior, motivation, communication and process skills and enables autonomous student learning. The African Virtual University (AVU) is inter-governmental organization started in 1997 and has its headquarters in Nairobi. The AVU is a network of African tertiary education and training institutions that are involved in the use of various ODEL methodologies to increase access to demand-driven programs in an affordable, cost-effective, flexible and sustainable manner. The AVU has made this possible by developing a learning platform that allows institutions from different countries with different levels of technological and educational

development to network through the use of ODEL. The need for e-learning in Africa arises from the increasing demand for education and the need to use relevant technology to deliver it to significant proportions of the population (Gunga & Ricketts, 2006).

2.3 Integration of ICT in Education in Kenya

Information Communication Technologies (ICTs) plays a crucial role in all aspects of human life. Its effectiveness, efficiency and accuracy cannot go unnoticed. ICT has the potential to integrate world economies thus demolishing the barriers created by time and distance. In spite of its role in improving service delivery, its integration in teaching and learning process in Kenya has been low and limited. Mwunda (2014) conducted a study in public secondary schools in Machakos County on the framework for ICT integration in secondary schools which show that the teaching and learning processes is still low. According to the study this has been influenced by a number of factors such as ICT competence among teachers, ICTs infrastructure as well as technical support. Mbithi (2014) conducted a study in Matungulu district, Machakos County secondary schools and found that there was provision of the technology facilities and e-learning materials that have led to digitization of content in English taught in secondary schools. However in the same study, knowledge and skills on how to integrate computers in teaching and learning by English teachers was found to be limited and thus the concern of the current study.

2.4. ICT Competencies Among Teachers

Since 1995 ICT has been a catalyst for economic growth in most developing countries (Greenberg, 2005). As a result it is seen as an important feature for sustainability and advancement of developing countries (Oлакulehin, 2007). It has improved efficiencies in governance, communication, travelling, buying and selling as well as in education (Kramer 2007; Hameed 2007; Wentz 2008).

Electronic learning (e-learning) as well as Mobile Learning (m-learning) and web enabled learning management system not only facilitate teaching and learning processes but also improves efficiencies in educational processes (Kozma 2008; Mlitwa, 2011).

Internet enabled information systems enable access to diverse learning resources (Ndukwe, 2004). ICT presents a multimedia approach to education that makes learning easy and fun (Sharudin, 2006). ICT facilitate learning to be done at any time, in any place and in collaboration with other learners and or teachers (Cobcroft, 2006). It offers a wide range of efficiencies that teachers and learners can only fully benefit from these advantages if it is integrated in the school curricula (Moyle, 2010). According to Frederickson (2009), various factors can influence the use of ICT for teaching and learning. These factors include availability of financial resources, appropriate teaching methods, school structures and the availability of ICT infrastructure.

In European countries such as Denmark, England and Poland availability of financial resources have made many schools to afford, acquire and use educational equipment such as smart boards for computer aided presentation (Frederickson, 2009). Most educators in these countries can make use of Power point to aid the teaching process (Kassim and Ali, 2007). Internet enabled ICT enhances communication between teachers and learners (Blezu, 2008). Although ICT is beneficial in teaching and learning processes various factors hinder its successful deployment into schools and its integration into full school curricula. Such factors include lack of ICT infrastructure to support ICT deployment, unreliable ICT equipment, vandalism and lack of technical and financial support (Gesci, 2009).

Jimoyiannis,& Komis (2007), observed that most of the ICT reforms and initiatives in schools failed due to their top-down approach that did not take into account teachers' skills, interest, and existing knowledge. Therefore an investigation of teachers ICT skills can provide insights into their competencies in adopting and using technology in the classroom. Both policy makers and research community in the world have been pre-occupied with establishing efficient and best ways of preparing teachers to adopt and use ICT as part of their daily teaching strategy. Studies show that all over the world, different countries have consistently initiated programs that are directed in making teachers adopt and use ICT in their day-today teaching and learning practices in school. According to Jimoyiannis, &Komis (2007), countries like UK, Singapore, China, Australia, European Union (EU), etc. have established programs that aim at enhancing teachers' skills in adapting and using ICT during teaching and learning processes. Many researchers consider designing and integrating efficient ICT teacher preparation programs as a key aspect to essential and successful, wide-ranging school reforms (Khan, 2012).

Kenya is currently undergoing a revolution in the ICT sector, which is destined to change the way schools conduct their business. The National ICT Policy for Education and Training aims to integrate ICT into education and training systems, and to use it to promote and enable educational reform (MOE, 2008). One of its visions is to create an e-enabled and knowledge-based society by 2015. The government has set up ICT structures in primary, secondary and tertiary institutions in order to build an ICT-literate community. ICT has been integrated into teacher training, and regulatory obstacles to the adoption of ICT technologies have been removed.

Although ICT in education in Kenya is a relatively new area of research, some useful publications are available, dating back to an evaluation of one of the earliest computer deployment projects in the country, the Computers in Education Project in Kenya (CEPK). The latter project was launched in April 1983 but its evaluation in 1990 is particularly relevant to the present research. At its pilot phase, with funding from the Aga Khan Foundation, a small number of computers were introduced into one secondary school in Nairobi. In the succeeding two years CEPK was subjected to both in-house and external evaluations. As a consequence, additional funding was obtained from Apple Inc., the International Development Research Centre (IDRC) and the Rockefeller Foundation, and in mid-1986 a three-year Phase II was launched. Five more secondary schools, which included private and public schools distributed throughout Kenya were brought into the project and each received computers, software and teacher training. During the three year period of Phase II, this innovative project was studied and evaluated by an independent research team (Makau, 1990).

In Kenya, the government recognizes the positive effect of ICT in making the country a middle level economy has is envisaged in Kenya vision 2030. Effort to implement ICT in schools was first initiated by publishing sessional paper No.1 of 2005 where ICT was given prominence. The idea was to equip public secondary schools with ICT infrastructure and integrate it in existing school curriculum in order to meet the challenges of information society. The publication stated that in every school; teachers, students and communities around it should participate in acquiring ICT skills desirable to benefit from knowledge-based economy by year 2015. Learning and teaching in schools was to be transformed to embrace ICT skills appropriate for the twenty first century (GOK, 2005).

Despite the importance and strategies developed by the Kenyan government to implement ICT in schools, research conducted in many schools in the country have established that most teachers are not effectively adopting and using ICT to support learning, teaching and management as intended (Manduku, Kosgey, & Sang, 2012). Laaria (2013) revealed that despite efforts made by various stakeholders and importance of the ICT in education sector, the National ICT policy on education of 2006 has not been effectively implemented as was intended. While many countries have reported over 41% adoption of ICT in teaching and learning in public secondary schools (Sang 2012), the proportion remains considerably low in Kenya. This may be, because the strategy adopted by the government did not take into consideration teachers' skills, attitudes and reactions towards these new tools. Little effort has been made to make teachers acquire skills in their subject areas to integrate ICT in teaching and learning (Otieno, 2003). This study therefore aimed at establishing the level of ICT competency among teachers in public secondary schools in view of making recommendations to enable policy makers to realize the desired school reforms to improve teacher competencies in ICT integration in public secondary schools.

2.5 ICT Application in Teaching and Learning in Schools.

One major obstacle to adoption of ICT's in developing countries has been identified as ineffective policies in government departments (Kiano, 2004). Many ICT policies have been formulated but not much has been done on the implementation side especially on the structures and processes in place. Different institutions and departments interpret the policies in various ways for implementation. For example the Kenya Institute of Curriculum Development (KICD) prepares curricula and translates policies, then presents them in the school syllabus for implementation. From the policy structure, the KICD has no total control of the implementation and curriculum implementers who include administrators and teachers left to effect the process. To realize full impact of

ICT, educational policies and programs need to be coordinated with the rest of educational policies in the country (MOE, 2005).

Countries like Finland and Singapore have national policies for implementing ICT in education. The plans describe the hardware, software and networking that will be implemented in schools as well as technical support and training of teachers. The national plan specifies measurable goals, authorize and fund specific programs and projects to advance the vision and provide the resources needed to implement them. The plans indicate how integration would be coordinated with change in the curriculum, pedagogy, assessment, teacher professional development and school restructuring. Policy leadership is key to any successful development strategy particularly if these efforts are to contribute to economic to economic and social transformation (Komis, 2007).

Van Braak, Tondeur, &Valcke (2008), argue that positive computer attitudes by teachers are expected to foster implementation of ICT in schools. Further study by Teo (2012) on teachers' attitudes towards computer use in Singapore, found that teachers were more positive about their attitude towards computers and intention to use them, than the helpfulness of computer towards teaching and learning. These studies reveal that teacher's skills, perceptions, and attitudes influence adoption and use of ICT in schools, thus prompting this study to assess the extent of teacher application in teaching and learning in secondary schools.

In June 2003, the African Summit of the World Economic Forum held in Durban, South Africa, came up with the New Partnership for African Development (NEPAD). The aim of the NEPAD initiative was to impart ICT skills to young Africans in primary and secondary schools, to harness ICT to improve, enrich, and expand education in African countries (Aginam, 2006). Although efforts have

been made to ensure that ICTs are available and used in secondary schools, the level of application by teachers is still low. It has been observed by Goshit (2006), that most schools, both private and government, do not offer ICT training programs. Okwudishu (2005) discovered that the unavailability of some ICT components in schools hampers teachers' use of ICTs. Lack of adequate search skills and of access points in the schools were reported as factors inhibiting the use of the internet by secondary school teachers (Kaku, 2005).

Hennessy (2010) established that most of programs towards teachers training in ICT, focused on basic literacy skills rather than on adoption and use of technology in teaching. According to Andoh (2012), teachers training institutions have continued to emphasis teaching about the technology rather than on how to use technology to teach. After analyzing and organizing a variety of approaches found in ICT uses in teacher training institutions, Andoh (2012), concluded that these institutions were not adequately preparing their teacher trainees to effectively use technology in teaching and learning. There is likelihood that teachers could adopt and use ICT in classroom if professional training is provided to them with ample time to learn, share, practice, and collaborate with colleagues about the technology. According to Higgins, & Moseley (2011), inability of teachers to understand why they should use ICTs and how exactly they should use them is a barrier to implementation of ICT in schools.

A survey by Kandiri (2012), on ICT access and use in Kenya secondary schools shows that, of 2250 ICT teachers that graduated from universities and tertiary institutions in 2010, 1350 were absorbed in industrial and/or ICT service sectors and 900 went to teach ICT in various educational institutions. Of those in teaching service, 189 were in technical institutions and 711 were in secondary schools. This displays a relatively small number of qualified ICT teachers in Kenyan schools. A report by Ministry of Higher Education, Science and Technology

(GOK, 2010) on secondary school, teachers' adoption and use of ICT also indicated the number of teachers skilled in ICT in secondary schools was low. The study revealed that out of the number available, few had ICT training effective in adoption and use of the technology in classroom. According to Miima, Ondigi & Mavisi (2013), lack of teacher competence, confidence, time and insufficient related ICT software make teachers to continue using old approaches to teach Kiswahili in schools.

Another study by Ayere, Odera & Agak (2010), on E-learning in secondary Schools in Kenya, reported that a number of teachers in schools had not received any training in ICT use during their formative years at teacher training institutions before joining the profession where 55% of the sampled teachers stated that they did not receive any ICT training at all. However, the study found that 51% of the teachers had taken self-initiative to undertake ICT training during the last three years they had been employed to successfully implement ICT in schools depends strongly on teachers' training on the technology. ICT competency standard has three dimensions; technological literacy, deep knowledge and knowledge creation (UNESCO, 2011). Some researches indicated that school leaders perceive lack of ICT training as a major challenge to the realization of ICT adoption (Pelgrum, 2002). This study therefore aimed at assessing the extent of ICT application in teaching and learning in public secondary schools by teachers in Machakos Sub County.

2.6 Availability of ICT Facilities in Schools.

To promote the use of ICT as resources and a tool for teaching, initiatives have been put in place globally, continentally and within individual countries which include the Global e-schools initiative. The global e-school and communities initiative (GeSci) was established in 2003 by the United Nations (UN) ICT task forces (GeSci, 2009). The goal of this initiative is to deploy ICT resources to

improve the quality of teaching and learning in primary and secondary education in developing countries (GeSci, 2012). GeSci engages with Ministries of Education (MOE) and other ministries within a country, to identify limitations and exploit the potential of ICT (ibid). Their objective is to help authorities to make informed decisions with regards to the deployment of educational ICT into schools (ibid). Through the GeSci, ICT facilities are not only deployed to schools but also integrated into school curricula (ibid). Along with global initiatives to ensure integration of ICT into school there are also practices (ICT deployment and integration into school curricula) within continental structures.

Across the continent, countries such as South Africa, Senegal, Mali, Ghana, Nigeria, Cameroon, Namibia, Uganda and Kenya , have had ICT in education initiatives that were driven mainly by educational institutions (such as primary and secondary schools) (Farrell *et al.*, 2007). Within these countries the use of ICT in schools has been made possible by large organizational programs such as the World Bank's Links for Development and School Net Africa. ICT is seen as a tool for achieving educational outcomes (LaRocque & Latham, 2003). With the advances that ICT has to offer for the teaching and learning process, it is vital that every learner has access to ICT resources, in order to experience its full benefits. To this effect, most African countries (e.g. Ghana, Botswana, South Africa, Zambia, Kenya and Namibia) that have developed national ICT in education policies which emphasis on universal access and use of ICT in all schools. Furthermore, formal structures on the continent, such as New Partnership for Africa's Development (NEPAD) have developed programs such as e-Schools Initiative to promote universal access and use of ICT in all schools (NEPAD, 2010).

East African Countries suffer the inadequacy of technological infrastructure. Such infrastructure include; hardware, software, limited internet access, poor bandwidth and sporadic electricity. Limited teachers' participation in curriculum development and evaluation, lack of preservice and in-service training, teachers' brain drain to the western countries, poor teachers' welfare and morale pose challenge to ICT application in schools. Parent and community participation in schools, poor school vision, mission and leadership hinder ICT integration in schools (Onguko & Hennessy, 2010). According to Gachinu (2014) integration of ICT in teaching Mathematics is limited by insufficient ICT facilities in schools and better performance in achievement tests was realized in school where integration is done in Kenyan schools.

Kenya like other developing countries struggles with high levels of poverty and this has an effect on the adoption and access to ICT (OECD, 2004). The initial aim to introduce ICTs in education was primarily at developing ICT skills, the focus has over time shifted to leverage ICTs to address issues of quality and to improve teaching and learning especially at secondary and post-secondary levels. However, availability and use of ICTs at various levels is still patchy. About 1,300 secondary schools out of more than 6,000 schools have computers, while most schools with computers use less than 40% of the available infrastructure and very few actually use ICT as an alternative method for curriculum delivery. This shows a very slow integration pace and may lead to all benefits of ICT in schools un-equitably realized or not being realized in the near future. Many teachers perceive that adoption of ICT in school will render them jobless due to it foreseen benefits such as e-learning and efficiency in the mode of delivery (Kenya ICT policy, 2007). It is with this view that this study sets out to investigate the how the availability of ICT facilities influence the integration of ICT in teaching and learning in public secondary schools Machakos sub County.

2.7 Teacher Gender and ICT Integration in Schools.

According to the World Bank (2009), gender refers to the socially constructed roles and socially learned behaviors and expectations of women and men in a particular society. The introduction of ICT into the educational sector created new social stereotypes and gender inequalities (Markauskaite, 2005). According to Markauskaite (2005), the invention of the computer has been viewed as a male domain; and further admit that a number of recent studies revealed ICT-related differences between females and males reduced mainly in the access to ICT and basic computer skills. Choudrie and Lee (2004) found that differences in gender were not important in determining integration of ICT.

More often than not technology is seen as gender-neutral, therefore there is a lack of coherent research practice to analyze gender disparities in ICT's across human levels of interaction (Fialova, 2006). There has been a slow but steady uptake of the technologies by females in new technologies such as telephones, mobiles or computers (Gupta, 2008). Dholakia, and Kshetri, (2004) in a Gender and Internet Usage study state that in Africa, women's participation in internet usage continues to be low, ranging from 12% in Senegal to 38% in Zambia (Dholakia et al, 2004). Ngeno, Githua, & Changeiywo (2013) indicated that both male and female teachers are fairly ready to integrate ICT in Mathematics instruction in secondary schools in the Kenya. This study therefore sought to establish if there existed a significant relationship between teachers gender and the integration of ICT in teaching and learning in public secondary schools in Machakos sub County.

2.8 Summary of Literature Review

In conclusion the integration of ICT in education promotes social and economic development. In developed countries ICT has made dramatic role in enhancing social and economic development as well as improving the quality of education. In developing countries, government initiatives have been made to integrate ICT in education but have not yet impacted positively on the quality of education. KICD (2009) observed that some schools in Kenya do not use ICT in teaching and learning. Teachers' competencies, attitudes and reactions have not been taken into considerations towards the governments efforts to integration of ICT in teaching and learning.

Pelgram (2002) noted that ICT was not well integrated in teaching and teachers were still using the traditional classroom practices of lecturing. The application of ICT in teaching and learning in most schools is limited because teacher training institutions mainly emphasize on teaching of technology rather than how to use it to teach. The availability of ICT facilities in most schools is a major challenge despite the governments, ' -communities' and parents' efforts. The study found that both male and female teachers had interest in the integration of ICT in teaching and learning. It was therefore important to investigate the factors influencing teacher participation in the integration of ICT in teaching and learning in Machakos Sub County.

2.9 Theoretical Framework

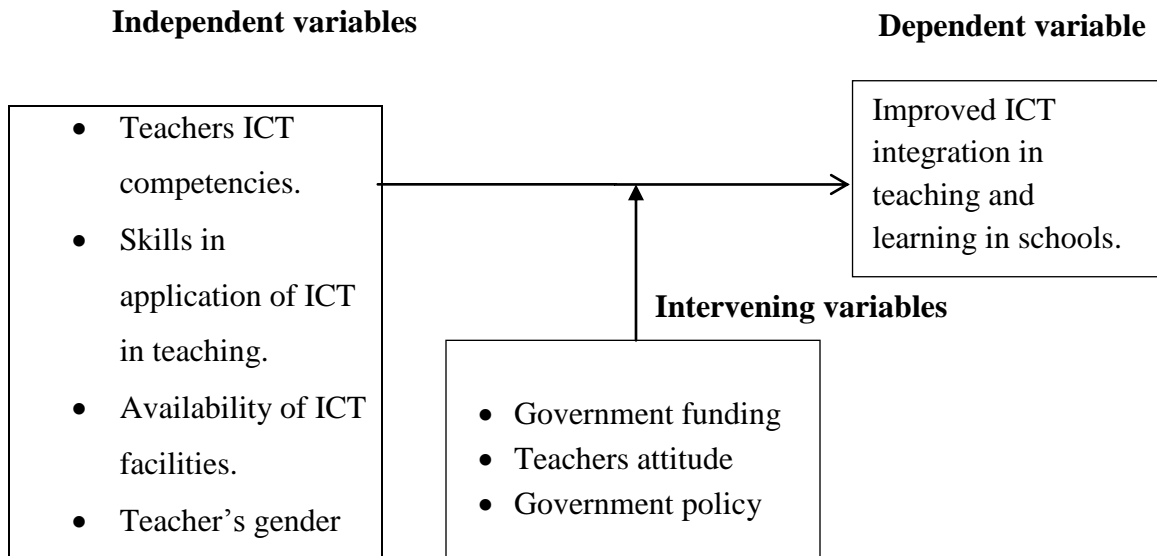
The study was guided by the Education Production Function theory. Coleman, (1966) proposed the theory of education production function as an application of the economic concept of a production function to the field of education. It relates various inputs affecting a student's learning such as schools, families, peers and neighborhoods to measured outputs including subsequent labor market success, college attendance, graduation rates, and, most frequently, standardized test

scores. The theory of education production function was used in this study to show how the various inputs in education by the government influence teachers' participation in the integration of ICT in public secondary schools in Machakos Sub County. Teachers' competency in ICT, their ability in applying ICT in teaching and the availability of ICT facilities were considered to be the inputs in ICT integration in schools. The provision of such inputs in public secondary schools would result to improved ICT integration in teaching and learning.

Robinson, (1953) criticized the way the factor input capital in the education production function theory was measured and how the notion of factor proportions had distracted economists. It is assumed that all workers are alike and their work output is the same. According to this argument, it is impossible to conceive of capital in such a way that its quantity is independent of the rates of interest and wages. Education production function theory therefore was used in this study to establish the influence of teacher competencies in the integration of ICT, assess the extent of ICT application in teaching and learning , to determine how the availability of ICT facilities influence teachers' participation in ICT integration in teaching and learning. The theory was also used to determine the statistical relationship between teacher ICT competency and the integration of ICT in teaching and to establish the statistical relationship between teacher gender and the integration of ICT in teaching and learning in public secondary schools in Machakos Sub County.

2.10 Conceptual Framework

The figure (2.1) shows the conceptual framework of the study.



In this study the conceptual framework shows the relationship between independent variables that may influence the dependent variable. The participation of teachers in the integration of ICT in teaching and learning in public secondary schools is influenced by various independent and intervening variables. The independent variables for the study include ; teacher ICT competencies in the use of computers, teachers' ability in applying of ICT in teaching and learning in the schools , the availability of ICT facilities in schools which include computer hardware, source of power, projectors, internet service as well as maintenance services and teachers gender. The intervening variables for this study include; government policy, government funding on ICT facilities and teacher's attitudes. The availability of ICT competent teachers with the appropriate skills, the availability of adequate ICT facilities, positive teachers' attitudes, government funding and the implementation of government policy on ICT integration in schools curriculum would lead to improved ICT integration in teaching and learning in public secondary schools in Machakos Sub County.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section describes the research design, target population of the study, sampling procedure and sample size, research instruments, and an explanation of data collection procedures as well as data analysis methods to be used in the study.

3.2 Research Design

The study adopted descriptive survey research design. Descriptive research design involve extensive observation, note taking and in-depth narrative to describe, explain and interpret conditions as they are (Kothari, 2003) .This design was suitable for this study because it enabled the researcher to collect data by administering questionnaires to a sample of individuals on their opinions and habits in relation to the application of ICT integration in teaching and learning (Kombo & Tromp, 2006). The descriptive design enabled the researcher to construct questions that will solicit the desired information and also identify suitable participants for the study

3.3 Target Population

The target population for this study was all the head teachers in the sixty seven (67) public secondary schools and the one thousand two hundred and thirty three teachers (1233) in the same schools in Machakos Sub County (County Education Office Machakos, 2015). The teachers' population in all the sixty seven schools consisted of nine hundred fifty three (953) males and two hundred eighty (280) females. This study population was considered appropriate for producing a representative sample for use in the study.

3.4 Sampling Procedure and Sample Size.

Kombo & Tromp (2006) define a sample as a finite part of statistical population whose properties are studied to gain information about a whole population. The total number of public secondary schools in Machakos Sub County is sixty seven (67). Cohen, *et al* (1994) established that 30% is a true representative of a population under study as the individuals participating in the study possess most of the characteristics present in the group under study. The sixty seven schools (67) were stratified as follows national schools, county schools and sub county schools. According to the county Education Office Machakos (2015), the number of schools in each of the categories include two (2) National, eleven (11) County and fifty four (54) Sub county schools. The researcher sampled 30% of each category of schools.

The two (2) national schools were purposively sampled as they were too few and could be under-represented if any was left out. The 30% of the eleven county (11) schools is = three (3) county schools. A sample of 30% of fifty four (54) sub county schools is = sixteen (16) sub county schools. Therefore a total of twenty one (21) schools were used in the study. Stratified sampling was used to select the teachers according to their gender. Simple random sampling was used to sample three (3) male and three (3) female teachers in each category to give a total of six (6) teachers from each sampled school. The six (6) teachers sampled from each of the twenty one (21) sampled schools gave a total of one hundred and twenty six (126) teachers. All the head teachers for the twenty one sampled schools were purposively sampled to form part of the study sample. The twenty one (21) head teachers, together with the one hundred and twenty six (126) teachers gave a total sample size of one hundred and forty seven (147) participants for this study.

Table 3.1 Sample Size

Category of school	Number of schools in each category	Number of sampled schools	Number of head teachers sampled	Number of teachers sampled
National	2	2	2	12
County	11	3	3	18
Sub county	54	16	16	96
Total	67	21	21	126

The number of teachers sampled from each of the three sampled categories of schools were ;Twelve (12) teachers from the two (2) national schools, eighteen (18) teachers from the three (3) county schools and ninety six (96) teachers from the sixteen (16) sub county schools. Total number of one hundred and twenty six (126) teachers and twenty one (21) head teachers were sampled for the study which gave the researcher a sample size of one hundred and forty seven (147).

3.5 Methods of Data Collection

The data for this study was collected using questionnaires. Questionnaires allowed the researcher to collect information from a large sample and diverse regions. Questionnaires can be administered to many respondents within a short time and confidentiality upheld since respondents do not indicate their names (Kombo & Tromp, 2006). This study used two sets of questionnaires one for the head teachers and another for secondary school teachers to collect data. The questionnaire for head teachers were divided into sections A, B, C, D and E. Section A sought demographic information on the head teachers, section B sought information on teacher competency in ICT, section C sought information on the extent of ICT application in teaching and learning, section D sought data

on the availability of ICT facilities while section E sought information on the effect of teacher gender on ICT integration in their schools.

The teachers' questionnaire was divided into sections A, B, C, D and E. Section A sought demographic information on the teachers' while section B sought information on teachers' competencies in the use of ICT in teaching. Section C sought information on the extent of ICT application in teaching and learning, section D sought information on the availability of ICT facilities and section E sought information on the effect of teacher gender on ICT integration in their schools. The use of questionnaire enabled collection of data from a large number of respondents within a short time. Information gathered using questionnaire enabled the researcher to analyze the data objectively and scientifically. In addition the questionnaire method of data collection allowed the researcher to collect data from a large number of participants with limited effect on its validity and reliability.

3.6 Piloting

The research instruments were piloted to ensure that, the ambiguous questions were identified and reframed correctly. Some poorly numbered questions were thus corrected accordingly. The questions were re-arranged to flow in line with the objectives of the study. The pilot study was done in two (2) schools outside the study sample schools where twelve (12) teachers and two (2) head teachers were involved. Guidance was sought from the researcher's supervisors to ascertain validity of the instruments.

3.6.1 Validity of Research Instruments.

Best & Khan (2009) says that a test is said to be valid to the degree that it measures what it claims to measure. Kombo & Tromp (2006) define validity as measure of how well a test measures what it is supposed to measure. The content validity of

the instrument was established through a pilot study to establish ambiguous questions and poor numbering.

3.6.2 Reliability of Research Instruments.

Mugenda and Mugenda (2008) define reliability as a measure of degree to which research instruments give consistent results after repeated trials. Reliability measures the stability of research instruments across two or more attempts. In this study reliability of the questionnaire was tested using test re-test method. The researcher piloted the questionnaire by giving some twelve (12) draft questionnaires to teachers and two (2) head teachers who answered the questions. This was done in the selected schools at an interval of two weeks before the actual data collection exercise. The feedback obtained from the two testing periods was correlated and analyzed using the Pearson's correlation coefficient to determine reliability of the instrument. According to Boudah (2011) a coefficient of + (plus) or _ (minus) 0.8 or more will show that the instruments are reliable. The resulting coefficient will determine reliability of the instrument. The following formula was used to analyze the Pearson's correlation coefficient i.e

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n \sum x^2 - (\sum x)^2][n \sum y^2 - (\sum y)^2]}}$$

Where: r = Pearson's correlation coefficient

x = values in first set of data

y = values in second set of data

n = total number of values

(Source; Pearson's Correlation Coefficient @ Tutor Vista.com.htm)

The research instruments were pilot-tested and the reliability coefficient was found to be 0.79 for the head teachers and 0.76 for the teachers which are slightly below the required Cronbach's alpha threshold value in Social Sciences research.

3.7 Data Collection Procedures.

The researcher secured a letter from South Eastern Kenya University (SEKU). The letter from SEKU was used to obtain a research permit from the National Council for Science, Technology and Innovation (NACOSTI). A letter of introduction was written to the head teachers of the sampled public secondary schools. The researcher visited the schools on appointments and personally administered the questionnaires. Approval by the head teachers and co-operation of members of the teaching staff was sought. The researcher further assured the head teachers and teachers that the findings were only to be used to accomplish the study and confidentiality would be guaranteed.

3.8 Data Analysis Procedures

Data analysis involved qualitative and quantitative methods. The process of data analysis involved editing, coding, classification and tabulation into meaningful categories using descriptive and inferential statistics. Descriptive data was analyzed based on themes using the principle of inductive reasoning. Calculations on frequency distributions, measures of central tendency i.e. mean and percentages of the analyzed data were presented in tables. Hypothesis testing was based on the sample descriptions using deductive reasoning and calculations of standard deviation. Chi-square and T-test were used for hypothesis testing with the help of the Statistical Package of Social Sciences (SPSS) where a level of 0.05 significance led to acceptance of the hypothesis (Cohen, Marion & Morrison, 2007). According to Elifson (1990), chi-square (χ^2) test of independence is used to evaluate the relationship between variables.

A five point likert scale ranging from ‘strongly agree’ to ‘strongly disagree’ was used to gauge teacher competency and ICT integration, frequency of computer use, barriers to computer use in teaching and the availability of ICT facilities in schools. A weighted mean score was used to interpret the results. A mean score of 5 to 3.5 was taken to mean head teachers and teachers agreed to the statements. A mean score of 3.4 to 2.6 was taken to mean mixed reactions from the head teachers and teachers. A mean score of 2.5 to 1 meant the respondents did not agree with the statement.

3.9 Ethical Considerations

The researcher obtained a letter from the Department of Post Graduate Studies, SEKU to allow her to collect data. This helped the researcher to apply for a permit from the NACOSTI. The permit was presented to the Sub County Education Officer (SCEO) and Heads of schools. Participants were assured of confidentiality and no real names were disclosed or recorded. The researcher explained to the participants the purpose of the study and assured them that the data would be confidential. Participants were informed that they could withdraw from responding to the questionnaires if they were not comfortable.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter consists of analysis, presentation and interpretation of data. The study investigated on the factors influencing teacher participation in ICT integration in teaching and learning in public secondary schools in Machakos Sub County. The study findings are presented under the following sub-headings; questionnaire response rate, demographic characteristics of the respondents and the results of findings based on the objectives of the study. Discussions and interpretations have been done with findings of this study being related to findings of other related studies. The study hypotheses have been tested and discussed.

4.2 Questionnaire Response Rate

The study sampled respondents included twenty one (21) head teachers and one hundred and twenty six (126) public secondary school teachers. All the head teachers responded to the questionnaires thus representing a 100% return rate. Out of the 126 teachers sampled 120 responded, representing a questionnaire return rate of 95.2%. According to Hartman and Helborne (1979), 50% response rate is adequate, 60% is good and 70% or more is very good. The response rate for head teachers and teachers was deemed as very good as they were 100% and 95.2% respectively.

4.3 Demographic Information Analysis

The study sought to analyze demographic data on the basis of gender, age group and work experiences for both the head teachers and teachers. The analysis for the demographic data is presented in Table 4.1 .

4.3.1 Gender of Respondents

Table 4.1 below show demographic data for gender of respondents.

Table 4.1 Demographic Data for Gender of Respondents.

gender	Head teachers	percent	teachers	percent
Male	11	52.4	58	48.3
Female	10	47.6	62	51.7
Total	21	100	120	100

Table 4.1 shows that 11 (52.4%) of head teachers are male while 10 (47.6%) are female. Similarly 62 (51.7%) teachers are female and 58 (48.3 %) are male. This show that there are more female teachers than male yet more male head teachers than females. This is an indication that the appointment of head teachers is not gender balanced.

4.3.2 Age Bracket for Teachers

The study sought to establish the distribution of head teachers and teachers in schools based on their age bracket. The findings are presented below.

Table 4.2 shows age bracket for head teachers

Table 4.2 Age Bracket for Head Teachers

Head teachers age bracket	Frequency	Percent
20-30 years	1	4.8
31-40 years	8	38.1
41-50 years	8	38.1
above 51 years	4	19.0
Total	21	100.0

Table 4.2 shows that most of the head teachers 16(76.2%) are between the age of 31 and 50 years while 4(19%) are above 51 years. This indicates that teaching experience is considered in the promotion to be a head teacher.

The Distribution of Teachers in Terms of Age Bracket.

Table 4.3 shows the distribution of teachers in schools based on their age bracket.

Table 4.3 Age Bracket for Teachers

Teachers age bracket	Frequency	Percent
20-30 years	50	41.7
31-40 years	22	18.3
41-50 years	29	24.2
above 51 years	19	15.8
Total	120	100.0

From the analysis on Table 4.3 majority of the teachers are between 20 to 30 years of age 50(41.7%). This may be interpreted to mean that majority of the teachers are young and more receptive to ICT and may be willing to integrate ICT in teaching and learning. The teachers above 51 years of age form a percentage of 19(15.8%) who may not be eager to integrate ICT in teaching and learning.

4.3.3 Teaching Experiences of Teachers and Head Teachers

The head teachers and teachers were asked how long they had worked in the schools. The responses are shown on table 4.4 below.

Table 4.4 Teaching Experience for Head Teachers

Head teachers experience	Frequency	Percent
below 1 year	3	14.3
between 1 - 5 years	7	33.3
between 6-10 years	7	33.3
above 10 years	4	19.0
Total	21	100.0

Table 4.4 shows that majority 14(66.6%) of head teachers had worked in the schools for a period of between 1 and 10 years while minority of the head teachers 4(19%) had worked in the schools for over 10 years. The implication of this finding could mean that majority of the head teachers have stayed long in their schools to respond to the need for ICT integration in teaching in the schools,hence embrace the technology.

Table 4.5 shows the Teaching experience for teachers.

Table 4.5 Teaching Experience for Teachers

Teachers experiences	Frequency	Percent
below 1 year	29	24.2
between 1 - 5 years	42	35.0
between 6-10 years	20	16.7
above 10 years	29	24.2
Total	120	100.0

As shown from Table 4.5 majority of the teachers had taught in their current schools for between 1 and 5 years which is 42(35%) while 29(24.5%) had worked for more than 10 years in their schools .This implies that majority of the teachers had worked in the school for a short time (at least 5 years) and could be receptive to ICT integration if the head teachers make the initiative.

4.4 Teachers Competencies in the Integration of ICT in Teaching and Learning.

The first objective of the study sought to establish the extent to which teacher competency influenced ICT integration in teaching and learning. In view of this the study sought to establish if teachers had undertaken training in computer in their career and to what level of training.

Table 4.6 below shows level of ICT training for head teachers.

Table 4.6 ICT Training for Head Teachers

Level of ICT	Frequency	Percent
Post graduate	0	0
degree	0	0
diploma	0	0
certificate	21	100
Total	21	100

It is clear from Table 4.6 show that all the head teachers 21 (100%) had trained at certificate level of ICT. This implies that the head teachers have the least ICT qualifications hence limited in initiating ICT integration in teaching in their schools. Therefore there is need for training head teachers in ICT skills so as to integrate it in teaching and learning.

The study sought to establish the level of ICT training of teachers. The responses from the teachers are shown in Table 4.7

Table 4.7 ICT Training for Teachers

Level of ICT	Frequency	Percent
Post graduate	1	.8
degree	5	4.2
diploma	8	6.7
certificate	106	88.3
Total	120	100.0

Table 4.7 shows that majority of the teachers had only trained at certificate level 106 (88.3%) and only 0.8% had post graduate training respectively. This indicates there is need for teachers to undergo training in ICT so that they can acquire competence to integrate ICT in teaching and learning.

The study also set to establish the computer elements covered by the head teachers and teachers in the training. Majority of the teachers(63%) and head teachers(57%) had trained in MS Word and internet. Few teachers and head teachers had undertaken excel and power point packages.

With regard to whether ICT training was on subject area or basic computer literacy the findings are shown on Table 4.8

The study also sought to establish whether teachers had been trained in ICT in the subject areas or in basic computer literacy. The head teachers responses are shown on Table 4.8

Table 4.8 Areas of ICT Training for Head Teachers

ICT areas	Frequency	Percent
subject area	1	4.8
just basic computer literacy	20	95.2
Total	21	100.0

Table 4.8 shows majority of the head teachers had trained on just basic computer literacy 20(95%) while only 1(4.8%) had trained on the subject areas. This findings are in agreement with the study by Mbithi (2014) which established that knowledge and skills on part of the teachers on how to integrate computers in teaching and learning was limited. This show that head teachers have mainly trained on basic computer literacy which is a prerequisite requirement for ICT integration. Therefore the is need for head teachers to be trained in ICT in the subject areas so as to enable them integrate it in teaching and learning.

The study sought to determine the areas of ICT training of the teachers. The responses are shown on Table 4.9

4.9 Areas of ICT Training for Teachers

ICT areas	Frequency	Percent
subject area	13	10.8
just basic computer literacy	107	89.2
Total	120	100.0

Table 4.9 shows that majority of teachers 107(89.2%) had only trained in basic computer while 13(10.8%) had training in the subject areas. This is an indication that there is need for teachers to be trained ICT in the subject areas to be competent to integrate ICT in teaching. This findings for head teachers and

teachers agree with the study by Otieno (2003) where he found that little effort had been made to make teachers acquire computer competence in the subject areas. The findings are also in line with the study by Hennessy (2010) who established that most programs towards teachers training in ICT focused on basic computer literacy skills rather than adoption and use of technology in teaching.

The study was also set to determine if head teachers had any in-service training in ICT in the subject areas.

Table 4.10 below shows the analysis on in-service in ICT integration for head teachers.

Table 4.10 In-service Training in ICT in Subject Areas for Head Teachers

Responses	Frequency	Percent
yes	9	42.9
no	12	57.1
Total	21	100.0

Table 4.10 shows that 12(57.1%) of head teachers had not been in-service in ICT in the subject areas while 43% had undertaken in-service training in their subject areas. There is need for in-service training for head teachers in the subject areas. The in-service would make the head teachers acquire competency for ICT integration in teaching and learning.

The study set to find out if teachers had ICT in-service training in the subject areas. The responses are shown on Table 4.11

Table 4.11 In-service Training in ICT in Subject Areas for Teachers

Responses	Frequency	Percent
Yes	43	35.8
No	77	64.2
Total	120	100.0

Table 4.11 shows that 77(64.2%) of the teachers had not undergone in- service training in their subject areas while 43(35.8%) had in service courses in ICT in their subject areas. These findings show that teachers have limited ICT competency in their subject areas. This finding agree with the study by Ayere, Odera & Ogak (2010) which found that many teachers had received any training in ICT during their formative years of teacher training.This indicates the need for in service training in subject areas in order to prepare teachers for ICT integration in teaching and learning.

The study also set to establish how useful the ICT training was to head teachers careers.The responses are shown on Table 4.12

Table 4.12 Extent of Usefulness of ICT Training to Head Teachers Career.

Level of usefulness	Frequency	Percent
very useful	11	52.4
barely useful	9	42.9
not useful	1	4.8
Total	21	100.0

Table 4.12 shows that almost half of head teachers11(52.4%) consider ICT training to be very useful in their career while only 1(4.8%) of them consider it not useful.This indicates that most head teahers would be willing to undergo training in ICT to gain competency for use in their career.

The study also sought to establish the teachers opinions the extent of usefulness of ICT training to them. The teachers opinions on the usefulness of ICT training are shown on Table 4.13

Table 4.13 Extent of Usefulness of ICT Training to Teachers

Usefulness	Frequency	Percent
very useful	72	60.0
barely useful	38	31.7
not useful	10	8.3
Total	120	100.0

Table 4.13 shows that majority 72(60%) of teachers considered ICT training to be very useful in their career while 10(8.3%) considered it not to be useful. These findings contradict the Kenya ICT Policy (2007) which perceived stated that many teachers perceived that the adoption of ICT in schools would render them jobless which made them develop a negative attitude. This implies that majority of teachers would be interested to undergo ICT training for their own benefits and still apply the skills in teaching and learning.

Further the study set to establish whether head teachers considered ICT training to be useful to them. The responses are shown on Table 4.14

Table 4.14 ICT Training Usefulness to Head teachers.

Response	Frequency	Percent
yes	15	71.4
no	6	28.6
Total	21	100.0

Table 4.14 shows that 15(71.4%) of head teachers considered ICT training to be useful to them while 6(28.6%) consider it not to be useful.This finding would mean that head teachers would to a great extent seek to acquire ICT training for their own gains.This would mean they know the importance of ICT competence in life hence integrate it in teaching and learning to benefit the learners.

The study set to determine if teachers considered ICT training to be useful to them.The responses are shown on Table 4.15

Table 4.15 Teachers Responses on Usefulness of ICT Training

Responses	Frequency	Percent
Yes	104	86.7
No	16	13.3
Total	120	100.0

Table 4.15 shows that majority 104(86.7%) of the teachers said they considered ICT training to be useful to them while 16(13.3%) did not consider the training useful.This means teachers would be willing to get ICT training for use in their personal needs and in their careers.There is need therefore to training teachers in ICT integration for use in teaching and learning.

The study also sought to determine the average number of years head teachers had used computers. The responses are shown on Table 4.16

Table 4.16 Head Teachers' Average Years of Computer Use

Years of computer use	Frequency	Mean
On average how many years have you used a computer		4.07
Below 1 year	3	
Between 1to 2 years	2	
Between 2 to 3 years	4	
Between 3 to 4 years	12	
Total	21	4.07

From the analysis on Table 4.16 the head teachers had used computers for a period of 4 years (mean 4.07 years) .This means head teachers have used computers long enough to be fully aware of their benefits in the field of education ,therefore would make efforts to integrate ICT in teaching and learning in their schools.

The study as well sought to establish the number of years the teachers had used computer. The responses are shown on Table 4.17

Table 4.17 Teachers Average Years of Computer Use

Years of computer use	Frequency	Mean
On average how many years have you used a computer		4.26
Below 1 year	22	
Between 1 to 2 years	26	
Between 2 to 3 years	6	
Between 3 to 4 years	66	
Total	120	4.26

From Table 4.17, it can be deduced that majority of the teachers had used computers for a period of more than 4 years (mean 4.26 years). Four years of computer use by teachers would be enough experience and to make them receptive on the policy of ICT integration in teaching and learning.

Similarly the study sought to find out if the head teachers were confident in using computers. The responses are shown on Table 4.18

Table 4.18 Head Teachers' Confidence on Use of Computers

Confidence level	Frequency	Percentage
not confident	2	9.5
fairly confident	12	57.1
not sure	2	9.5
confident	4	19.0
very confident	1	4.8
Total	21	100.0

The findings on Table 4.18 show that 12(57.1%) of the head teachers said they were fairly confident in using computers,4(19%) were confident while only 1(4.8%) was very confident in using computers.This implies that though the head teachers had been using computers for around 4 years,they need further training in ICT in order to build confidence in computer use which is key to effective ICT integration in teaching and learning.

The study sought to establish if teachers were confident on use of computers The findings are shown on Table 4.19

Table 4.19 Teachers Confidence on Use of Computers.

Confidence level	Frequency	Percent
not confident	14	11.7
fairly confident	44	36.7
not sure	28	23.3
confident	33	27.5
very confident	1	.8
Total	120	100.0

As shown in the Table 4.19 about 44(36.7%) teachers were fairly confident in use of computers,33(27.5%) were confident, while 28(23.3%)said they were not sure of their confidence on the use of computers. Only a small minority were confident on the use of computers.This means there is need for indepth ICT training for teachers to develop the computer confidence which is needed for its integration in teaching and learning in schools.

The study further sought to find the extent to which the level of training contributes to the use of computers in teaching and learning. Most teachers and head teachers said the extent of computer training greatly contributes to use of computers in teaching and learning. Teachers with adequate training use computers more than their counterparts who have limited or no training.

Further the study sought to find out the extent to which teacher competencies influence the use of computers in teaching and learning. The findings are presented below.

Table 4.20 Head Teachers Competencies Influence on Use of Computers

Statement	SD		D		NS		A		SA		Mean
		%		%		%		%		%	
Teachers have basic computer training.			4	19	4	19	11	52.4	2	2.5	3.52
Teachers have adequate training.			4	19	0		12	57.1	5	23.5	3.86
Computers enhance the quality of teaching	1	4.8	1	4.8	4	19	3	14.3	12	57.1	4.14
I can teach using a computer	1	4.8	7	33.3	7	33.3	2	9.5	12	57.1	3.05
If training I would try out instructional computer technology in my subject area	2	9.5	1	4.8	1	4.8	8	38.1	9	42.9	4.00
Facilitated in my subject area	5	23.8	5	23.5	3	14.3	4	19	4	19	2.86
I can take risk of using computer in teaching	6	28.6	3	14.3	4	19	6	28.6	2	9.5	2.76

Table 4.20 shows that majority of the head teachers agreed that computers enhance the quality of teaching and learning (mean= 4.14). These findings agree with the study by Moyle (2010) which established that the integration of ICT in teaching improved students learning and offered a wide range of efficiencies to both teaches and learners. Majority of the head teachers also agreed that if given adequate training they would try out instructional computer technology in the subject areas (mean= 4.00). These findings Majority of head teachers said they do not use computers because they do not have adequate training. About 8(38%) of head teachers disagreed they have been trained in ICT in their subject areas. When asked if they could take the risk of teaching using ICT, majority of the head teachers 6(28.6%) disagreed that they could take risk of teaching using computer.

Majority of the head teachers 11(52.4%) agreed that most teachers have basic computer training. This means the head teachers are incompetent in integrating ICT in their subject area hence there is need for in-service training so as to make them effectively integrate it in the schools.

Table 4.21 show extent to which teacher competencies influence computer use.

Table 4.21: Extent to Which Teacher Competencies Influence Computer Use

Statement	SD	%	D	%	NS	%	A	%	SA	%	Mean
Teachers have basic computer training.	7	5.8	24	20	19	15.8	49	40.8	21	17.5	3.44
Don't have adequate training.	16	13.3	51	42.5	6	5	33	27.5	14	11.7	2.82
Computers enhance the quality of teaching and learning	3	2.5	4	3.3	1	0.8	45	37.5	67	55.8	4.41
Teach using a computer	6	5	18	15	19	15.8	41	34.2	36	30	3.69
If I could get adequate training I would try out instructional computer technology in my subject area	4	3.3	6	5	7	5.8	44	36.7	59	49.2	4.23
facilitated in my subject area	27	22.5	40	33.3	10	8.3	32	26.7	11	9.2	2.67
Risk of using computer in teaching	16	13.3	19	15.8	15	12.5	42	35	28	23.3	3.39

Table 4.21 shows that most teachers 67(55.8%) were in agreement that computers enhance the quality of teaching and learning (mean =4.41).These findings concur with the study by Mlitwa (2011) which found that integration of ICT not only facilitate teaching and learning but also improves efficiencies in educational processes. Majority of teachers 59(49.2%) well also in agreement that they would try out instructional computer technology in their subject areas given some training (mean =4.23). These finding agree with the study by Mbithi (2014) which found that knowledge and skills on how to integrate computers in teaching and learning limited teachers in effecting ICT integration It is also worth noting that most teachers 33(27.5%) said they do not use computers in teaching because they do not have inadequate training (mean= 2.82).There is therefore need for teachers to be trained in ICT in their subject areas so that they can effectively teach using computers.

The study also sought to find out how schools prepare teachers to integrate ICT in teaching and learning. Most of the teacher's respondents said there is no preparation done in the schools for ICT integration while a few stated that ICT in service training was done to teach the schools. The responses from the head teachers were in agreement with the teachers.Andoh's (2012), study agrees with the study finding that institutions were not adequately preparing teachers to effectively use ICT in teaching and learning. Majority of the teachers and head teachers suggested that ICT training was necessary in order to improve ICT competency for use in teaching and learning.

4.5 Application of ICT in teaching and learning.

The second objective of the study was to assess the extent to which teachers apply computers skills in teaching and learning.

The first question sort to find out the frequency of computers use by head teachers. The findings are presented on Table 4.22.

Table 4.22 Frequency of Computer Use by Head Teachers

Frequency	Frequency	Percent
1 to 2 times a week	12	57.1
3 to 4 times a week	4	19.0
5 or more times a week	5	23.8
Total	21	100.0

Table 4.22 shows that over half of the head teachers used computers 1 to 2 times a week 12(57.1%) while 5(23.8%) used computers 5 times a week. 19% of head teachers used computers 3 to 4 times a week. This means head teachers are frequent users of computers and should encourage teachers to apply ICT in teaching and learning and lead by example.

The study sought to find out the frequency of computer use by teachers. The responses are shown on Table 4.23

Table 4.23 Frequency of Computer Use by Teachers

Frequency	Frequency	Percent
1 to 2 times a week	64	53.3
3 to 4 times a week	25	20.8
5 or more times a week	31	25.8
Total	120	100.0

Table 4.23 shows that most of the teachers 64(53.3%) said they had used computers about 1 to 2 times a week, 31(25.8%) of them used computers 5 or more times a week whereas 25(20.8%) used computers 3 to 4 times a week. These findings show that teachers were frequent users of computers just like the head teachers. This implies that teachers are aware of the importance of computers

in their lives and therefore should be eager to apply ICT in teaching and learning to enable the learners benefit from ICT .

The head teachers were asked if they used computers in teaching and learning. The findings are presented on Table 4.24

Table 4.24 Computer Use in Teaching and Learning by Head Teachers

Responses	Frequency	Percent
Yes	5	23.8
No	16	76.2
Total	21	100.0

Despite the regular computer use by head teachers it is clear from Table 4.24 that only 5(23.8%) of the head teachers used computers in teaching and learning. More than half 16(76.2%) of the head teachers however, do not use computers in teaching and learning. This implies that most head teachers did not use computers in teaching and learning which means head teachers may not initiate or encourage teachers to use computers in teaching.

Table 4.25 show teachers use of computer in teaching and learning.

Table 4.25 Computer Use in teaching and learning by Teachers

Responses	Frequency	Percent
Yes	49	40.8
No	71	59.2
Total	120	100.0

Table 4.25 shows that majority of teachers 71(59.2%) do not use computers in teaching and learning while 49(40.8%) used computers in teaching and learning. These findings indicate that the National Policy on ICT integration in teaching

and learning has not been effected in many schools. There is need for KICD and the Quality Assurance and Standards to make a follow up in schools to ensure effective ICT integration in teaching. Studies conducted by Mbithi (2014) and Mwunda (2014) agree with these findings that the level of ICT integration in teaching and learning in secondary schools is still low.

Further the study sought to find out the frequency of use of computers by head teachers and teachers in preparing assignment, analyzing marks, ranking of students, presentation of subject matter, internet browsing and email use. The analysis for presented below.

Table 4.26 shows frequency of computer use by head Teachers to do various tasks.

Table 4.26 Frequency of Computers Use by Head Teachers in Various Tasks

Tasks	VP		P		A		G		VG		Mean
		%		%		%		%		%	
Preparing assignments	2	9.5	9	42.9	4	19	5	23.3	1	4.8	2.71
Analyzing marks	1	4.8	6	28.6	9	42.9	4	19	1	4.8	2.90
Ranking the students	2	9.5	6	28.6	8	38.1	4	19	1	4.8	2.81
Presentation using power point	3	14.3	9	42.9	4	19	2	9.5	3	14.3	2.67
Internet use	1	4.8	10	47.6	2	9.5	6	28.6	2	9.5	2.90
Email use	1	4.8	6	28.6	3	14.3	6	28.6	5	23.8	3.38

From Table 4.26 most of the head teachers 9(42.9%) are poor in both the use of computers in preparing assignments and internal tests and in presentation of content using power point. Majority of head teachers 10(47.6%) said they are

poor in internet browsing for subject preparation in teaching. Only 5(23.8%) rated themselves as very good in email use. This implies that most head teachers require ICT training to acquire the skills they require to operate ICT equipments.

Table 4.27 shows the frequency of computer use by teachers to do various tasks.

Table 4.27 Frequency of teachers of Use of Computers in Various Tasks

Tasks	VP	P	A	G	VG	Mean
Preparing assignments	21(17.5)	25(20.8)	26(21.7)	25(20.8)	23(19.2)	3.03
Analyzing marks	20(16.7)	23(19.2)	28(23.3)	28(23.3)	21(17.5)	3.06
Ranking the students	21(17.5)	24(20)	24(20)	30(25)	21(17.5)	3.05
Presentation using power point	29(24.2)	30(25)	27(22.2)	18(15)	16(13.3)	2.68
Internet use	24(20)	19(15.8)	30(25)	26(21.7)	21(17.5)	3.01
Email use	20(16.7)	23(19.2)	29(24.2)	19(15.8)	29(24.2)	3.12

From Table 4.27 majority of the teachers expressed their neutrality in the use of computers in preparing assignments, analyzing marks and in ranking students. They however were poor in using the internet 24(20%) for subject content preparation while 59(49.25) are poor and very poor in presentation of subject matter using power point. Only 30(25%) said they are good in using computer to rank students. This can be attributed to the fact that most of them undertook MS Word processing and excel packages in their training but did not do power point presentation as was shown from the qualitative responses. Majority of teachers 43(35.9%) also said they are poor and very poor in email use. This means that

teachers are handicapped in the use of ICT and therefore require to be trained in use of ICT to do various tasks in their careers to make their work effective and timely.

The study also sort to establish if there was an ICT policy in the schools. The analysis for this question is demonstrated below.

Table 4.28 shows head teachers responses on ICT policy in schools

Table 4.28 Head Teachers' Responses on ICT Policy in Schools

Responses	Frequency	Percent
Yes	2	9.5
No	19	90.5
Total	21	100.0

Table 4.28 shows that 19(90.5%) of the schools did not have an ICT policy while 2(9.50%) of schools had a policy.. This is a clear indication that there were no clear guidelines in the schools on the way to integrate ICT in teaching and learning. There is need for head teachers to formulate ICT policies for their schools in order to guide teachers on ICT integration in teaching and learning.

Table 4.29 shows teachers responses on the availability of an ICT policy in schools.

Table 4.29 Teachers Responses on ICT Policy in Schools

Responses	Frequency	Percent
Yes	47	39.2
No	73	60.8
Total	120	100.0

Table 4.29 shows that majority of the teachers 73(60.8%) did not have an ICT policy in their schools while only 47(39.2%) had a policy in place. This indicates

that there are no clear guidelines and also lack of commitment on the part of schools to integrate computers in teaching and learning. This means there is need for head teachers to formulate ICT policies for use in their schools.

Most teachers (61%) and 90% of head teachers said that the schools government policy on ICT policy integration had not influenced the integration of ICT in teaching and learning in their schools since most schools had no ICT policy in place. The head teachers therefore should formulate sound policies that guide teachers on ICT integration in teaching and learning.

The study set to investigate how often teachers used the following technologies in teaching and learning namely: - internet, computers, television, overhead projector and LCD projector. The analysis for use of the technologies is as shown below.

Table 4.30 shows Head Teachers' Use of Technology in Teaching and Learning.

Table 4.30 Head Teachers' Use of Technology in Teaching and Learning.

Technology	Always	Rarely	Not at all
Internet	7(33.3)	11(52.4)	3(14.3)
Computer	11(52.4)	8(38.1)	2(9.5)
Television	14(66.7)	6(28.6)	1(4.8)
Overhead Projector	13(61.9)	6(28.6)	2(9.5)
LCD Projector	14(66.7)	4(19.0)	3(14.3)

(Parenthesis is percentage)

Table 4.30 shows that majority of head teachers used television 14(66.7%), 13(61.9%) used overhead projectors and 14(66.7) used LCD projectors technologies in teaching and learning always. 11(52.4%) used internet rarely, 8(38.1%) used computer rarely in teaching and learning. 3(14.%) of head teachers

never used internet or LCD Projector in teaching and learning. This means head teachers rarely use modern technologies in teaching. Therefore there is need for head teachers to provide internet, computers television, overhead and LCD projectors in their schools, and encourage teachers to use integrate them in teaching and learning.

Table 4.31 shows teachers use of ICT in various technologies in teaching and learning.

Table 4.31 Teachers Use of Technology in Teaching and Learning

Technology	Always	Rarely	Not at all
Internet	28(23.3)	66(55.0)	26(21.7)
Computer	35(29.2)	53(44.2)	32(26.7)
Television	58(48.3)	42(35.0)	20(16.7)
Overhead Projector	63(52.5)	51(42.5)	6(5.0)
LCD Projector	64(53.3)	45(37.5)	11(9.2)

(Parenthesis is percentages)

Table 4.31 indicates that majority of teachers 66(55%) rarely search internet while 26(21.7%) never used internet at all. Majority of teachers 53(44.2%) of teachers rarely used computers while 32(26.7%) never used computers at all for information in preparation for teaching. Majority of teachers 66(55%) rarely used internet to search information for teaching and learning, while 53(44.2%) rarely used 29.2%. Majority of teachers use television technology in teaching and learning (48.3%). Majority of teachers also use overhead and LCD projectors in teaching and learning (53.3%). This means teachers should be provided with internet, overhead and LCD projectors and also be encouraged to search information in the internet for use in teaching and learning.

Further the study sought to determine the rate of use of computers in teaching and learning in the schools response categories were rated as very good, good, average, and poor.

Table 4.32 shows head teachers' rating on use of computers in teaching and learning in schools.

Table 4.32 Head Teachers Rating on Use of Computers in Teaching and Learning in schools.

Rates	Frequency	Percent
very good	1	4.8
good	6	28.6
average	8	38.1
poor	6	28.6
Total	21	100.0

Table 4.32 shows that 8(38.1%) of head teachers said there is average rate of computer use in teaching and learning while 6(28.6%) said the rating was good and poor respectively. Only 1(4.8%) of head teachers rated the use of computer in teaching and learning as very good in the schools. This indicates there is limited use of computers in teaching and learning in public secondary schools thus there is need for stern measures to be put in place by head teachers to ensure ICT skills are applied in teaching and learning.

Table 4.33 shows teachers rating on computer use in teaching and learning in schools.

4.33 Teachers Rating of Computer Use in Teaching and Learning in Schools

Rate	Frequency	Percent
very good	16	13.3
good	24	20.0
average	44	36.7
poor	36	30.0
Total	120	100.0

Table 4.33 shows that majority 44(36.7%) of teachers said there was average rate of computers use in teaching and learning while 36(30%) rated it as poor. Only 13% rated the use of computer in teaching and learning in their schools as very good. This means there is minimal use of computers in teaching and learning in the schools, therefore there is need for head teachers and teachers to make initiative to apply ICT skills in teaching and learning.

Further, the study set to determine the barriers in ICT integration according to the teachers. The responses were given as strongly agree, agree, not sure, and disagree. The descriptive analysis for the barriers to ICT integration is presented below.

Table 4.34 shows head teachers views on barriers to ICT integration in schools.

Table 4.34 Head Teachers’ Barriers to ICT Integration in Schools

Barriers	SD	D	NS	A	SA	Mean
Insufficient number of computers	1(4.8)	1(4.8)	2(9.5)	10(47.6)	7(33.3)	4.00
Teachers lack skill/difficulty to use computers			2(9.5)	11(52.4)	8(38.1)	4.29
Slow network/internet		2(9.5)	1(4.8)	9(42.9)	9(42.9)	4.19
Quality of ICT training			2(9.5)	9(42.9)	10(47.6)	4.38
Inadequate time to search internet information		7(33.3)	3(14.3)	7(33.3)	4(19)	3.38
High running and maintenance cost		8(38.1)	6(28.6)	5(23.8)	2(9.5)	3.05

Majority of head teachers said the quality of ICT training (mean 4.38) and lack of skills on the part of teachers (mean 4.29) are the major barriers to ICT integration in schools. Some of head teachers 8(38.1%) also agreed that maintenance cost was a minor factors hindering ICT integration in teaching and learning. A good number 18(85.8%) of the head teachers cited slow internet as a major barrier to ICT integration. There is need for fast internet connectivity in schools so as to enable teachers to access internet information for use in teaching and learning.

Majority of the teachers and head teachers stated lack of skill and poor quality training as the major challenges in the use of computers in the schools in teaching and learning.

Table 4.35 show teachers barriers to ICT integration in schools.

4.35 Teachers Barriers to ICT Integration in Schools

Barriers	SD	D	NS	A	SA	Mean
Insufficient number of computers	4(3.3)	4(3.3)	5(4.2)	36(30)	71(59.2)	4.38
Teachers lack skill/difficulty to use computers	4(3.3)	19(15.8)	8(6.7)	53(44.2)	36(30)	3.82
Slow network/internet	5(4.2)	14(11.7)	9(7.5)	47(39.2)	45(37.5)	3.94
Quality of ICT training	2(1.7)	13(10.8)	14(11.7)	55(45.8)	36(30)	3.92
Inadequate time to search internet information	7(5.8)	27(22.5)	15(12.5)	46(38.3)	25(20.8)	3.46
High running and maintenance cost	6(5)	25(20.8)	18(15)	31(25.8)	40(33.3)	3.62
N						

Table 4.35 show that majority of the teachers 71(59.2%) said insufficient number of computers (mean 4.38) is a major barrier to the integration of ICT in teaching and learning. A majority 53(44.2%) also agreed they lack skills in using computers which limits ICT integration (mean 3.92) while 46(38.3%) said they have inadequate time to search internet information or teaching. Only 44(39.2%) agreed that slow internet is a barrier to ICT integration. There is need to provide faster internet connectivity to enable teachers to use internet to search for teaching and learning materials. This indicates that there is need for training of teachers to improve their skills in ICT integration in teaching and learning. There is also need to encourage teachers to search information in the internet to improve quality of teaching and learning.

4.5 Availability of ICT Facilities in Schools

The third objective sought to establish how the availability of ICT facilities influences integration of ICT in teaching and learning. In view of this the study sought to find out the teacher responses about the availability computer laboratory in their schools.

Table 4.36 shows head teachers responses on availability of computer laboratory in their schools.

Table 4.36 Head Teacher’s Responses on Availability of Computer Laboratory.

Responses	Frequency	Percent
Yes	10	47.6
No	11	52.4
Total	21	100.0

Table 4.36, shows that 10(47.6%) of head teachers said they had a computer laboratory while 11(52.4%) said they did not have a computer laboratory in the school. This implies that more than half of schools have no computer

laboratories. This means that head teachers should construct computer laboratories for safety of computers.

Table 4.37 shows teachers responses on the availability of computer laboratories in their schools.

4.37 Teachers Responses on Availability of Computer Laboratory in Schools

Responses	Frequency	Percent
Yes	89	74.2
No	31	25.8
Total	120	100.0

Table 4.37 shows that 89(74.2%) of the teachers said they had a computer laboratory whereas 31(25.8%) did not have a computer laboratory in their schools. This implies that computers in schools could be carelessly stored hence there is need for head teachers to put up ICT laboratories in their schools to ensure safety of computers.

The study also sought to find out the number of computers available in the school for use in teaching. The analysis is shown on Table 4.38.

Table 4.38 Head Teachers' Opinions on Availability of Computers for Teaching

Statement	Mean	S.D
How many computers are available for use in teaching?.	12.29	12.088
What is the ratio of learners to computers in your school	12.62	14.702

From the results on Table 4.38 It is clearly observable that the average number of computers used in teaching was 12:1 (mean 12.29). Similarly according to the head teachers, the ratio of learners to computer 12:1. The head teacher responses concur with the teachers on the ratio of learners to computers in schools. This

indicates that there are computers laboratories in schools but the computers are inadequate. Head teachers should provide more computers in their schools for use in teaching. These findings are in agreement with a study by Gachinu (2014) which established the state of insufficient ICT facilities in public schools in Kenya.

Table 4.39 shows teachers responses on the number of computers in schools.

4.39 Teachers Responses on Number of Computers in Schools

N=120	Mean	S.D
How many computers are available for use in teaching?	16.02	19.871
What is the ratio of learners to computers in your school	11.13	30.604

From the analysis on Table 4.39, it is clear that on average about 16 computers were available for use in teaching (mean= 16.02). Further the ratio of learners to computer indicates that 11 learners are allocated 1 computer (mean 11.13). This indicates that the computers are inadequate for teaching, hence the need to provide more computers for use in teaching and learning.

The head teachers and teachers were also asked to give their opinions on the adequacy of computers for use in teaching and learning. The analysis is shown on 4.40

Table 4.40 shows head teachers opinions on the availability of ICT facilities for administration and learning purposes.

Table 4.40 Opinions of Head Teachers Computers Adequacy of Computers for Administration and Learning Purposes

Computer adequacy	N	Mean	Std. Deviation
How many computers are available for use in administration	120	4.38	6.302
How many computers are available for use for learners	120	24.45	105.728
N	120		

From Table 4.39 it is evident that administration uses an average of 4 computers (mean = 4.38) whereas the number of computers available for use by learners is 24. This means there is a disparity in availability of computers. This means that the schools administration should provide more computers for use by teachers and learners to reduce the ratio of computers to learners.

Table 4.41 shows teachers opinions on adequacy of computers for teaching and learning.

Table 4.41 Teachers Opinions on Adequacy of Computers for Teaching and Learning in Schools.

Computer adequacy	Frequency	Percent
Yes	29	24.2
No	91	75.8
Total	120	100.0

Findings on Table 4.41 shows that 91(75.8%) of teachers said computers are not adequate for use in teaching and learning while only 29(24.2%) said they had enough computers for teaching and learning. This indicates that there are computer laboratories in schools but the computers are inadequate hence the need for head teachers to provide adequate computers for their schools.

The study also sought to find the opinions of head teachers and teachers regarding availability of ICT facilities in schools. The analysis of the responses is shown in Table 4.42

Table 4.42 shows head teachers opinions on availability of ICT facilities in their schools.

Table 4.42 Opinions of Head Teachers Regarding Availability of ICT Facilities in Schools.

Statement	SD	D	NS	A	SA	Mean
I do not have adequate access to computers		5(23.8)	1(4.8)	6(28.6)	9(42.9)	3.90
I do not have access to internet		3(14.3)	2(9.5)	7(33.3)	9(42.9)	4.05
I do not integrate ICT in teaching because of lack of computers		4(19)	2(9.5)	8(38.1)	7(33.3)	3.86
Time is restricted on the use of internet		6(28.6)	3(14.3)	6(28.6)	6(28.6)	3.57
There is need for provision of computers in the school		1(4.8)	2(9.5)	4(19)	14(66.7)	4.48
If provided with enough ICT facilities I would try out instructional computer technology		1(4.8)		8(38.1)	12(57.1)	4.48

It can be noted from Table 4.42 that majority of the head teachers agreed that if provided with enough computers they would try out instructional computer technology, they also agreed there is need for provision of more computers to schools (mean= 4.48). Majority of head teachers also said they do not have access to internet (mean 4.05) meaning they do not use internet to search information for use in teaching and learning. A fair majority of head teachers 16(76.2%) agreed they have no access to internet. This means they cannot search information in the internet for use in teaching. Head teachers should provide internet to their schools for use in teaching and learning in order to enhance quality of education.

Table 4.43 below shows the teachers' opinions on availability of computer facilities for teaching and learning in schools.

Table 4.43 Teachers Opinions on Availability of ICT Facilities in Schools

Statement	SD	D	NS	A	SA	Mean
I do not have adequate access to computers	10(8.3)	35(29.2)		44(36.7)	31(25.8)	3.42
I do not have access to internet	7(5.8)	41(34.2)	1(0.8)	35(29.2)	36(30)	3.43
I do not integrate ICT in teaching because of lack of computers	12(10)	27(22.5)	5(4.2)	39(32.5)	37(30.8)	3.52
Time is restricted on the use of internet	14(11.7)	19(15.8)	11(9.2)	43(35.8)	33(27.5)	3.52
There is need for provision of computers in the school	2(1.7)	6(5)	2(1.7)	29(24.2)	81(67.5)	4.51
If provided with enough ICT facilities I would try out instructional computer technology			2(1.7)	33(27.5)	85(70.8)	4.69

As can be observed from Table 4.43, majority of teachers 85(70.8%) agreed if provided with enough computers they would try out instructional computers technology (mean 4.69). Majority of teachers equally said there is need for provision of computers in the schools (mean 4.51) while 75(62.5%) said they did not have access to computers. This implies that teachers were not integrating ICT in teaching and learning and that there is need for provision of computers in schools which are necessary for ICT integration in teaching.

4.6 Overall ICT Integration in Teaching and Learning

Since this study was about ICT integration, the study sought to find out overall integration of ICT in the teaching learning process among the schools. The study findings are shown on Table 4.44

Table 4.44 show overall ICT integration index in schools.

4.44 ICT Integration index in Schools

ICT integration area	N	Mean	Std. Deviation
Presentation of subject matter using power point	120	2.68	1.347
Evaluation of students	120	3.05	1.234
Internet browsing for subject preparation	120	3.01	1.375
Overall ICT integration index	120	2.9917	1.17927

It is easily observable from the Table 4.44, based on the overall ICT integration index that most schools had not integrated ICT in the teaching and learning process. It can also be seen that most teachers were ambivalent on the use of computers on the Evaluation of students (mean =3.05) and Internet browsing for subject preparation (mean = 3.01). Moreover, the use of computers in presenting subject matter by use of Power Point presentation slides (mean =2.68) was yet to be adopted.

4.6 Hypothesis Testing

4.6.1 Ho₁ There is no Significant Relationship Between Teacher Competency and ICT Integration.

The first hypothesis for the study stated that there is no significant relationship between teacher competency and the integration of ICT in teaching and learning in public secondary school in Machakos Sub County. The hypothesis presumed that integration of ICT is independent of teachers' competency. In order to prove this assertion, a correlational analysis was conducted at the .01 level of significance and the results are presented in Table 4.45

Table 4.45: Relationship Between Teachers' Competency and ICT Integration

Variable	Correlation	Teachers competency	overall ICT integration index
Teachers competency	Pearson Correlation	1	.366**
	Sig. (2-tailed)		.000
	N	120	120

The analysis on Table 4.45 show the relationship to be positive and significant; $R(118) = .366$, $p < .001$; $R^2 = 13.4$. From the R^2 value we can deduce that teacher competency can explain about 14% of the total variance in ICT integration. This means that there is a high likelihood of schools integrating use of ICT when teachers are competent in the use of computers and other ICT facilities. In view of this finding therefore the null hypothesis was rejected and conclusion made that teachers competency and ICT integration are statistically dependent.

4.6.2 Ho₂ There is no Significant Relationship Between Teachers Gender and ICT Integration in Public Secondary Schools in Machakos Sub County.

The second null hypothesis for the study stated that: “Teachers’ gender does not have a significant influence on ICT integration in teaching and learning in public secondary schools in Machakos Sub County”. The hypothesis presumed that gender of the teacher and ICT integration were statistically dependent. In order to prove the validity of this claim, a t-test for independence of means was run at the .05 level of significance and the results are presented in tables 4.46 below.

Table 4.46 shows mean differences on ICT integration based on gender.

Table 4.46 Mean Differences on ICT Integration Based on Gender

	Gender	N	Mean	Std. Deviation
overall ICT integration index	female	62	3.0027	.98786
	male	58	2.9799	1.36336

From Table 4.46, it can be seen that the mean perceptions regarding ICT integration between male and female were different although the difference was marginal. In particular, the mean perception for male was 2.97 while that for females was 3.00 thus giving a mean perceptual difference of .03. In order to test if the differences were statistically significant, a t-test for independence of means was run and the results are shown in table 4.47

Table 4.47 shows T-test for independence.

Table 4.47 T-test Analysis for Independence

		t	Df	Sig. (2-tailed)	Mean Difference
Overall	Equal	.105	118	.916	.02280
	variances assumed				
Ict integration index	Equal	.104	103.427	.917	.02280
	variances not assumed				

From the analysis on Table 4.47 , it is easy to note that the gender of the teacher does not statistically influence the levels of ICT integration in a school; $t(118) = .105, p > .05$. This means that the views of men and women insofar as gender aspect is concerned regarding ICT integration are statistically independent. Therefore on the basis of this finding, the second null hypothesis was accepted and conclusion made that gender and ICT integration are statistically independent. This means that ICT integration in schools does not depend on the gender of the teachers. These findings agree with studies by Ngeno, Githua and Changeiywo (2013) which indicate both male and female teachers were fairly ready to integrate ICT in teaching and teaching in schools.

CHAPTER FIVE

5.0 FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents summary of the findings, conclusion and recommendation of the study. It also gives suggestions for further research.

5.2 Summary of the Findings

The purpose of the study was to establish factors influencing teacher participation in integration of ICT in teaching and learning in public secondary schools in Machakos Sub County. The objectives of the study were; to establish the extent to which teachers competency influence the integration of ICT teaching and learning and to assess the extent to which teachers apply computer skills in teaching and learning. The study also set to determine the influence of ICT facilities on ICT integration in teaching and learning and to establish the relationship between teacher gender and ICT integration in teaching and learning.

5.2.1 To Establish the Extent to Which Teachers Competency Influence ICT Integration in Teaching and Learning.

The first objective sought to establish the extent to which teacher competency influence ICT integration in teaching and learning. The study found that 86% of the head teachers and 77% of teachers had undertaken computer training. The study established that the training in computer use was mainly done at certificate level (88.3%) . In addition majority of the head teachers and teachers had trained in MS Word and internet packages and only 11% of them had trained in subject areas; while 89% had trained in basic computer literacy. It also found also that the few head teachers and teachers had in service training in ICT in the subject areas (36%). The head teachers and teachers considered the ICT training to be

very useful in their career (71%). The findings indicate that majority of teachers had used computers for an average period of five years (mean 5.2) while the head teachers had used for about four years (mean 4.07).

The study findings also indicate that 7% of head teachers were fairly confident in use of computers while 37% of the teachers were fairly confident on computer use. Both head teachers and teachers said the extent of computer training greatly influence the use of computer in teaching and learning. Findings of the study show that majority of head teachers and teachers were not using computers in teaching and learning (mean 2.82) although they also agreed that computers enhance the quality of teaching and learning (mean 4.14 and 4.41 respectively). The study findings also indicate that head teachers and teachers said if given ICT training, they would try out computer instruction technology in their subject areas.

On teacher preparation the study found that most schools do not prepare teachers to integrate ICT in teaching and learning. The hypothesis testing found there is high likelihood of teachers integrating ICT in teaching and learning when they are competent in use of computers and other ICT facilities. The relationship between teacher competency and ICT integration is positive and significant; $R(118) = .366, p < .001$. ie teacher competency can explain about 14% of total variance in ICT integration.

5.2.2 To Assess the Extent to Which teachers Apply Computer Skills in Teaching and Learning.

The second objective sought to assess the extent to which teachers apply ICT skills in teaching and learning. The study found that head teachers used computers 1 to 2 times a week (57%) while 53% of the teachers used computers at the same frequency. In spite of the frequency of computer use the findings indicate that only 41% of teachers and 24% of head teachers use computers in teaching and learning. The findings show majority of head teachers and teachers were average in use of computers in preparing assignments, analyzing marks and in ranking students. Findings indicate that most schools did not have an ICT policy in place. This is evident from 91% head teachers who said there was no ICT policy while 61% of teachers said the same.

Head teachers and teachers from the schools that had an ICT policy did not find it as influencing ICT integration in teaching and learning. The study established that teachers rarely used computers for teaching and learning (29.2%) but used the television (48.3%). Majority of head teachers used television, LCD projectors in teaching and learning (33.3%). The findings revealed that teachers rate computer use in their schools as low (37%) while the head teachers rate it as 38%. The study also established that insufficient number of computers by teachers (mean 4.38) and quality of ICT training (mean 3.92) are the major barriers to ICT integration in teaching and learning. On the same note the head teachers cited quality of ICT training and lack of skill on part of teachers as the major barriers to ICT integration in teaching and learning.

5.2.3 To Determine How the Availability of ICT Facilities Influence Integration of ICT in Teaching and Learning.

The third objective sought to determine how the availability of ICT facilities influence integration of ICT in teaching and learning. The study found that most schools had a computer laboratory. Only 48% of head teachers said there is a computer lab in the school while 74% of the teachers concur with the head teachers. The findings indicate that the ratio of learners to computers is 1.11 meaning that computers are inadequate.

Both head teachers and teachers agreed that there were computer laboratories in schools but computers were inadequate for use in teaching and learning. There is therefore need for head teachers to provide adequate computers for their schools. Findings indicate that teachers and head teachers agreed that if provided with enough computers they would try out instructional computer technology (mean 4.69 for teachers and 4.48 for head teachers respectively). Both teachers and head teachers agreed that there is need for provision of computers in schools.

5.2.4 Teacher Gender and ICT integration in Teaching and Learning

The fourth objective was to establish the relationship between teachers gender and ICT integration in teaching and learning. The study found that there are more female teachers (51.7%) compared to male teachers (48.3%). These findings also indicate that male head teachers are more (52.4%) while 47.6% consists of female head teachers. Hypotheses testing showed that gender of teachers does not statistically influence the levels of ICT integration in a school; $t(118) = .105, p > .05$ which means the views of men and women are thus statistically independent.

5.3 Conclusions

Based on the findings of the study, it can be concluded that both head teachers and teachers had been trained in basic computer literacy at certificate level and had no ICT training in their subject areas. This means they are limited in ICT competency, and therefore it can be concluded that there is need for in depth training of teachers in ICT in the respective subject areas in order to develop the competency and confidence needed to integrate ICT in teaching and learning.

The findings show that ICT integration in teaching and learning has not been embraced in many public secondary schools in Machakos Sub County. There is also limited use of ICT technology such as internet, television, computers, LCD and overhead projectors in teaching and learning. In addition the researcher found that head teachers and teachers used computers frequently for personal needs but did not use them for teaching and learning. The researcher thus concluded that the government policy on integration of ICT in teaching and learning has not been fully effected in secondary schools in Machakos Sub County. The researcher established that the major barriers to ICT integration in teaching and learning were poor quality of training and lack of skills on the part of the teachers and head teachers.

The findings on the availability of ICT facilities in schools shows that there are computer laboratories in schools but the computers are inadequate. It is therefore necessary for head teachers to provide adequate computers for their schools to for use in teaching and learning. This would assist in improving the quality of education. Based on the findings of the study it can be concluded that teacher gender does not influence integration of ICT in teaching and learning in public secondary schools in Machakos Sub County.

5.4 Recommendations

In view of the study findings the reaeacher made the following recommendations:

- i) The Ministry of Education should ensure that all teachers train in ICT skills that are necessary for ICT integration in teaching and learning.
- ii) Head teahers should encourage teachers to use ICT in teaching and learning and lead by example.
- iii) Head teachers should ensure they provide computer facilities to their schools to reduce the ratio of learners to computers and also improve accessibility by learners. Internet provision would anable teacher to research information for use in teaching and learning.
- iv) Given that there are no ICT policies in schools, curriculum developers should guide school head teachers to formulate ICT policies in schools which would enhance ICT integration in teaching and learning.

5.5 Suggestions For Further Research

The researcher recommends the following areas for further research;

- i) A systematic examination on all the aspects of teacher education that influence the integration of ICT in teaching and learning in secondary schools in Kenya.
- ii) Bridging of a gap between the ICT Policy creation and the policy implementation in order to focus on strategies for policy implementation.
- iii) To establish other variables that influence the integration of ICT in teaching and learning such as economic ,social and geographical factors and examine their impact on ICT integration in teaching and learning.

REFERENCES

- Adomi, E.E., Okiy, R.B., & Ruteyan, J.O. (2003). A Survey of cybercafés in Delta State, Nigeria. *The Electronic Library journal* 21 (5): 487-95.
- Afshari, M.; Bakar, K.A.; Luan, W.S.; Samah, B.A. & Fooi, F.S., (2009). Factors affecting teachers' use of information and communication technology. *An International Journal of Instruction*, 2(1), (pp. 77-104).
- Aginam, E., (2006). *NEPAD scores students' ICT education in Africa Low. Vanguard*. Available: <http://www.vanguardngr.com/articles/2002/features/technology/tec527092006.html> .
- Anderson, R.E., & S.L Dexter. (2000), *School technology leadership: incidence and impact*. Center for research on information technology and organization, university of California, Irvine.
- Andoh, B., (2012). *An exploration of Teachers' skills, perceptions and practices of ICT in teaching and learning in the Ghanaian second-cycle schools*, *Contemporary education technology* 3(1).
- Asgararkhani, M. (2005). The Effectiveness of e-Service in Local Government: A Case Study of Electronic Administration Service" *The Electronic Journal of e-government*, 3(4):157-166.2005
- Ayere, M.A., Odera, F.Y. & Agak, J.O., (2010). *E-learning in secondary Schools in Kenya: A Case of the Nepad E-schools*. *Educational Research and Reviews*, 5(5): 218-233, May. www.academicjournals.org/err/PDF/Pdf%202010/May/Ayere%20et%20al.
- Baylor, A. L., & Ritchie, D. (2002). *What factors facilitate teacher skill, teacher morale, and perceived student learning in technology-using classrooms?* *Computers & Education*.
- Best, J.W. & Khan, J.V., (1993). *Research in Education*; (7th Ed) Boston. Allyn and Bacon.
- Blackmore, J., Hardcastle, L., Bamblett, E. & Owens, J., (2003). *Effective Use of Information and Communication Technology (ICT) to Enhance Learning for Disadvantaged School Student*. [www. dest.gov.au/ archive/schools / publications/2003/ICT/ICTreport](http://www.dest.gov.au/archive/schools/publications/2003/ICT/ICTreport).

- Blezu, C., (2008). *The Impact of E-Learning in Education*.www.wseas.us/e-library/conferences/2008/bucharest2/macmese/macmese-S07.
- Bonifaci, V, Colombo, B.A.Demetrescu, C, Finacchi, Laura, L. (2004).*A Java-Based System for Building Animated Presentations Over the web*.www.dis.uniroma1.it/Leo web/docs/scp03.pdf.
- Boudah, J. (2011). *Conducting Educational Research.Guide to Completing a Major Project* ; London. SAGE Publications Ltd.
- Brummelhuis,A.C., (1995). *Models of Educational Change: the introduction of computers in Dutch secondary education*; Erischede, University of Twente.
- Cashman, T.J., Gunter, G.A., Gunter, R.E. & Shelly. G.B., (2004).*Integrating technology in the classroom*.3rd ed. Boston: Course Technology.
- Cohen, L., Marion, I.,& Morrison, K.,(2007).*Research Methods in Education*(4thedition).London;Routledge.
- ColemanJ.,Ernest Q.,Campell, Carol J.,(1966).*Equality of Educational Opportunity*. Washington and US Government Printing Office.
- Collis,B. & I.S. Jung, (2003).*Uses of Information and communication Technologies in Teacher Education*; Routledge, falmer.
- Davis,W.J.K.,(2002). *Learning Resources*:London:University Press
- Dholakia,R.&Kshetri,N.,(2004).*Gender and Internet Usage*.The Encyclopedia and Living Consortium,(200).Gender and ICTs: Implication for policy and Strategy.Soffer,T.&Raban.Y.
- Drent, M., &Meelissen, M., (2008). *Which factors obstruct or stimulate teachers educators to use ICT innovatively?* Computers & Educationhttp: //dx. doi. org/10.1016/j.compedu.2007.05.001
- Elifson,K. W.,Runyon,R.P and Haber,A.(1990).*Fundamentals of Social Statistics*.(2nd ed.) New York:McGraw-Hill,Inc.

- Farrel, G., (2007). *Survey of ICT and Education in Africa: Kenya Country Report*. Paper Presented at the ICT Education Conference in Kenya, Nairobi.
- Fialova, K., (2006). Associating Gender with ICT policy. *Association for progressive Communications Womens Networking Suppor Programme*. Information for Development. Retrieved <http://www.14donline.net/articles>
- Fredrickson, U., (2009). Ways to Use ICT in Schools to optimize the Impact on Teaching and Learning. *Acta journal Didactica Napocensia*, 2 (4):21-32
- Gachinu, J.T., (2014). *Influence of ICT on Performance in Mathematics in Public Secondary Schools in Embu North District of Kenya*. Unpublished Masters project report. University of Nairobi.
- Global e-Schools Communities Initiative, (2009). *Deploying ICTs in Schools: A framework for identifying and assessing technology Options, their benefits feasibility and total cost of ownership*. <http://ww.gesci.org/background>. Retrieved 22 July 2010.
- Goshit, T., (2006). *Nigeria's need for ICT: SP. 259 technology and policy in Africa*. Available: <http://ocw.mit.edu/NR/rdonlyres/Special-Programs/SP-59Spring-2006/891209EE-E63B-4617-BA9D-7635A63C754B/0/goshit.pdf>
- Greenberg, A., (2005). *ICTs for Poverty Alleviation: Basic Tool and Enabling Sector*. <http://www.eldis.org/fulltext/sidaictpoverty.pdf>.
- Gupta, R., (Ed) (2008). *Gender and ICTs. Empowering Women in the knowledge Society*. Retrieved from [14D-www.14donline.net](http://www.14donline.net)
- Hoffman, B., (1996). *Integrating technology into schools*; Education Digest, 62 (5), 51+ Retrieved November 2, 2002 from EBSCO Host.

- Kaku, F.A., (2005). *The use of Internet by secondary school teachers in the rural areas of Delta State: The case of Udu Local Government Area*. Abraka: Delta State University. Unpublished B.Sc. (LIS) project.
- Kandiri, M., (2012). *A survey on ICT Access and use in Kenya secondary schools*. Summit strategies ltd, Nairobi, Kenya.
- Kassim, H, Ali, Z., (2007). The use of ICT in the Implementation of Student Centered Learning (SCL) *Internet Journal of e-Language Learning Teaching*, 4(1):15-31.
- Kenya ICT4D *National Policy, (2006) [Online]*. Available:
<http://comminit.com/trends/ictpolicies/ictpolicies-10. Html>
- Kerlinger, F.M., (1973). *Foundation of Behavioral Research*. (3rd Ed), New York. Holt, Reinhart and Winston.
- Kiano, L.M & Salani, E., (2004). *Students Gender Attitudes Towards the use of Calculators in Mathematics Instruction*. Proceedings of the International Group for the Psychology of Mathematics Education (PME); 3, 113-120. Bergen, Norway.
- KIE, (2009). *Geography Syllabus*: Nairobi, Kenya Literature Bureau.
- Kombo, D.K & Tromp, L.A., (2006). *Proposal and Thesis writing: an introduction*. Nairobi, Paulines Publication of Africa.
- Kothari, C.R., (2004). *Research Methodology; Methods and Techniques*. New Age International (P) Limited publishers, New Delhi.
- Kozma, R.B., (2008). *ICT, Education Reform and Economic Growth. A Conceptional Framework*. http://download.intel.com/education/evidence_of_impact_Kozma-ICT-Framework.pdf
- Kozma, R.; McGhee, R., Queilemal Z., E. & ZALLES, D., (2004). Closing the Digital Divide; Evaluation of the world links program. *International journal of Educational Development* Volume 25 issue 4 pp 361-381.

- Kramer, W.J, Jenkins, B. &Katz, R.S., (2007).*The Role of Information and communication Technologies Sector in Expanding Economic Opportunity*.
www.hks.harvard.edu/m-RCBG/C&R,publications report .
- Laaria, M., (2013). Leadership challenges in the implementation of ICT in public secondary schools Kenya,..*Journal of Education and Learning 2 (1) 32-43*
<http://dx.doi.org/10.5539/jel.v2n1p32>
- LaRocque, N. & Latham, M., (2003).*The Promise of E-Learning in Africa: The Potential for Public-Private Partnerships*
http://info.Worldbank.org/etools/docs/library/116120/ethiopia/e-learning_africa.
- Makau, B.M. & IDRC, (1990). *Computers in Kenya's Secondary Schools: Case study of an innovation in Education Conference inOntario* .
- Manduku, J. Kosgey, A., & Sang, H., (2012). *Adoption and use of ICT in enhancing management of public secondary schools: A survey of Kesses zone secondary schools in Wareng District of UasinGishu County, Kenya*. Unpublished Masters project report.
- Markauskaite, J., (2005).Exploring Differences in Trainee Teachers ICT Literacy.Does Gender Matter?.Accessed December 06,2007 from<http://ww.ascilite.org.au/conf/brisbane05/blogs>
- Markauskaite, L., (2006).*Exploring Differences in Trainee Teachers ICT Literacy.Does Gender Matter?*Coco. (Centre for Research on Computer Supported Learning and Cognition). University og Sydney. Retrieve November 2010.
- Martin, J., (2005). *Pod guides-Is It Time for an Audio Visual Travel Guide?* Accessed <http://geourop about.com/b/2005/31/pod guides-is -it -time for-audio visual-travel-guide>.
- Mbithi, J., (2014). *Integration of ICT in Instruction of English in Matungulu Sub County, Machakos*.Unpublished Masters projectreport. Kenyatta University.

- Miima, F., Ondigi, S., & Mavisi, R., (2013). *Teachers Perceptions About Integration of ICT in Teaching And Learning of Kiswahili Language in Secondary Schools*. Unpublished Masters project report. Kenyatta University.
- Millennium Development Goals (2008). *UNDP Millennium Development Goals (MDGs) Report*. <http://www.undp.org/mdg/>.
- Ministry of Education, (2008). *About the Ministry*. Retrieved March 19 2009 from [http://www.science& technology.go.ke/](http://www.science&technology.go.ke/).
- Ministry of Information and Communication, (2006). *'National ICT Policy'*. <http://www.information.go.ke/docs/ICT%20Policy.pdf>
- Mlitwa, N.B.W & Nonyane, J.N., (2008). *The Status of ICT Access and Use in South African Schools: Comparing Urban and Rural Schools in Mpumalanga province*. <Http://emerge2008.net/access/content/group/emerge2008>.
- Mlitwa, N.W.B., (2011). *Integration of e-learning System into Academic Programs In Modern Universities: A South African perspective*. Cape Town: TVK e-INNOVATIONS.
- Mugenda, O. & Mugenda, A., (2008). *Research Methods. Quantitative and Qualitative Approaches*: Publishers Act Press, Nairobi.
- Mwunda, N., M., (2014). *A Framework for Integration of ICT in Teaching and Learning Process in Machakos Sub County*. Unpublished Masters project. Moi University.
- Ngeno, J., Githua, B., & Chageiywo, J., (2013). *Teachers Perceptions on their preparedness to integrate ICT in Secondary Schools in Rift Valley Region in Kenya. A Journal of Education and Practice. Vol.4 No.12, 2013.*

- Ndukwe, E.E., (2004). *Information and Communications Technology Science and Medicine in the 21st Century Nigeria*. www.ncc.gov.ng/archive/ speeches[11 April 2012]. NE pad e-Africa Commission 2010: <http://www.eafricacomission.org/>
- Nwagwu, W.E., (2006). Integrating ICTs into the globalization of the poor developing countries. *Journal on Information Development* 22 (3): 167-179
- OECD, (2003). *Seizing the Benefits of ICTs in a Digital Economy. Meeting of the OECD at Ministerial Level, The Benefits of ICT are not immediate*. Brochure.
- Olakulehin, F.K., (2007). Information and Communication Technologies in Teacher Training and Professional Development in Nigeria. *Turkish online Journal of Distance Education*, 8(1):133-142.
- Omari, I.M. & Mosha, H.J., (1987). *The quality of primary education in Tanzania*. Nairobi. Man graph
- Onguko, B. & Hennessy, S., (2010). *Key past and current initiatives supporting the use of ICT in schools in Sub-Saharan African countries*. In *Developing the Use of Information and Communication Technology to Enhance Teaching and Learning in East African Schools: Review of the Literature*.
- Otieno, S., (2003). *Kenya: Atop achiever of universal education*. *The East African Standard*-Retrieved October 23rd 2004 from <http://www.eaststandard.net>
- Owino, O., (2013). *The Impact of E-Learning on Academic Performance: A Case Study of Group Learning Sets*. Unpublished Masters Project. University of Nairobi.
- Park, N.; Roman, R.; Lee, S. & Chung, J.E., (2009). User acceptance of a digital library system in developing countries: An application of the Technology Acceptance Model. In *International Journal of Information Management*, 29(3), (pp. 196-209).
- Pelgrum, W.J., (2002). *The Effectiveness of ICT in Schools Current Trends and Future Prospects Discussion Paper*. Paper presented at the OECD Japan Seminar.

Plomp, T.J., Brummelhuis, T. & Rampmund R., (1996). *Teaching & Learning for the future*; Report of the committee of multimedia and teacher training; Den Haag; SDU.

Prestridge, S., (2012). The beliefs behind the teacher that influences their ICT practices, Griffith University Brisbane Australia. *Journal of Computer Education* 58(2012) 449-458

Republic of Kenya, (2005). *Sessional Paper No.1 of 2005, A Policy Framework for Education, Training and Research*; Government printers, Nairobi.

Republic of Kenya, (2010). *ICT Capacities and Capabilities in Secondary Schools in Kenya 2009/2010 NCST No.046*, Nairobi.

Robinson, J., (1953). *The Production Function and the Theory of Capital*; Review of Economic Studies.

Sharudini, N.F (2006). *Core Approach into the Development of Interactive Multimedia Learning Environment Learning of Al-Quaran*. <http://prints.ptavruitm.edu.my/1765>.

Simkins, M., Cole, K., Tavalin, F. & Means, B., (2003). *Increasing Student Learning Through Multimedia Projects*. Alexandria: Association for Super Development.

Strudler, N.B., & K. Wetzel. (1999). *Lessons from exemplary colleges of education: factors affecting technology integration in pre-service programs*. Educational technology research and development.

Teachers Service Commission, (TSC, 2007). Code of Regulations. Nairobi

Teo, T., (2012). Pre-service teachers' attitudes towards computer use: A Singapore survey. *Australasian Journal of Educational Technology* 24 (4) 413-424

UNESCO, (2011).*ICT Competency Standards for Teachers; Implementation Guidelines, version 1*

Von Braak, J. Toney, J. &Valake, M., (2008). Explaining different types of computer use among primary school teachers.*European Journal of Psychology of Education* 19(1)407-422 [http:// dx.doi. org/10.1007 /BF03173218](http://dx.doi.org/10.1007/BF03173218)

Wambaria, M., (2014). *Perceptions and the Use of e-Learning in Machakos County*.Unpublished phd project report.Moi University.

Webster,J. &Hackley,P.,(1997).Teaching Effectiveness in Technology-mediated distance learning. *In Academy of management journal*,40(6),(pp.1282-1309).

APPENDICES

APPENDIX I: Letter of Introduction.

South Eastern Kenya University,
P.O Box 170-90200,
Kitui.

To the Head teacher,

.....

I am Felistas Mbithe Michael, a student at the South Eastern Kenya University pursuing a Master of Education (M.ED) degree in Education Administration and Planning. As part of the course requirement, I am required to submit a research project. I am conducting a research on the factors influencing teachers' participation in the integration of ICT in teaching and learning in public secondary schools in Machakos sub County. Your school has been selected through sampling to participate in the study. I wish to seek your permission to collect data from the school head teacher and some sampled teachers. I therefore kindly request you to respond to the questionnaires as honestly as possible. The data collected will be strictly used for academic purpose only. Your cooperation will be highly appreciated.

Thank you.

Yours faithfully,

Felistas.

APPENDIX II

QUESTIONNAIRE FOR HEAD TEACHERS

This questionnaire is intended to collect data on teacher's participation in the integration of ICT in curriculum implementation in public secondary schools in Machakos Sub County. The data will be used for academic purpose only. Please answer in the spaces provided and tick (✓) where appropriate. Do not write your name or the name of your school anywhere on this questionnaire. Answer all questions as honestly as possible. Your responses will be kept confidential.

Section A. Demographic Information.

Please indicate the correct option by ticking (✓) or give information in the spaces provided.

Please indicate your gender a) Female _____ . b) Male _____

What is your age group?

- a). 20-30 years b). 31-40 years
c). 41-50 years d). 51 and over

For how long have you worked in this institution?

- a) Below 1 year
b) Between 1-5 years
c) Between 6-10 years
d) Above 10 years

SECTION B. ICT Competencies among Secondary School Teachers

Please indicate your opinion the extent to which you agree with teacher competencies in use of ICT in teaching in public secondary schools by answering the following questions.

1.i) Have you undertaken any training in computer use in your career and to what level of ICT training have you been trained? Certificate/Diploma/Degree/Post graduate

ii) What computer elements/packages did you cover in the training?

.....
.....

2.i) Was the ICT training on integration in your subject area or just on basic computer literacy.....

ii) Have you had any in-service course in ICT in your subject area? Yes/No.

3.i) Do you consider the ICT training you have to be useful in your teaching career? Yes/No

ii) If yes, how has the ICT training been useful in your career? Very useful/ useful/not sure/barely useful/Not useful

4.On average how many years have you used a computer?

5.How confident are you in using a computer?Not confident/fairly confident/Not sure/Confident/Very confident.

6. In your opinion, to what extent does the level of ICT training contribute to the use of computer in teaching and learning?

.....

7. Please indicate in your opinion the extent to which you agree with teacher competencies in the use of ICT in teaching and learning by ticking appropriately.

SA=strongly agree, A=agree, NS=not sure, Disagree, SD strongly disagree.

	Statement	Strongly agree	Agree	Not Sure	Disagree	Strongly Disagree
1	Most secondary school teachers have basic computer training.					
2	I do not use computer in teaching because I don't have adequate training.					
3	Computers enhance the quality of teaching and learning					
4	I can effectively teach using a computer					
5	If I could get adequate training I would try out instructional computer technology in my subject area					
6	I have been computer facilitated in my subject area					
7	I can take risk of using computer in teaching					

8. How does your school prepare teachers to integrate ICT in teaching and learning?

.....
.....
.....

9. Give some suggestions on improvement of ICT competence among teachers in your school.....

.....
.....
.....

SECTION C. Application of ICT in teaching and learning

1. How often do you use computers?

1 to 2 times a week 3 to 4 times a week 5 or more times a week

2. Do you use computer in teaching and learning? Yes/no

3. If yes how do you rate yourself on the frequency of use of computer to do the following?

	Statement	very good	good	average	poor	very poor
i	Preparing assignments and internal tests					
ii	Analyzing marks					
iii	Ranking the students					
iv	Presentation of subject matter using power point					
v	Internet browsing for subject preparation					
vi	Email use					

4. Is there an ICT policy in your school? Yes/no

5. If yes comment on how the policy influence the use of ICT in teaching in your school.

.....

If no, explain why.

.....

6. How often do you use the following technologies in teaching and learning?

Technology	Always	rarely	Not at all
Internet			
computer			
television			
Overhead projector			
LCD projector			

7. How do you rate the use of computers in teaching and learning in your school?

Very good/Good/Not sure/Average/Poor

8. What are the major challenges in the use of computers in your school in teaching and learning?

.....

9. Do you consider the following to be barriers in ICT integration in teaching and learning in your school?

	Statement	Strongly agree	Agree	Not sure	disagree	Strongly disagree
i	Insufficient number of computers					
ii	Teachers lack skill/difficulty to use computers					
iii	Slow network/internet					
iv	Quality of ICT training					
v	Inadequate time to search internet information					
vi	High running and maintenance cost					

SECTION D. Availability of ICT facilities in schools.

1. Do you have a computer laboratory in your school? Yes/No
2. How many computers are available for use in teaching?.....
3. What is the ratio of learners to computers in your school?.....
4. In your opinion do you have adequate computers for teaching and learning in your school? Yes/No
5. How many computers are available for use in administration and for learners?.....
6. Indicate the extent to which you consider the following statements correct on the availability of ICT facilities in your school by ticking your response appropriately.

Statement	Strongly agree	Agree	Not sure	Disagree	Strongly disagree
I do not have adequate access to computers					
I do not have access to internet					
I do not integrate ICT in teaching because of lack of computers					
Time is restricted on the use of internet					
There is need for provision of computers in the school					
If provided with enough ICT facilities I would try out instructional computer technology					

7. To what extent does the availability of ICT facilities contribute to the use of computers in teaching and learning in your school?

.....
.....
.....

SECTION E. Teacher gender and ICT integration in teaching

1. To what extent does teacher gender influence ICT integration in teaching in your school?

.....

.....

.....

.....

2. Indicate the extent to which ICT has been integrated in the following areas in your school

Statement	To a very large extent	To a large extent	To a small extent	To a very small extent	No extent at all
Teaching subject matter					
Evaluation of students					
Use of internet					

Thank you for your participation and genuine contributions.

APPENDIX III

QUESTIONNAIRE FOR TEACHERS

This questionnaire is intended to collect data on teacher's participation in the integration of ICT in curriculum implementation in public secondary schools in Machakos Sub County. The data will be used for academic purpose only. Please answer in the spaces provided and tick (✓) where appropriate. Do not write your name or the name of your school anywhere on this questionnaire. Answer all questions as honestly as possible. Your responses will be kept confidential.

SECTION A. Demographic Information.

Please indicate your gender a).Female_____ b) Male_____

What is your age group?

- | | | | |
|-----------------|--------------------------|-----------------|--------------------------|
| a). 20-30 years | <input type="checkbox"/> | b).31-40 years | <input type="checkbox"/> |
| c).41-50 years | <input type="checkbox"/> | d). 51 and over | <input type="checkbox"/> |

For how long have you worked in this institution?

- | | |
|-----------------------|--------------------------|
| a) Below 1 year | <input type="checkbox"/> |
| b) Between 1-5 years | <input type="checkbox"/> |
| c) Between 6-10 years | <input type="checkbox"/> |
| d) Above 10 years | <input type="checkbox"/> |

SECTION B. ICT Competencies among Secondary School Teachers

Please indicate your opinion the extent to which you agree with teacher competencies in use of ICT in teaching in public secondary schools by answering the following questions.

1.i) Have you undertaken any training in computer use in your career and level of ICT training have you been trained? Certificate/Diploma/Degree/Post graduate

ii) What computer elements/packages did you cover in the training?

.....
.....

2 i) Was the ICT training on integration in your subject area or just on basic computer literacy?

ii) Have you had any in-service course in ICT in your subject area? Yes/No.

3. i) Do you consider the ICT training you have to be useful in your teaching career? Yes/No

ii) If yes, how has the ICT training been useful in your career? Very useful/useful/not sure/barely useful/Not useful

4. On average how many years have you used a computer?

5. How confident are you in using computers? Not confident/Fairly confident/Not sure/Confident/Very confident.

6. In your opinion, to what extent does the level of ICT training contribute to the use of computer in teaching and learning?

.....

7. Please indicate in your opinion the extent to which you agree with teacher competencies in the use of computer in teaching and learning by ticking appropriately.

SA=strongly agree, A=agree, NS=not sure, Disagree, SD strongly disagree.

	STATEMENT	Strongly agree	Agree	Not Sure	Disagree	Strongly Disagree
1	Most secondary school teachers have basic computer training.					
2	I do not use computer in teaching because I don't have adequate training.					
3	Computers enhance the quality of teaching and learning					
4	I can effectively teach using a computer					
5	If I could get adequate training I would try out instructional computer technology in my subject area					
6	I have been computer facilitated in my subject area					
7	I can take risk of using computer in teaching					

8. How does your school prepare teachers to integrate ICT in teaching and learning?

.....
.....

9. Give some suggestions on improvement of ICT competence among teachers in your school.....

.....
.....

SECTION C. Application of ICT in teaching and learning

1. How often do you use computers?

1 to 2 times a week 3 to 4 times a week 5 or more times a week

2. Do you use computer in teaching and learning? Yes/no

3. If yes how do you rate yourself on the frequency of use of computer to do the following?

	Statement	very good	good	average	poor	very poor
i	Preparing assignments and internal tests					
ii	Analyzing marks					
iii	Ranking the students					
iv	Presentation of subject matter using power point					
v	Internet browsing for subject preparation					
vi	Email use					

4. Is there an ICT policy in your school? Yes/no

5. If yes comment on how the policy influence the use of ICT in teaching in your school.

.....
.....

If no, explain why.

.....
.....

6. How often do you use the following technologies in teaching and learning?

Technology	Always	rarely	Not at all
Internet			
computer			
television			
Overhead projector			
LCD projector			

7. How do you rate the use of computer in teaching and learning in your school?

Very good/Good/Not sure/Average/Poor

8. What are the major challenges in the use of computer in your school in teaching and learning?

.....
.....
.....

9. Do you consider the following to be barriers in ICT integration in teaching and learning in your school?

	Statement	Strongly agree	Agree	Not sure	disagree	Strongly disagree
I	Insufficient number of computers					
ii	Teachers lack skill/difficulty to use computers					
iii	Slow network/internet					
iv	Quality of ICT training					
v	Inadequate time to search internet information					
vi	High running and maintenance cost					

SECTION D. Availability of ICT facilities in schools.

1. Do you have a computer laboratory in your school? Yes/No
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3. What is the ratio of learners to computers in your school?.....
4. In your opinion do you have adequate computers for teaching and learning in your school? Yes/No
5. How many computers are available for use in administration and for learners?.....
6. Indicate the extent to which you consider the following statements correct on the availability of ICT facilities in your school by ticking your response appropriately.

Statement	Strongly agree	Agree	Not sure	Disagree	Strongly disagree
I do not have adequate access to computers					
I do not have access to internet					
I do not integrate ICT in teaching because of lack of computers					
Time is restricted on the use of internet					
There is need for provision of computers in the school					

If provided with enough ICT facilities I would try out instructional computer technology					
--	--	--	--	--	--

7. To what extent does the availability of ICT facilities contribute to the use of computers in teaching and learning in your school?

.....

.....

SECTION E. Teacher gender and ICT integration in teaching

1. To what extent does teacher gender influence ICT integration in teaching in your school?

.....

.....

.....

.....

2. Indicate the extent to which ICT has been integrated in the following areas in your school

Areas	To a very large extent	To a large extent	To a small extent	To a very small extent	No extent at all
Teaching subject matter					
Evaluation of students					
Use of internet					

Thank you for your participation and genuine contributions.

APPENDIX IV

PERMISSION TO COLLECT DATA



SOUTH EASTERN KENYA UNIVERSITY

OFFICE OF THE DIRECTOR

BOARD OF POST GRADUATE STUDIES

P.O. BOX 170-90200
KITUI, KENYA
Email: info@seku.ac.ke

TEL: 020-2413859 (KITUI)
: 020-2531395 (NAIROBI)
Email: bps@seku.ac.ke

Our Ref: E55/MAC/20240/2012

Date: Tuesday, September 22, 2015

Felistas Mbithe Michael
Reg. No. E55/MAC/20240/2012
C/O Dean, School of Education

Dear Felistas,


RE: PERMISSION TO COLLECT DATA

This is to acknowledge receipt of your Master in Educational Administration and Planning Proposal document entitled, *"Factors influencing teachers' participation in the integration of ICT in teaching and learning in public secondary schools in Machokos Sub-County"*

Following a successful presentation of your Master Proposal, the School of Education in conjunction with the Directorate, Board of Post graduate Studies (BPS) have approved that you proceed on and carry out your research data collection in accordance with your approved proposal.

During your research work, you will be closely supervised by Dr. Selpher K. Cheloti and Dr. Redempta Maithya. You should ensure that you liaise with your supervisors at all times. In addition, you are required to fill in a Progress Report (**SEKU/ARSA/BPS/F-02**) which can be downloaded from the University Website.

The Board of Postgraduate Studies wishes you well and a successful research data collection as a critical stage in your Master of Education in Educational Administration and Planning.


Prof. Cornelius Wanjala
Director, Board of Postgraduate Studies

Copy to: Deputy Vice Chancellor, Academic, Research and Students Affairs
Dean, School of Education
Chairman, Department of Education Administration and Planning
Dr. Selpher K. Cheloti
Dr. Redempta Maithya
BPS Office -To file

JK/mk

APPENDIX V

AUTHORIZATION LETTER



NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,
2241349, 310571, 2219420
Fax: +254-20-318245, 318249
Email: secretary@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

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

Ref. No. **NACOSTI/P/16/67825/9284**

Date:
26th January, 2016

Felistas Mbithe Michael
South Eastern Kenya University
P.O. Box 170-90200
KITUI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "*Factors influencing teacher participation in integration of ICT in teaching and learning in public secondary schools in Machakos Sub-County,*" I am pleased to inform you that you have been authorized to undertake research in **Machakos County** for a period ending **22nd January, 2017.**

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

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.


DR. S. K. LANGAT, OGW
FOR: DIRECTOR GENERAL/CEO

Copy to:

The County Commissioner
Machakos County.

The County Director of Education
Machakos County.



APPENDIX VI

RESEARCH PERMIT

CONDITIONS

1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit.
2. Government Officers will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2) hard copies and one(1) soft copy of your final report.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice.

REPUBLIC OF KENYA
National Commission for Science, Technology and Innovation
Serial No. A/7663

RESEARCH CLEARANCE PERMIT

CONDITIONS: see back page

THIS IS TO CERTIFY THAT:
MS. FELISTAS MBITHE MICHAEL
of SOUTH EASTERN KENYA UNIVERSITY,
124-90100 MACHAKOS, has been
permitted to conduct research in
Machakos County
on the topic: FACTORS INFLUENCING
TEACHER PARTICIPATION IN
INTEGRATION OF ICT IN TEACHING AND
LEARNING IN PUBLIC SECONDARY
SCHOOLS IN MACHAKOS SUB-COUNTY.

Permit No : NACOSTI/P/16/67825/9284
Date of Issue : 26th January, 2016
Fee Received : ksh1000

for the period ending:
22nd January, 2017.

Applicant's Signature
[Signature]

Director General
[Signature]
National Commission for Science, Technology & Innovation