

**INFLUENCE OF TEACHER CHARACTERISTICS ON INTEGRATION OF
INFORMATION COMMUNICATION AND TECHNOLOGY IN TEACHING
IN ICT CHAMPION SCHOOLS IN MACHAKOS SUB- COUNTY**

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**A Research Project Submitted in Fulfillment of the Requirements for the
Degree of Master of Education in Curriculum Studies of South Eastern Kenya
University**

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South Eastern Kenya University

DECLARATION

This project is my original work and has not been presented to any other institution for any other award. I understand that plagiarism is an offence and I declare therefore that this research project is my original work and has not been submitted for any award in any other institution

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This research project is dedicated to my husband Dr. Fredrick Kalui and my children Victor Kalui and Maureen Ndanu. My family was a source of inspiration throughout my postgraduate studies and for them I thank God.

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ABBREVIATIONS AND ACRONYMS

CFSK	Computer for Schools Kenya
EMS	Education Management System
FPE	Free Primary Education
ICT	Information Communication Technology
ICT4E	Information Communication Technology for Education GOK Unit
KESSP	Kenya Education Sector Support Programme
MoE	Ministry of Education
MOEST	Ministry of Education Science and Technology
NI3C	National ICT Innovation and Integration C
SITES	Second Information Technology in Education Studies
TAM	Technology Acceptance Model
WAP	Wireless Application Protocols
UNCTAD	United Nations Conference on Trade and Development
UNESCO	United Nations Educational, Scientific and Cultural Organization.

ABSTRACT

The main objective of this study was to investigate the influence of teacher characteristics on ICT integration in teaching in ICT Champion schools in Machakos Sub-county. The study was guided by the following objectives: to establish the influence of teacher's demographic factors, teacher attitude teacher's subject specialization, teacher's level of training and teacher's teaching experience on ICT integration on teaching in ICT champion schools in Machakos Sub –County. The study used mixed methods research design. A sample of 163 teachers and 9 principals was selected. Teacher respondents were selected using Yamene (2000) formula whereby a population of 271 yielded a sample of 163 respondents. The principals were chosen purposively from the nine schools owing to the crucial role they play in implementation of ICT integration. The study used primary data that was collected using self-administered structured questionnaires and interview guide to teachers and principals respectively. Content validity of the instrument was ascertained through a pilot study. Reliability was ascertained by a test retest method. Quantitative data was analyzed using descriptive and inferential statistics with aid of the SPSS software. The influence of teacher characteristics on integration of ICT in teaching in public secondary schools was tested using Pearson's chi-square test at five percent (0.05) level of significance. The study found that there was a statistically significant relationship between demographic factors, attitude and training in ICT programme especially power point presentation with integration of ICT in teaching because the p-value for chi-square test was a figure below 0.05. The null hypothesis for those objectives was rejected while on the other hand there was no significant relationship between teaching subjects and teaching experience because the p –value was a figure above 0.05 hence the null hypothesis for those objectives was accepted. The study recommended that the government should introduce compulsory computer training for teachers to equip them with ICT competencies and also sensitize the few with negative to deflect that negative attitude and embrace it.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Incorporating Information and Communication Technology (ICT) in education is an essential matter for every country due to the tremendous changes occurring in the world. In fact, ICT is the instrument for rigorous advancement in this 21st century through which the world is connected (Alazzam, Bakar, Hamzah & Asimiran, 2012). According to The World Summit on the Information Society (2006), the main aim of introducing ICT under Ministry of Communication and Information Technology was to fight poverty and contribute towards realization of Sustainable Development Goals. ICT has impacted on the quality and quantity of teaching and learning in that it offers chances for distance education where students, academic and non-academic staff can communicate with each other conveniently whether during official or unofficial working.

It is necessary for citizens' world over to gain ICT knowledge and skills so as to adapt the turbulent revolutionary universe. As an outcome of the ICT explosion, the world has become like a classroom and the universe is evident in the classroom (Alazzam et al., 2012). Through ICT, learners are comfortably linked to the rest of the universe and information can conveniently be accessed. However, according to Alazzam et al. (2012), classroom individually requires changes to address the new method for teaching and learning, hence teaching systems require to be altered and the part of teachers also need to be amended. Mukhari (2014) affirms that, in the new social dispensation, the teacher's task is still to aid learners to develop their rightful skill also fulfill their ability for individual progress. The transformation because of the presence and dominance of ICT has resulted to a position where the teacher no longer is the main figure who imparts knowledge to the students but a facilitator of learning.

In the 1980s, developed countries made it compulsory for the education system to incorporate ICT to enhance teaching and to address past disparities in schools (Bransford & Brown, 2000). Worldwide investment in ICT to improve teaching in

schools has been started by most governments. Clear instance is United Kingdom, the government's expenditure on educational ICT was £2.5bn in 2008-9 (Nut, 2010) in United States, the government spend \$6 billion on K-12 schools and \$4.7 billion in higher education in 2009, and the New Zealand government spent \$410 million for ICT infrastructure every year for its schools (Nut, 2010). The implication is that there is need for application of ICT integration in schools.

Regardless of all investments on ICT infrastructure, equipment and professional progress to improve education in most nations, Gulbahar (2007) claims that large educational investment has yielded insignificant evidence of ICT merging in teaching. The mismatch between the level of investment on ICT infrastructure and level of implementation has been attributed to two factors, namely the external and internal factors (Tedla 2012; Tay 2012; Sang, Valcle, Van braak & Tondeur ,2010)

External factors are deemed as the key obstacles and include issues related to ingress to the technologies (hardware, software and integration connectivity) without which it is quite impossible to mention about ICT combination. When the external factors are in place teachers may not automatically implement ICT integration since the decision concerning whether and how to utilize technology relies on their court (Ertmer, 2005). Chigona (2014) reiterated that the task of the teacher is of much significance in ensuring that ICT is utilized in educational institutions.

The inability to integrate in this context has been attributed to internal factors; teacher characteristics. Various surveys have been undertaken to investigate the external factors as compared to internal factors (Baek, Jung & Kim, 2008; Norton, McRobbie, & Cooper, 2000). Ertmer (2005) asserts that teachers have a great responsibility of deciding when and how to apply technologies for learning. Baylor and Ritchie (2002) observed that few teachers amalgamate ICT into teaching activities despite increased availability in ICT hardware, school associated support for ICT merging and a greater consciousness of teachers about the significance of educational ICT use.

There is a clear indication that teacher related variables are key internal determinants of technology integration (Becker,2000). This is a clear indication that there are other factors, other than availability of technological infrastructure that seem to contribute

to teachers' successful technology integration. Teacher characteristics or concerns can be described as the feelings; thoughts and reactions teachers develop in regard to ICT integration in teaching (Hord, Rutherford, Huling, Austin & Hall, 1998). It implies that the decision on whether to integrate and when to integrate lies on an individual teacher.

The reviewed literature indicates that there is necessity to undertake studies on teachers' degree of ICT skills and their attitudes towards ICT but even on other factors accountable to have facilitated or hindered them from incorporating ICT in teaching. Research conducted in other parts of the country and in the global scene on merging of ICT in teaching, is only context-specific because of target population, sampling methods, research design limitations and might not imperatively be transferable to Machakos Sub-County context. Therefore, the need and urgency for a local probe to the factors influencing ICT integration to ICT champion schools in Machakos Sub-County.

Teacher characteristics in this context encompasses demographic factors (age, gender and level of education), attitude, subject specialization, extent of ICT training and teaching experience. Related literature reviewed depicted that age affects teachers' successful adoption and utilization of the new technology in learning and teaching (UNESCO, 2014). Chemwei and Koech (2014) found that young teachers between the ages of 25-30 seem to have higher interest in ICT. The young teachers show great enthusiasm in the adoption and use of computers in their private and in public life and this enthusiasm dwindles with age (Kamau, 2014). The older generation of teachers experience challenges when using ICT in classrooms which is attributed to the supposedly usefulness and its perceived simplicity of use. (Guoyuan, 2010). This means these teachers for them to integrate ICT to teaching there is urgent need for training.

The gender digital divide was perceived as a worldwide emerging matter that could influence fruitful adoption and use of ICT in teaching (UNCTAD, 2014). In some developing countries; gender digital divide has been reported (Hennessy, Harrison & Wamakote, 2010). Senegal, being an African nation, women's technological

literacy ratio is still quite low (38.7%) whilst men's technological literacy rate was estimated at 61.8% in 2009 (UNESCO Institute of Lifelong Learning, 2014). This study reveals Kenyan status in respect to the influence of gender on integration of ICT in teaching.

In Bangladesh, teachers have taken long to embrace and utilize ICT for teaching because of short comings associated with teacher's negativity towards ICT integration and rampant corruption in the education sector at top management. In Germany, ICT incorporation in pedagogy wasn't comprehensively embraced in schools as a result of insufficient trained teachers for ICT integration in the respective subjects with a technology connotation. To enable the merging of ICT to be fruitful, teachers should be vested with skills and knowledge and most significantly, must have positive attitudes (International Education Studies, 2012).

According to Selwyn (2007) ancient computer were the domain in mathematics science and technology departments. The researcher further elaborates the computer is chiefly combined into their practice more than the others, therefore some subjects have ability of ownership while others are unfamiliar and suspicious to it. Marinas and Ditapat (2011) studied curriculum development in Philippines discovered that there is intensive training and orientation for supervisors and school teachers to make sure the curriculum enactment is performed productively. The researchers remarked that capacity development for teachers equip them with necessary professional expansion that equips them to tackle alterations successfully. Sahlberg (2010) stated that shortage of teachers progress programmes in Finnish republic influenced combination of ICT to the processes of learning and teaching.

Rastogi and Malhotra (2013) argues that, in order to gain positive outcomes of ICT in education, any education system of any country which is responsible for the implementation of the innovation should take cognizance of teacher development in ICT integration first so as to produce confident teachers in ICT incorporation in teaching students of 21st century digital age. The researcher consequently asserts that its only teachers who shape what go on in classroom. This underscores the need for teacher training in ICT integration in teaching so as to ensure appropriate blending of

the traditional pedagogy to the ultra-modern ICT inputs. The process of schooling must be envisaged at delivering what its suppose to for it to make room for providing an ideal learning community.

China had a slow start in its effort to integrate technologies into education owing to its slow economic development and lack of resources in most of the 20th century (Liu & Zhang, 2006). In 2001 Chinese government had an extensive curriculum reform whereby content related to ICTs was added to curriculum for each subject area (Sang et al 2010) MoE. Chinese government in addition to investing in ICT infrastructure has needed in preparation for pre-service teachers and to educate the in –service teachers to combine ICT into their classes, by presenting ICT literacy training teacher programmes the teacher education institutes, a practice which is not common in many African countries (Yuan, 2006). Consequently, ICT integration has made remarkable growth and achievement in both western rural areas of China and the developed regions (Zhao & Xu, 2010). In the sub-saharan region the teaching and learning in ICT application is perceived to be significant, the incorporation isn't comprehensively utilized per the expectation and experience in the proper developed nations. Makgato (2012) convey that teachers don't utilize ICTs because they are worried of current innovations and revamp and are technophobic although ICTs are available in their respective schools.

In addition to the earlier discussed characteristics, teaching experience plays an important role for productive combination of ICT in curriculum delivery. Deen-Swarray, Gillwald, and Morrell (2012) stated that, teachers with extensive teaching experience were aged and therefore demonstrated low self-efficacy in access and ease of use of ICT tools in classroom activities. It is not clear whether teacher's teaching experience influence integration of ICT in teaching curriculum in Machakos sub-county. This study identifies the gap and provides the possible solution.

Its Kenya's vision to be comprehensive developed nation by the 2030 and as such education in secondary schools is among the platforms that were explored to make sure preparation of skilled personnel. Secondary school curriculum needs to present innovation in teaching by ensuring its outcome is able to bring transformations to the

work environment. For viability of ICT integration strategies, the government together with relevant stakeholders have devised initiatives of integrating ICT for an improved education quality. For instance computer for schools – Kenya (CFSK) whose purpose is to offer Kenyan youth with ingress to current technology by computer donations to public secondary schools in Kenya, by 2013 CFSK had secured 50,000 computers to be distributed to approximately 3000 learning organizations among them Machakos Sub-County Schools (Reddick, 2010). The National ICT innovation and integration centre were set up in order to undertake technical sustenance for ICT infrastructure (Republic of Kenya, 2014). The government has also come up with Kenya National ICT Policy (2006) and the Kenya National ICT Master Plan 2013/14 – 2017/18 to led educational stakeholders in introducing ICT infrastructure in public secondary schools nationwide.

The background information indicates that Kenya has an ICT policy and legal framework of ICT integration in education. The teachers are faced with some challenges concerning the intergration of ICTs in management of education set. This has resulted to a slow pace of integration of ICT in schools inspite of governments' promise and commitment in provision of computers to increase educational access, quality and equity and at the same time make learning relevant to the dynamic society. As such, the scholar in this study sought to carry out a study in the schools which have excellent and efficient ICT department by the virtue of the fact that they were provided computers by the Computer For Schools, Kenya courtesy of MoE (Champion schools in ICT) in Machakos Sub-County as opposed to the other schools whereby some donot even have the computers and hence one has no moral authority to expect the teachers to integrate ICT in teaching. These schools were selected purposevely and its necessary to research on them because they all have computers and teachers are expected to utilize them for ICT integration in teaching. The idea is to get teachers responces concerning ICT integration to allow sound decision to be made by the education stakeholders.

The study is subsequently an inclusion to the on-going research attempts to determine the influence of teacher characteristics on incorporation of ICT in teaching in ICT champion schools in Kenya.

1.2 Statement of the Problem

The Kenyan government like many other governments globally has made a lot of efforts to introduce and equip public secondary schools with computers so as to ensure that teachers have paradigm shift from traditional approaches to teaching to digital instruction whereby issues of quality, relevance and equity are assured. The MoE through the Kenya Institute of Curriculum Development (KICD) has also interpreted the national ICT policy, prepared ICT curriculum and given it to schools for execution. Notwithstanding the endeavour made by the Kenyan government and all key education stakeholders, it has been indicated that the incorporation of ICT in secondary schools teaching has remained quite low in Kenya (Mwunda 2014).

Information from Machakos Sub- County education office states that ICT combination to teaching in the public secondary schools has continued to remain very low and so is the academic performance. The implication is therefore the National ICT policy on education (2006) has not been successful enacted as expected. It is in view of this backdrop that the researcher strived to investigate the teacher characteristics influencing teacher involvement in ICT integration in teaching in ICT champion schools in Machakos Sub- County.

1.3 General Objective

To investigate influence of teacher characteristics on integration of ICT in teaching in computer champion schools in Machakos Sub- County.

1.3.1 Specific Objectives

The study was guided by the following research objectives:

- i). To establish the influence of teacher's demographic factors (age, gender and level of education) on ICT integration in teaching in ICT champion schools in Machakos sub-county.
- ii). To determine the influence of teacher's attitude on ICT integration in teaching in ICT champion schools in Machakos Sub County.
- iii). To investigate the influence of teacher's subject specialization on ICT integration in teaching in ICT champion Schools in Machakos Sub- County.

- iv). To establish influence of teacher's level of training on ICT integration in teaching in ICT champion schools in Machakos Sub - County.
- v). To establish the influence of teacher's experience in teaching on ICT integration in teaching in ICT champion schools in Machakos Sub –County.

1.4 Research Hypothesis

- Ho₁: There is no statistically significant relationship between teacher's demographic factors (age, gender and level of education) and ICT incorporation in teaching in ICT champion schools in Machakos sub-county.
- Ho₂: There is no statistically significant relationship between teacher's attitude and ICT integration in teaching in ICT champion schools in Machakos Sub – County.
- Ho₃: There is no statistically significant relationship between teacher's subject specialization and ICT integration in teaching in ICT champion schools in Machakos Sub –County.
- Ho₄: There is no statistically significant relationship between teacher's Level of training and ICT integration in teaching in ICT champion schools in Machakos Sub-County.
- Ho₅: There is no statistically significant relationship between teacher's years of teaching experience and ICT integration in teaching in ICT champion schools in Machakos Sub-County.

1.5 Significance of the Study

The outcome of this study would be essential to a number of education sector stakeholder. First; this study can be used by policymakers on the development of teacher programs to incorporate the actual utilization of ICT in teacher development program. The findings of the study would assist the ICT champion schools in

Machakos Sub- County in understanding teacher influence characteristics in the success of ICT integration in classrooms and come up with appropriate strategies to demystify the trend. Consequently the Board of Management in the same schools will utilize the findings to identify gaps in teacher development and address the situation appropriately.

The findings will also inform MOEST on how best to formulate, communicate and implement policies which would help teachers to be facilitators of knowledge in the 21st century rather than being the monopoly of knowledge and produce learners who can fit in the knowledge society. The findings will be useful to Kenya Institute of Curriculum Development in formulating and developing a curriculum that is in tandem with the recent level of digitization in education universally. The study will provide researchers and academicians with a basis upon which further studies on effectiveness of ICT integration in institutions of learning can be conducted. It will serve as a reference for researchers as they conduct studies in this and other related topics.

1.6 Limitations of Study

As Cohen, Manion and Morrison (2007) affirm, limitation is a factor that presents possible impediments to the study that might not be controlled by the researcher. The challenges likely to affect the study include: challenge in methodology since there is no sufficient or fully accepted method of research which could be used in every research, the researcher mitigated this by using methodological triangulation whereby both qualitative and quantitative methods con currently. In accessibility as the schools are far apart and some are not well served by all-weather roads and the researcher is a teacher who operates on a very busy work schedule. The researcher mitigated this challenge by engaging the service of a trained research assistant to aid in transmission and administration of questionnaires. Any difficulties of dishonest responses by respondents were dealt with by applying methodological triangulation technique. The challenge of noncooperation and non-response rate was mitigated by use of reconnaissance to acquaint with the environment and create rapport with the teachers and the principals. Random sampling for teachers in the study sample in the Sub

County was done to increase chances of reaching all respondents. The researcher assured the respondents utmost confidentiality, anonymity and sought informed consent whereby the respondents were not coerced and findings in the study were merely used for educational purposes.

1.7 Delimitations of Study

Cohen, Manion and Morrison (2007) define delimitation as the confined set by the researcher to mark the scope of the study. This study was delimited to the influence of teacher characteristics which include demographic aspects (age, gender and level of education), attitude, subject specialization, level of training and teaching experience on combination of ICT in teaching in ICT champion schools in Machakos Sub County. It was delimited to ICT champion schools only since it's the area of interest, they are the ones funded by the MOE and installed with the relevant infrastructure and content for merging of ICT in teaching exercises. The respondents were teachers and principals in the ICT champion schools owing to the fact that they had access to computers as opposed to the other public and private schools some of which did not have computers. The study was also delimited to Machakos Sub-County since it was not possible to go to the whole of Machakos County due to time and financial implications.

1.8 Assumptions of the Study

Leedy and Ormrod (2010) posited that, assumptions are so basic that, without them, the research problem itself could not exist. Therefore the study was based on the assumptions that; data collection devices (questionnaires and interview) were effectual for this particular study because they were piloted to ensure validity and reliability, respondents answered the questionnaires genuinely because their anonymity and confidentiality was preserved, all the targeted schools were on session, teachers in all the schools were ready to be involved in the study as reconnaissance was done prior to actual data collection period, they voluntarily gave the correct information and that the sample size chosen was appropriate to represent the whole target population.

1.9 Definition of Significant Terms

Attitude: refers to a predisposition to answer favourably or unfavourably to an object, person, or event. It is the way teachers think and feels about ICT combination in teaching in ICT champion schools in Machakos Sub -County.

Gender: refers to culturally and socially constructed difference between men and women. It is a range of characteristics pertaining to, and differentiating between masculinity and femininity.

ICT Integration: alludes to the use of technology in communication, data processing and storage to impart knowledge and assist in teaching and learning in ICT champion schools in Machakos Sub -County.

ICT Champion School: refers to public secondary school which received computers courtesy of CFSK through the MOE in Machakos Sub -County.

Information Communication Technology: alludes to the physical device and software that connect several computer hard ware parts and transfer data from one physical location to the other

Demographic Factors: refers to personal characteristics that are used to collect and evaluate data on people in a given population.

Subject Specialization: it's a strong subject matter background in one's teaching subjects.

Teacher Characteristics: refer to feelings, thoughts and reactions teachers develop in regard to and innovation that is relevant to their job. These teacher characteristics are veiled and deeply entrenched in day to day activities (Ertmer 2005)

Teaching Experience: refers to the teachers' knowledge or mastery of subject content gained with time through involvement in or exposure to it in ICT champion schools in Machakos Sub-County.

Teacher level of Education: refers to the professional knowledge of the teacher.

Pedagogy: it's the study or science of ways and methods of teaching.

Outcome: it's a measure of what is exhibited through an activity either verbally or nonverbally or in a written form/ knowledge and ability of functional, social and interaction norms that govern teaching.

1.10 Organization of the Study

The study was organized into six chapters; chapter one highlights the background to the study, statement of the problem, general objective of the study, specific objectives of the study, significance of the study, limitations of the study, delimitations of the study, assumptions of the study and definitions of significant terms. Chapter two deals with the literature review which is organized into sub- themes, summary of literature review, and conceptual frame work. Chapter three presents the research methodology which describe; the research design, target population, sample and sampling techniques, research instrument, validity of research and reliability of research instrument, data collection processes and data analysis methods and ethical considerations. Chapter four presents findings and presentation of research results while chapter five comprises of discussion and interpretation of research findings. Chapter six presents, conclusion and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents related literature on teacher characteristics influencing ICT incorporation in teaching of ICT champion secondary schools in Machakos Sub-County. The literature review considers the influence of teachers' demographic factors (age, gender and level of education), teacher's attitude, subject specialization, teacher degree of ICT training and teaching experience. This chapter further deals with summary of literature review, theoretical and conceptual Frameworks.

2.2 Teacher Demographic Factors and Combination of ICT in Teaching

Teacher demographics such as age, gender and level of education influence merging of ICT in teaching of curriculum for secondary schools. Most research outcomes from developed world have reported that there is much utilization of ICTs by the youth in comparison to the older generation; the older feel threatened by the new emerging technologies than the youthful generation. Makgato (2012) alludes that old teachers who are comfortable with the traditional method of teaching do not want new and innovative means of teaching. They are fixed to the face to-face teaching and teacher centered ways which provides them the sense of power and control in front of their students. Salhberg (2010) argues that senior Finnish teachers trained in ICT incorporation develop their confidence to higher levels than colleagues coming to it lately, devoid of training in ICT incorporation. UNESCO (2014) depicted that age influences teachers' endorsement and use of the new technology in teaching. Young teachers in the age bracket of 25-30 years seem to have higher interest in integrating ICT to teaching (Chemwei & Koech 2014). Lentilalu (2015) in his study on teacher factors influencing integration of ICT in teaching in Samburu North Sub- County revealed that age of teachers has considerable influence on ICT integration in teaching and learning. The age bracket of teachers mostly accessing and using computers in teaching was found to be below 30 years and was rated as 61.4% of the 62 total respondents.

World Bank (2009) defined gender as the socially built positions and socially learned behaviours and expectations of women and men in a specific community. In many parts in the world, there is continuing segregation in schools in connection to ingress to ICT and chances to use ICT productively. High school student-to-computer ratios and first come first serve policies in mixed schools don't favour female (Farrell & Wacholz, 2003). The gender digital divide was viewed as a universally emerging matter that could influence fruitful acquisition and utilization of ICT in teaching (United Nations Conference on Trade and Development [UNCTAD], 2014). According to World Summit on the Information Society (2006) serious gender divide exist which has not been given special attention. Unless it's addressed there is risk that ICT may exacerbate existing disparities among women and men due to historical injustice

Markauskaite (2006) poses that in spite of the fact that technology is expanding quite fast, access and gender differences have been connected to low degree of computer acceptance. In an assessment of its programme in four African nations, World link international established that regardless of attempts to make ICT programme gender neutral, gender inequalities in access continue in Uganda and Ghana.

In Kenya, the rate of men to women utilizing ICT according to 2001 figures stood at 70% and 30% respectively. It is also argued that the difference was partly contributed to the perception in the country that ICT was a technical subject meant for men, with many females keeping away from it. The study undertaken by Lau and Sim (2008) explored the degree of ICT integration by Malaysian secondary school teachers and revealed that extent of teachers' academic qualifications influences ICT integration in teaching.) From the study of Luhombo (2015) on Teacher factors influencing integration of ICT in teaching of English language in public secondary schools in Mumias Sub-County, it can be deduced that, age, gender, academic qualification determine the adoption of ICT for English lessons in Mumias sub-county. Clark (2000) found a considerable relationship between teachers' level of education and their attitude towards adoption of information technology. This study determines the influence of teacher demographic factors such as age, gender and level of education in

merging of ICT in teaching in ICT champion schools in Machakos Sub-county and gives recommendations.

2.3 Teacher's Attitude and Merging of ICT in Teaching

Ajzen and Fishbein (1980) described attitude as a predisposition to respond favorably or unfavorably to an object, person, or event. A study by Rastogi and Malhorta (2013) in India illustrates that the success of executing the new curriculum with ICT in education relies highly upon the attitudes of the teachers and their readiness to adopt such technology. Sang, et al. (2010) from his study in China concerning teacher influence characteristic on merging of ICT in teaching, emphasized the sizeable connection between computer-related attitudes and computer use in education. That being the case, teachers should be equipped with both ICT knowledge and skills and also develop and imbibe right attitudes towards integration of ICT in teaching (Kurga, 2014).

Huang and Liaw (2005) studied attitudes toward computers and found that attitude influences teachers' acceptance of the usefulness of technology, and again influences whether teachers merge ICT into their classroom or not. Mumtaz (2000) contends that schools can't go far to promote educational technology use without consideration of teachers' attitudes. Albirini (2006) has also suggested that it is crucial to understand the attitudes of the teachers towards ICT since it is only then that it will be possible to encourage them to integrate ICT into their teaching. In a related study, Teo (2008) carried out a survey on pre-service teachers' attitudes towards computer utilization in Singapore. A sample of 139 pre-service teachers was evaluated for their computer attitudes using questionnaire with four factors: affect (liking), seen usefulness, viewed control, and behavioral urge to use the computer. The researcher established that teachers had a positive attitude towards computers and intention to use computer than their views on the importance of the computer and their control of the computer.

Also, Drent and Meelissen (2008) undertook a study about factors which influence the innovative use of ICT by teacher educators in the Netherlands. A sample of population of 210 teachers was used for the study. Their study showed that student-

oriented pedagogical method, positive attitude towards computers, computer experience, and personal entrepreneurship of the teacher educator have a direct positive influence on the innovative use of ICT by the teacher. Higgins and Moseley (2011) observed that teachers who use ICT in classes contend that its useful for personal work and for teaching and were ready to continue using it because of its usefulness. Edward (2015) in her study on Principals features influencing incorporation of ICT in the management of secondary schools in Makueni County posited that principals' attitude towards the use of ICT influences the combination of ICT in school management. Attitude of teachers towards ICT integration in teaching of whole curriculum in Machakos Sub –County has been determined by the study.

2.4 Subject specialization and Integration of ICT

ICT emerging in teaching is driven by epistemological differences that are inherent to specific subject areas or by the instructional material (Wood & Floden, 1990). Hennesy *et al.* (2010) argued on existence of correlation between teaching subject and ICT amalgamation in teaching. The researcher consequently posits that there is a close connection between ICT use and mathematics subject. Sang (2010) discovered that teachers' ICT adoption is determined by compatibility to a particular subject or the perceived usefulness as theorized by TAM model (Davis, Bagozzi & Warshaw, 1989).

Andrews (2000), claims that in some subjects like English there is little compatibility because of the sub-aversive, humanities specialty, liberal and book dominated culture which is undisputable a factor in the resistance for teachers of English to new technology. Estling and Maria (2009), posits that teachers of English in Sweden haven't changed their teaching much since ICT emerged in the arena. They only use computer to search the electronic dictionaries, trace facts and use word processing programs (Drent & Meelissen 2008). The study also depicts that less teachers use the computers to communicate with other areas of the world in English language. Selwyn (2007) state that traditionally computers were the domain of mathematics, science and technology departments.

The researcher further elaborates that computer is more congruent with some subject histories and more amalgamated into their exercise than others, that's some subjects have an aspect of ownership for it while others are unfamiliar and suspicious to it. Most studies have been carried out in the developed countries about the influence of subject specialization on ICT integration but very little on regional and local level for that matter the researcher strives to establish the influence of subject specialization on integration of ICT in teaching in ICT champion Schools in Machakos Sub-County Schools.

2.5 Teacher's Level of ICT Training and Integration of ICT in Teaching

Jimoyiannis and Komis (2007, nations such as China, Australia, UK, Singapore have started programs geared towards improving teachers' skills in embracing the utilization of ICT in teaching and learning exercise. In most African nations, deficiency of proper trained teachers and low degree in ICT skills and knowledge in teachers has posed as prominent hindrance in execution of ICT in schools (Dzidonu, 2010). For successful enactment of ICT in schools, there must be sufficient personnel to have the required skills. In a situation whereby these skills are absent, it will be impossible to comprehensive execute this technology in schools. Edward (2015) whose research is on principals facets influencing incorporation of ICT in the management of schools in the county of Makueni discovered that majority of the principals with positive and negative attitude 92 percent had not integrated ICT in preparation of school timetable due to lack of skills to prepare timetable using the computer.

In India, the use of ICTs is restricted due to few numbers of adopters especially within female teachers. A research by OECD (2014) showed only 19% of teachers got training in ICT, whilst 18% could use and access ICT in their individual and professional capacity. This depicts quite a small population of teachers have ICT skills and the ability to ingress ICT software exercises based on appropriate application software (Rastogi et al., 2013). The global campaign for education (2012) cited the shortage of women teachers being able to access and utilizes these new

technologies in classes and was aggravated by the bottleneck of insufficient female teachers training.

In developing countries, ICT in education seems to have been embraced by policy-makers in such a hasty adoption, a scenario which ignored building teacher's skills and perception toward ICT combination. The relevant literature points at the importance in studies apart from the one's on teacher's measure in ICT skills and their perceived attitude upon ICT, and even on the factors accountable that made teacher uptake of ICT integration very slow. Kenya is presently experiencing a revolution in the sector of ICT, which is focused to transform the mean in which schools transact their activities. The national ICT policy for education and training is meant at integrating methods, and to utilize it to boost and facilitate educational revamping (MOE, 2008). There is no doubt that this innovative change is inevitable and it has to start in education sector where the teacher plays a crucial role.

The government has come up with platforms of ICT in secondary and primary schools, and also in tertiary institutions, so as to construct an ICT-literate society. ICT has been combined in training of teachers and regulation hinderances to endorsement of ICT anticipated in the Kenya vision 2030. Attempt to enact ICT in schools was initially initiated by issuance of session paper no 1 of 2005 that gave emphasis to public secondary schools, and also combine it to the current school curriculum to counter the challenges of information society. This publication remarked that each school: teachers, students and the community in the vicinity should be involved in acquisition of appropriate ICT skills to gain from knowledge-based economy. Teaching and learning was meant to be modified to accommodate ICT skills perfect for this 21st century (GoK, 2005). There is no single teacher who can afford to live in isolation all are expected to embrace the innovation so as to be in tandem with the dynamic society.

Notwithstanding the significance and strategies formulated by the Kenyan government to enact ICT in schools, research carried out in majority of schools in the country have ascertained that majority of teachers are not successfully embracing the use of ICT to sustain learning, teaching and management as was meant Manduku,

Kosgey and Sang(2012);and Laaria (2013) conveyed that although endeavours have been put in place by various stakeholders and significance in education industry on ICT platform, Kenya national ICT policy of 2006 on education has been fruitfully enacted as per the aspiration. Most nations recorded above 41% endorsement of ICT in learning and teaching in secondary schools that are public. (Sang, 2010), the ratio remains substantially low in Kenya. This might be due to the strategy used by the government didn't consider teachers' attitudes, competencies, specialization in subjects, demographic features and reactions perceived on these new instruments.

UNESCO (2010) conforms that capacity development in curriculum execution has been and still continues to pose a great obstacle in the education sector. There are no frequent arranged in-service and induction exercises to continuing accelerating the teachers capacity in integration and enactment of the curriculum successful. Hence, it was recorded that there was disorganized coordination for the in-service programs offered by the various players. Minimum attempt has been put in place to provide teachers with skills in their respective subject specialization to incorporate ICT into learning and teaching (Otieno, 2003). It is contrary to this notion that the researcher established the statistical association among teacher extent of training and combination of ICT to teaching in Machakos Sub-County.

2.6 Teaching Experience and Integration of ICT in Teaching

Baek, Jong and Kim (2008) noted that experienced teachers are likely to be willing to merge ICT in their lessons. Equally, in United States, the (United States National Centre for Statistics, 2000) cited that teachers having limited experience in the profession were mostly able to combine computers in their lessons than those more experienced. It was also expansive from the same centre that, those teachers who are three years old in the profession reportedly spent 48% of their time using computers, while the ones with 4 to 9 years, consumed 45% of their available time on computers, for those with experience ranging between 10-19 years utilized 47% of their time, and eventually those with over 20 years used 33% of their time on computers. The cause of this difference might be that youthful teachers have high experience in the use of modern technology.

Subsequently in a survey undertaken for at least 300 teachers, Russell, O'Dwyer, Bebell and Tao (2007) alludes that the ICT quality of incorporation is linked to teachers' years of service. Equally, Granger, Morbey, Lotherington, Owston and Wideman (2002) undertook a qualitative survey on causes leading to teacher's productive execution of ICT in Canada. They interviewed 60 participants from 12 different schools. The outcome established no connection between the teaching experience of teachers and the experience of ICT application. ICT competencies and a fruitful execution is complicated and not distinct of ICT merger.

Information from National Centre for Education Statistics (2013), shows that teachers who have lesser period of experience are most probable able to utilize computers in their lessons than those teachers with many years of experience. This might be an assumption that its due to the reason that new teachers that are exposed to computers in their cause of training, and consequently possess reasonable experience in utilizing the instrument. Deen-Swarray Gillwald, and Morrell (2012) stated that teachers with extensive teaching experience were aged and therefore demonstrated a low self-esteem in combining of ICT tools in classroom activities.

The Kenyan National ICT Master Plan 2013/14 – 2017/18 stated that the professional development outcomes after about three years of experience are not homogeneous and recommended for it to be done continuously. An experience in teaching plays a critical role for effective integration of ICT in curriculum delivery. The adoption and application of ICT in teaching and learning is easily influenced by a period of time in which the teacher served in teaching. The teachers who served in teaching profession for long period tend to have no interest in ICT (Mulwa & Kimosop, 2015) as cited in Dix (2007) found that teachers with much computer experience had higher confidence in their capability to use computers successfully.

Lentilalu (2015) studied on the factors influencing teachers incorporation of ICT in Samburu North Sub County found that, work experience of teachers in teaching profession had some influence in embracing and utilization of ICT implements in preparation of lessons. The findings thus indicated that majority (59.1%) of the respondents had acquired ICT skills during pre-service teacher education

programmes. Those teachers who have been in the teaching profession for less than 10 years exhibited great interest in the use of instructional technology. Subsequently, teachers with many years in teaching profession showed negligible concern in the use of technology in classroom lessons. The study consequently established the statistical influence of teacher experience on ICT incorporation in teaching in ICT champion schools in Machakos Sub –County.

2.7 Summary of Literature Review

The variables are interconnected and therefore the success or the failure of the execution of ICT in teaching and learning doesn't rely on one factor but it is a system that encompasses a set of interlinked factors (Tedla, 2012). On ages of teachers, literature reviewed agrees with a study carried out by Lentilalu (2015) on factors influencing ICT incorporation for teachers in Samburu North Sub- County; Chemwei et al (2014) on evaluation of ICT integration in instruction methods in teacher colleges and universities in Kenya. The findings have shown that youthful teachers who are less than 30 years manifested great self-efficacy and enthusiasm in the use of new emerging technologies in teaching and learning unlike older generation teachers who don't use computers in day to day learning and teaching. This study reveals the status in Machakos Sub –County.

The gender of teachers was established as a determinant factor in ICT incorporation in teaching. The literature reviewed is consistent with ICT Policy Making in East Africa (2005) which indicated that a small number of female teachers pursue ICT courses. This study also agrees with Omollo, Indoshi and Ayere (2013) who found that female teachers fail to use computers for their daily, private and professional activities. Emanating from the study its deduced that female teachers barely access and deploy ICT tools to prepare the presentation of their lessons. Even though most productive initiatives gaps remain with concern to demographic factors according to the literature revealed. This literature will be done to reveal the status in Machakos Sub –County.

Reviewed literature has revealed that fruitful use of computers is reliant on the teachers' intentions, personal beliefs and attitude towards teaching with technology

and ICT use (Divaharan & Ping, 2010; Ozden, 2007). Teachers’ attitudes towards technology highly influence their acceptance of the usefulness of technology and its combination in teaching. Rastogi *et al* (2013) established that trained teacher’s exhibited competency in application of technology in teaching. The outcomes indicated that teachers with ICT skills in computer applications were capable to develop lesson notes and present in classroom with great technological competency and confidence. This concurs with the study of Edward (2015). A study by Luhombo (2015) concluded that research has not been conducted to establish teacher characteristics influencing the incorporation of ICT in teaching of ICT champion schools in Machakos Sub- County. It is against this assertion that the researcher revealed the influence of teacher characteristics on combination of ICT in teaching in Machakos Sub-County.

2.8 Theoretical Framework

This study was mounted on the theory of Technological Acceptance Model by (Davis, Bagozzi & Warshaw 1989). It looks at the way different variables are placed and interconnected.

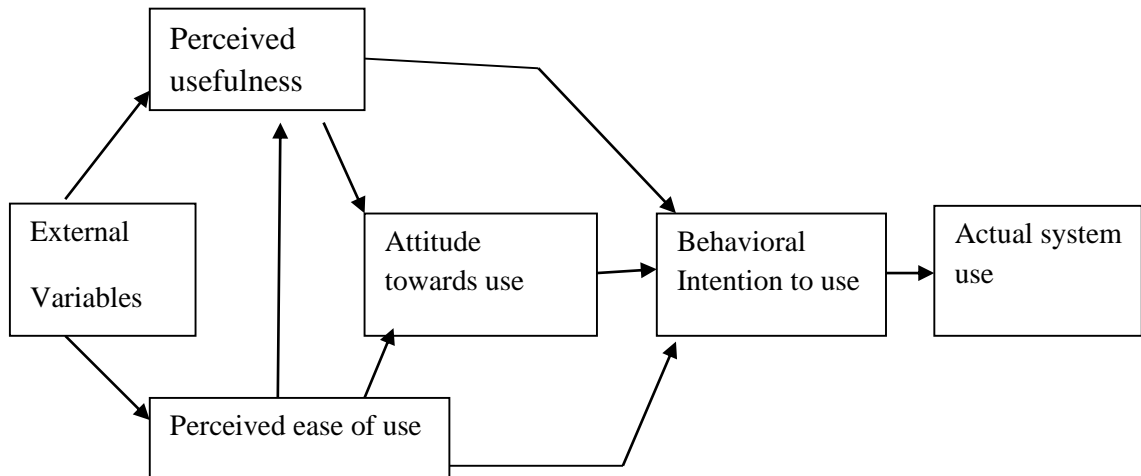


Figure 2. 1: Technology Acceptance Model

(Source: Davis, Bagozzi & Warshaw, 1989)

The research was guided by Technology Acceptance Model (TAM). The model was designed by Davis in 1989 and is based on factors influencing user adoption and acceptance of technology. The model proposes that when users are presented with a new technology, there are two factors that influence their decision about how and

when they will use it. Such factors are; Perceived usefulness and perceived simplicity of use. Perceived usefulness which alludes to the level to which a person believes that using a specific method would improve his/her job performance. Perceived ease of use, refers to the extent to which a person believes that utilizing a particular system would be free from endeavour, (Davis, 1989). Teachers form attitudes and intentions towards attempting to use new technology before to directing any effort to using it.

This theory was adopted because the study involved individual characteristics influencing the integration of ICT. It was also used because the target population in this particular study has been presented with computers hence the decision to either use or not use is entirely reliant on the teacher. The integration depended on the perceived importance and ease of use of the modern technology. Following this theory the researcher considered teachers and principals as key people who establish the rate of ICT merging in schools depending on whether they deem the use of ICT as useful or easy to use in teaching. The theory explains the behavior of individuals towards the use of new technology. Critics of TAM claim that the model does not focus on learning tasks. Absence of task focus in TAM framework has resulted to mixed findings because information communication technology is task oriented (Dishaw & Strong 1999).

2.9 Conceptual Framework

Mugenda and Mugenda (2003) Conceptual frame work refers to hypothesized model classifying the variables under investigation and their relationship.

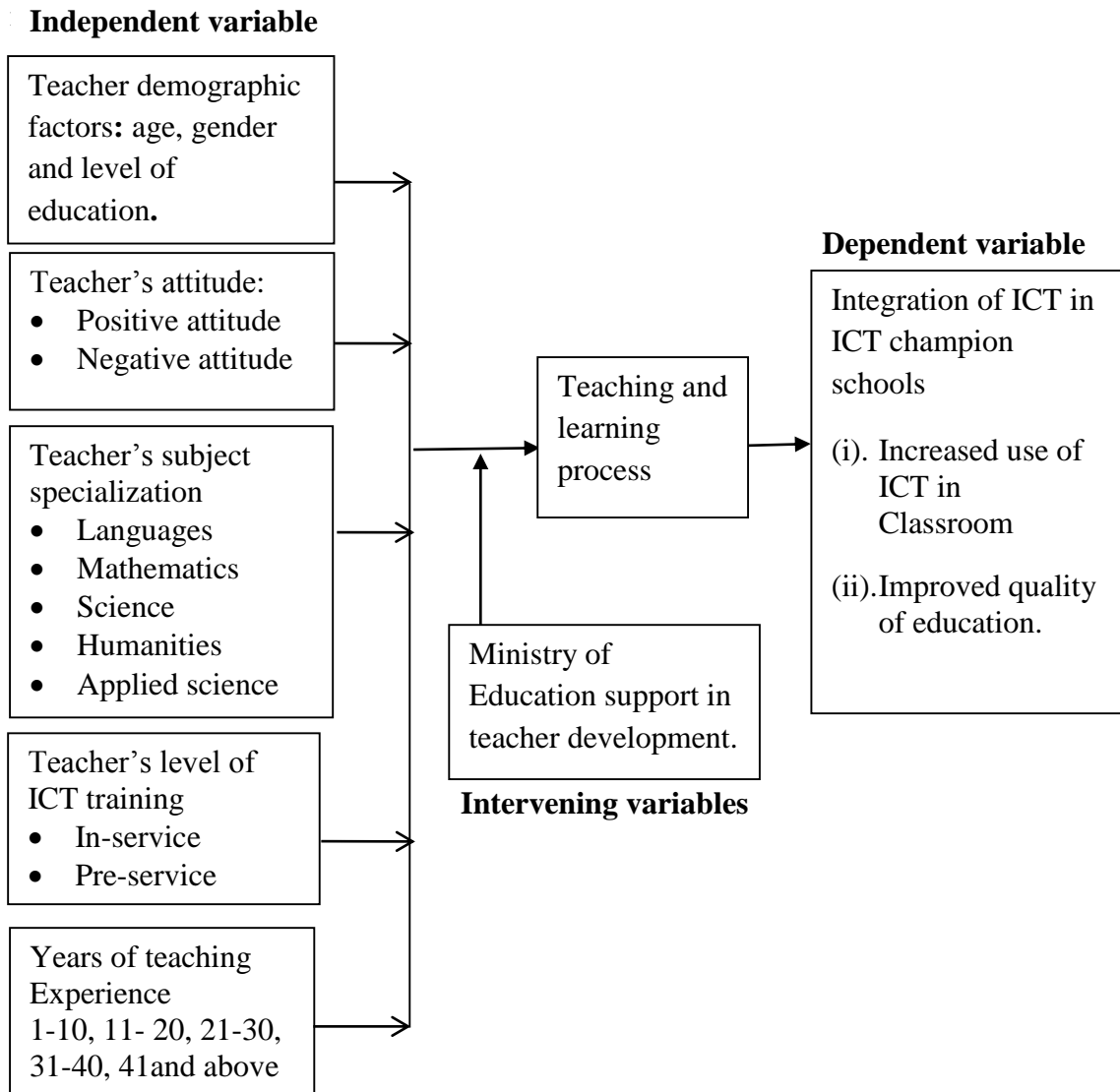


Figure 2.2: Conceptual Framework of the Study

Figure 2.2 displays variables involved in the study including teachers' demographic factors (age, gender and level of education) teacher attitude, subject specialization, teacher level of training and teacher years of teaching experience towards deemed gains and use of ICT amalgamation in pedagogy. The dependent variable is variable

influenced by the independent variables. In this instant, the conceptual framework for this study strives to sketch a roadmap of influence of teacher characteristics through transformation of attitude or intention to use to real adoption and use of technology combined in classes exercises (Davis, 1993). The results comprise increase in the population of teachers merging ICT in teaching and good quality of education which is in tandem with the societal needs of 21st century.

The intervening variable could indirectly influence ICT combination in classrooms. This: refers to the Ministry of Education and all stakeholders aimed at enabling the teacher to adopt technology and eventually contribute to knowledge society which will be absorbed in the job market and lead to industrial growth. Intervention strategies have to be done to ensure training in integration of ICT is put in place to demystify the impeding variables.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter consists of research methodology, it specifically presents research design, target population, sampling techniques and sample size, research instruments, validity of research instruments, reliability of research tools, data collection procedures, data analysis techniques and ethical considerations.

3.2 Research Design

Kombo and Tromp (2006) a research design can be considered as an arrangement of conditions of collection and analysis of data in a way that aims to merge relevance with research goal. This study used mixed methods research design which requires collecting, analyzing and merging quantitative data like surveys and qualitative data like interviews. The choice of mixed methods research design was necessitated by the fact that multiple ways are used to explore a research problem. It supplies energy that offsets the weaknesses of both the quantitative and qualitative research. The ability of each can complement for the weaknesses of the other (John & Onwuegbuzie, 2004). Creswell, Plano and Clark (2006), explanatory sequential approach suited this design in which the collection and analysis of quantitative data was proceeded the collection and analysis of qualitative data. It also provides an approach for developing better, context specific instrument. Helps to explain the findings prudently and validate them.

Preference was awarded to quantitative data, because quantitative data collection was done initially and represented the prominent feature of the study, while qualitative element followed in the second stage of the study (Ivankova et al., 2006) and the findings were amalgamation during the execution level of study.

3.3 Target Population

Mugenda and Mugenda (2012) asserts that target population is a full set of individual cases or items with some common features to which the researcher intends to generalize the outcomes of the study, it's the fabric that holds the whole study

together. This study targeted ten ICT champion schools in Machakos Sub –County, their principals and teachers. Documentary evidence from Machakos County Education Office, Statistics section, 2015 indicate that, there are 305secondary school teachers and principals drawn from the ten ICT chamion schools. This includes principals and teachers in these schools.Head teachers are very important since they are the policy makers in school. Teachers are the enactors of the curriculum and hence perform a crucial part in determining how and when to teach the curriculum. The researcher gathered data from the teachers and principals who were used in establishing the factors which influence the application of ICTs in teaching activity. Table 3.1 shows the target population

Table 3.1 : Population Frame

Category	Population
Principals	10
Teachers	295
Total	305

3.4 Sampling Techniques and Sample Size

According to Mugenda and Mugenda (2003), sampling is the procedure of choosing a manageable population of individuals with potential to represent the large segment of individuals from which they were selected. Ten schools in Machakos Sub- County have an excellent and efficient ICT department; they are the ICT champion schools owing to the fact that they were given computers by Computer for Schools, Kenya, courtesy of the MOE. The schools were selected purposefully. Nine ICT champion Schools participated in the study. The tenth school did not participate in the actual survey as it was used for piloting. The nine principals were purposefully selected from the nine schools due of the pivotal task they perform in curriculum implementation. The researcher used Yamene (2000) formula to get the study sample of teachers

because it would have been very costly and time consuming to deal with the whole population.

$$n = \frac{N}{1 + N(\epsilon)^2}$$

Whereby n = Sample size

N= Target population

e =the level of precision (sample error) where confidence level

is 95% (P) is 5% (0.005)

According to Yamene (2000) a population of 271 teachers gave rise to a sample of 163 which was proportionately allocated to all schools and percentages computed. A predetermined number of teachers from each school were chosen randomly. To attain the commensurate sample in every school, the researcher adopted the formula shown as follows;

$$\text{Sample} = n/N \times 163$$

Whereby n is the entire number of teachers in every school.

N is the total population of teachers in the ICT champion schools in Machakos Sub-County. The acceptable allotment of the sample size was tagged on the school population of (Refer table 3.2).

Table 3.2: Sampling Frame

School	No. of Teachers	Teacher Sample	%
Machakos Girls	42	25	59.523
Machakos School	66	39	59.090
Mumbuni Girls	30	18	60.000
Kitonyini Secondary	21	13	61.904
Mbuani Secondary	16	10	62.500
Muindi Mbingu	33	20	60.606
Nyayo Girls	23	14	60.869
Muvuti Secondary	19	11	57.894
Kyangala Secondary	21	13	61.904
Total	271	163	

Source: Machakos Sub-County Department of Statistics (2015)

Table 3.1 shows the ICT champion schools and their total teacher population. Machakos Sub-County has ten ICT champion schools whose population is 305; 10 principals and 295 teachers. However, this study used a sample of 9 ICT champion schools as the tenth school was used for piloting purpose. That means 9 principals and 163 teachers. From the target population of 271 teachers, a sample from each school indicated a total of 163.

3.5 Research Instruments

The data collection instruments which were used in the study are designed and formulated by the researcher. Questionnaires for teachers and interview guide for principals were used for this study. Questionnaires are a collection of elements to which a respondent is supposed to respond in writing. Semi structured questionnaires were used; they were structured in such a manner that the respondents could be able to respond to the questions in totality aided for meeting the aims of research. The teachers' questionnaire was divided into five parts based on this study objectives namely: teacher demographic factors (age, gender and teacher level of qualification) in section one, teacher attitude in section two, teacher's subject specialization in

section three, teacher level of ICT training and teacher teaching experience in years as the last section. The components were rated on a 5-point Likert scale. Questionnaires were preferred because they raise insights into respondent perceptions and are simple to formulate. They are easy to standardize as every respondent is asked the same question in the same way and that enhances reliability. They are also easier to be completed by respondents. They can be used to gather information from most respondents at the same time without involving the researcher in so much movement from one respondent to the other (Borg, 1998).

This study used interview guide as a means of gathering qualitative data whereby face to face interviews with the 9 principals were organized. Structured and semi-structured interview questions were utilized. The essence of using interviews was that they are convenient to handle because the questions are predetermined by the researcher. They also allow a sizeable information to be gathered in a short period of time. Interviews also aid ascertaining clarity by probing. The questions which were posed were confidential to the researcher and the respondents only. All respondents were assured of anonymity which dispelled any fear of victimization. Kombo and Tromp (2007) argue that structured interviews have a high reliability and give in-depth information about particular cases of interest.

According to (Guba & Lincoln, 1985) Credibility, dependability, confirmability and transferability in qualitative data were assured through use of a framework to ensure trustworthiness whereby the researcher used structured interview guide to warrant audit trail. During the interview the principals were asked questions to clarify pertinent issues concerning the manner in which teachers filled some responses in the questionnaires. Triangulation of information from several sources (survey and interview data) was used and priority in analysis was given to quantitative data but validated through use of qualitative data and decision was made based on both sources of data.

3.6 Validity of the Instruments

Frankel, Norman and Hyun (2012) define validity as the quality that an activity or apparatus or appliance utilized in research is accurate, correct, true and sensible. It is

the degree to which a tool weighs what it intends to. It deals with the accuracy of data collected for the study represents the variables of the study. The research tool was piloted by distributing questionnaires to 10% of the sample to teachers from one of the ICT champion schools which was exempted from the actual survey. The results were a valuable input especially on content validity and ensured that the tool was in accordance with the aims it was tailored to measure (Kothari, 2004). Grammatical errors were rectified to eliminate ambiguity in statements. The content validity of the items in the questionnaire was validated by consulting the supervisors of this study in the South Eastern Kenya University. Qualitative data was validated by comparing with other researchers who have done similar study. This enabled the researcher to obtain professional recommendations and modification of the research instruments (Kimberlin & Winterstein, 2008)

3.7 Reliability of Research Instruments

Reliability estimates the level to which a research tool produces consistent outcomes after repeated tests (Frankel et al, 2012). In the study reliability was determined through triangulation whereby both questionnaires and interview guide were used as there is no single research method which is sufficient when used alone. Test retest method which was administered to fifteen of the target population from one ICT champion school which did not participate in the study was also done (Mugenda et al 2003). This yielded twenty four (24) teachers who were randomly selected. Questionnaires were administered to the respondents and then repeated after 14 days. A Pearson's Product Moment formula for the two tests was employed to calculate the correlation coefficient in order to ascertain consistency in eliciting the same answers every time the tool was used. A correlation coefficient of 0.8 which is considered high enough to judge the instrument as dependable for the study was obtained through use of the following formula.

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

The researcher's conclusion was that the research instruments were reliable.

3.8 Data Collecting Procedures

The researcher administered the questionnaires to the respondents (teachers) with the date and time for collection of filled questionnaires agreed upon in liaison with the respondents. For the case of interview the researcher booked an appointment with each respondent (principal). The usage of interview guides assured both the researcher and the respondent were on course. The researcher probed the respondent to answer pertinent issues concerning teachers. Prolonged engagement was also done to establish trustworthiness.

3.9 Data Analysis Techniques

Data analysis involves processing raw facts, figures and numerals into meaningful information by sorting, coding, cleaning, processing and interpreting data (Cohen, Manion & Marrison, 2007). The collected data was summarized, coded, edited, and then the information synthesized to reveal the outcome of the data. Quantitative data gathered by use of semi structured questionnaire elements was sorted and exhibited by use of descriptive statistics in form of percentages, tables and charts (Creswell, 2003) and chi-square statistical analysis were used establish the influence of the independent variables on the dependent variable.

The quantitative data was categorized and organized in accordance to the aims of the study for analysis by use of Statistical Package for Social Sciences (SPSS) version 20. Then data entry was executed which included sorting, encoding and interpretation with the purpose to the aims of the study as organized in the questionnaire. Qualitative data collected from the interview guide was organized into themes, pertinent to the study. It was presented through narration. Integration was done whereby the data was merged during data analysis and interpretation of the findings (Tashakkori & Teddlie, 1998). The researcher integrated the quantitative and qualitative stages when formulating research questions for the qualitative measure, when developing interview protocols, when probing the respondents to clarify their answers, when presenting the qualitative data descriptively and when interpreting the findings (Creswell, 2003)

3.10 Ethical Considerations

Mugenda and Mugenda (2003) defines ethics as that branch of philosophy which deals with one's conduct and serves as a guide to one's behavior. It also refers to something being morally correct or acceptable (The Oxford Advanced Learner's Dictionary 8th Edition). The researcher was obligated to ensure the ethical considerations were followed. Each respondent in the study was informed in advance on the purpose of the research so as to secure informed consent and subsequently prepare for the interview. There was no incentive or pressure to entice respondents to take part in the study. Anonymity and confidentiality were assured before participation. The researcher disregarded any information which could disclose the identity of the participants. Debriefing was eventually done to enliven the good will of the respondents.

CHAPTER FOUR

RESEARCH RESULTS

4.1 Introduction

This chapter comprises the findings and presentations of the study outcomes on “Influence of teacher characteristics on incorporation of information communication and technology in Machakos Sub-County ICT Champion schools”. The study investigated the influence of teacher’s demographic factors (age, gender and extent of education) on ICT integration in teaching, influence of teacher’s attitude on ICT merger in teaching, influence of teacher’s subject specialization on ICT merger in teaching, influence of teacher’s amount of training on ICT combination in teaching, and influence of teacher’s years of teaching experience on ICT integration in teaching in ICT champion schools.

4.2 Instrument Return Rate

Return rate entails the percentage of the subjects who responded to the information gathering apparatus as administered. The study had 163 respondents were sampled to represent a target population of 271 teachers. 9 principals were to represent 10 principals. All the questionnaires and interview schedules were administered as proposed in the study. Of these, 124 questionnaires were returned and eight (8) interviews were conducted. The principals’ return was 89% while that of teachers was 76%.

Table 4.2 gives the actual number of respondents who were involved in the study as compared to the expected sample for both teachers and principals.

Table 4.2: Response Rate

Respondent	Number Targeted	Number Responded	Response rate (%)
Teachers	163	124	76
Principals	9	8	89

From Table 4.2, out of the 163 teachers sampled, 124 (76%) of the respondents participated in the study and out of the nine principals sampled eight participated which is 89%. According to Mugenda and Mugenda (2003) and Hartman and Helborne (1979), 50% response rate is ideal, 60% is reasonable and 70% and above is commendable. Teachers' response rate and principals was construed as perfect which was 76% and 89% respectively.

4.3 General Demographic Characteristics of Respondents

This study meant to ascertain the demographic characteristics of respondent with the aim of establishing the general background of the respondents that participated in the study. The areas that are to be discussed include gender, age, highest academic qualification, years of experience and respondents teaching subjects.

4.3.1 Teacher Respondents by Age

The study strived to estimate the age bracket of the teachers in secondary schools. From the study, it was established out that many of the teachers in secondary school were between 20-30 years (48%) followed by 31-40 years (31%). These two groups constituted the bulk (79%) of teaching personnel in the educational institutions with the remaining two groups aged above 41years constituting 21%. Figure 4.3.1 summarizes the distribution of respondents by age.

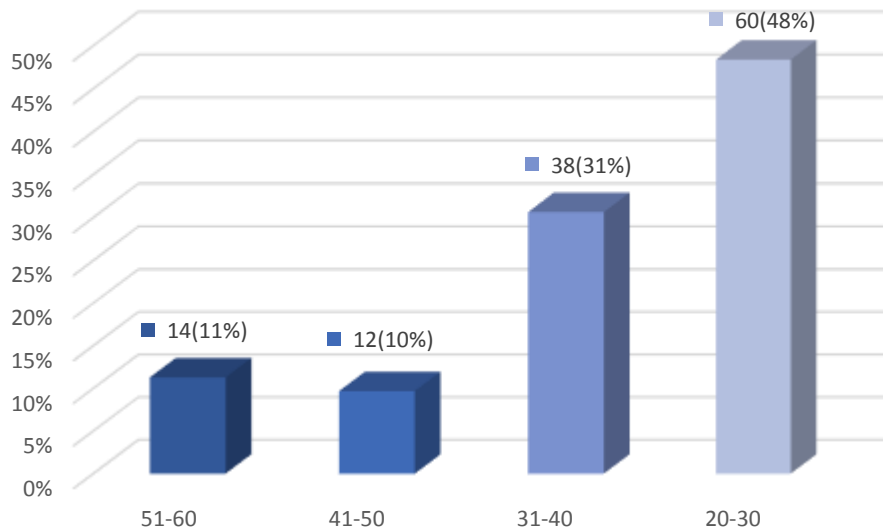


Figure 4.3.1: Teacher Respondents by Age 20-60

The age of a teacher is a pointer to the degree of his\ her participation in teaching activities. The findings show that a large number of teachers were in their active age in teaching profession (20-40 years) alluding to ease of combining ICT in teaching. This information helped researcher to ascertain the extent of participation in merger of ICT in teaching.

4.3.2 Teacher Respondents by Gender

Out of the 124 teachers interviewed, 63 which represent 51% were male and 61 which represent 49% were female as shown in the figure 4.3.2 from the study, it was revealed that there were no large variations in the composition of teacher by gender.

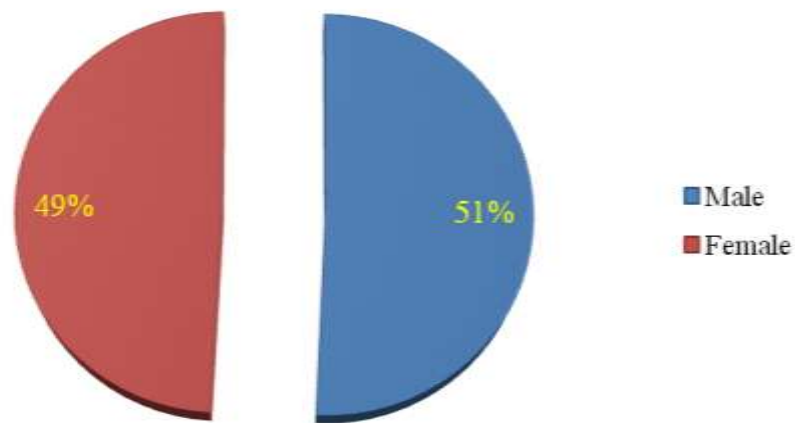


Figure 4.3.2: Teacher Respondents by Gender

4.3.3 Teacher Respondents by Highest Academic Qualifications

From the study results 73% of the teachers had a degree in Bachelor of Education which is a norm not an exception in the teaching profession while 11% had a degree in Master of Education as their highest qualification. The findings reveal that the majority of the teaching personnel constituting 84% had the minimum professional qualification for secondary school teaching. 13% of respondents had a diploma, 2% had other qualifications which included Master of Business Administration and Master in Journalism while only 1% of respondents had a BA/BSC with PGDE as highest academic qualification. Figure 4.3.3 shows the findings.

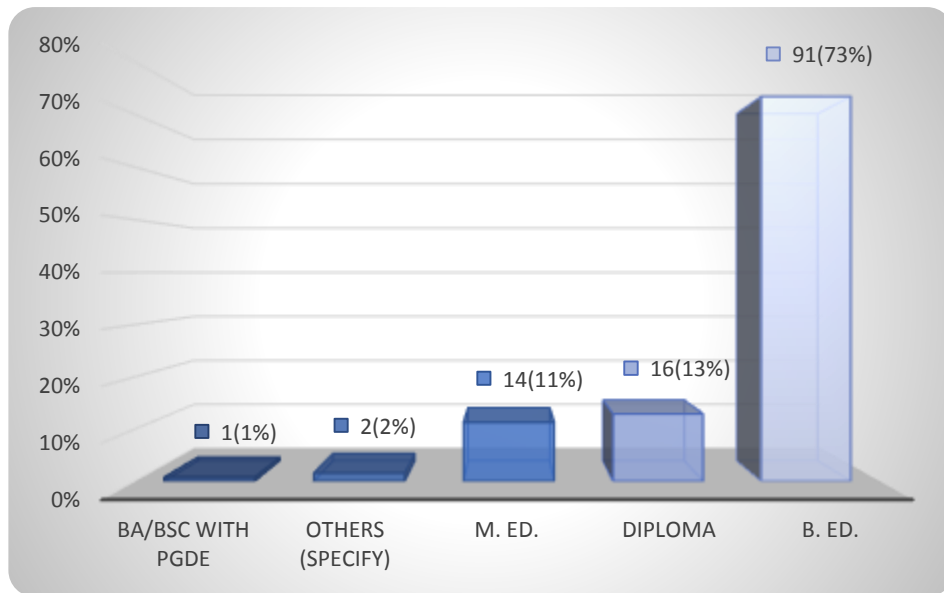


Figure 4.3.3: Respondents by Highest Academic Qualification

From these findings most of the teachers had acquired academic qualification thought of very highly and could therefore understand and integrate ICT in their work.

4.4 Teacher Extent of Education and ICT Integration

This research investigated the relationship between level in education and knowledge (expertise) of teachers on ICT integration in classroom. The status of teachers on ICT integration is shown in Table 4.4.

Table 4.4: Teacher Level of Expertise

Teacher Status	Frequencies	Percentage
Unfamiliar	2	1.6
Newcomer	13	10.5
Beginner	29	23.4
Average	39	31.5
Advanced	28	22.6
Expert	13	10.5
Total	124	100.0

The study shows that 31.5% of teachers were at an average level, 23.4% beginners' level 22.6% were at an advanced level while 10.5% of teachers were each at the expert level and newcomers level respectively.

4.5 Demographic Factors and Merger of ICT in Teaching

The initial aim of this study was to ascertain the influence of teachers' demographic factors (age, gender and extent of education) in combining ICT for teaching ICT champion schools. The respondents were requested to indicate their age and level of ICT integration in teaching. To achieve this objective a cross tabulation of age and amalgamating ICT by teachers was carried out and analyses were displayed in Table 4.5.1.

Table 4.5.1: Age and Integration of ICT as Reported by Teachers

	Level of ICT Integration						Total
	Unfamiliar	Newcomer	Beginner	Average	Advanced	Expert	
51-60	1	4	4	5	0	0	14
	7.1%	28.6%	28.6%	35.7%	0.0%	0.0%	100%
41-50	0	0	7	3	2	0	12
	0.0%	0.0%	58.3%	25.0%	16.7%	0.0%	100%
31-40	1	7	8	12	8	2	38
	2.6%	18.4%	21.1%	31.6%	21.1%	5.3%	100%
20-30	0	2	10	19	18	11	60
Totals	0.0%	3.3%	16.7%	31.7%	30.0%	18.3%	100%

From table 4.5, out of 124 respondents, in the 51-60 years age category, 1(7.1%) was unfamiliar with ICT integration 4(28.6%) in each category were beginners and newcomers in integrating ICT in teaching while newcomers; there was no teacher in the age bracket who was at an advanced and expert level.

In the 41-50 years age category, majority 7(58.5%) were at beginners' measure of merging of ICT in teaching while 3(25.0%) and 2(16.7%) were average and at an advanced extent in ICT merger in teaching. However, there was no teacher who was at an expert extent in teaching ICT combined components.

In the age category of 31-40 years, the distribution across the level of integration showed that majority were average 12(31.6%) compared to those at beginners and advanced levels who were 8(21.1%) in each level of ICT integration. Only 2 (5.3%) teachers in this category were at an expert level. Further, the study reveals that teachers of the ages 20-30years formed large proportion of those who were at least at an average level 19(31.7%), advanced level 18(30.0%) expert level 11(18.3%) for

teaching ICT incorporated aspects. None of the teachers in this age category was unfamiliar with integrating ICT. The study sought to exam the statistical importance of these observations using a chi square test and findings are shown in Table 4.5.2.

Table 4.5.2: Chi-Square Tests between Ages

Chi-Square Tests			
	Value	Df	Asymp. Sig(2-Sided)
Pearson chi-square	34.901 ^a	15	.003
Likelihood Ratio	38.904	15	.001
Linear-by-Linear Association	21.305	1	.000
No of valid cases	124		

a. 5 cells (16.7%) have expected count less than 5. The minimum expected count is .19.

From table 4.5.2, the chi square test of dependence of age in relation to integration of ICT had a significance of .003 compared to the $p = 0.05$. Considering that the significance was a value less than 0.05, it means that at 5% level of significance integration of ICT was dependent on age of the teachers with young teachers being more likely to adopt ICT. Hence the null hypothesis that, there isn't statistically importance relationship between teacher's age and ICT integration was rejected and the alternative hypothesis taken, meaning that there is statistically significant relationship among teacher's age and ICT integration in teaching in ICT champion.

4.5.1 Age and Integration of ICT as Reported by Principals

This was the first objective whereby age was one of the demographic factors.

Data collected from the principals indicated that young teachers form the greatest population of teachers who integrate ICT in teaching as compared to long serving ones.

4.5.2. Gender and Integration of ICT as Reported by Teachers

This was also part of the first objective whereby gender was the second demographic factor. The respondents were urged to reveal their gender and level of competence in ICT integration in teaching. To achieve this objective, gender influence of teachers in merge of ICT was analyzed and the findings captured. The table below shows gender verses different levels of competence in integration of ICT for teaching.

Table 4.5.3: Gender and Integration of ICT

	Level of ICT Integration						Total
	Unfamiliar	Newcomer	Beginner	Average	Advanced	Expert	
Males	1	6	9	20	17	10	63
	1.6%	9.5%	14.3%	31.7%	27.0%	15.9%	100%
Females	2	7	20	19	11	2	61
	3.3%	11.5%	32.8%	31.1%	18.0%	3.3%	100%
	0.8%	10.7%	23.8%	32.0%	23.0%	9.8%	100%

From the findings, the proportion of male teachers who were average 31.7%, advanced 27% and expert level at 15.9% was larger than for female teachers within the similar levels. Further Chi-square analyses were undertaken to test if there was an important difference in ICT integration based on gender, the hypothesis was tested at a significance level of five percent. Table 4.5.4 summarizes the findings.

Table 4.5.4: Gender and Merging of ICT as Conveyed by Teachers

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	20.148 ^a	10	.028
Likelihood Ratio	17.250	10	.069
Linear-by-Linear Association	7.942	1	.005
N of Valid Cases	124		

a. 3 cells (12.4%) have expected count less than 5. The minimum expected count is .01.

Based on the chi square statistic, the computed value .028 is less than the p value .05. This implies that at 5% level of significance integration of ICT was dependent on gender of the teachers. Hence the null hypothesis that they isn't statistically importance connection between teacher's demographic factors and ICT amalgamation was rejected and the alternative hypothesis taken, meaning no statistically significant association between gender and integration of ICT in teaching in ICT champion schools.

4.5.3 Gender and Integration of ICT as Reported by the Principals

Based on the findings from the principals, the proportion of male teachers who were average, advanced and expert level was larger than for female teachers within the similar levels.

4.5.4 Level of Education and Integration ICT as Reported by Teachers

Level of education was the third demographic factors in the first objective. The respondents were requested to indicate their level of education and also their measure of competence in incorporation of ICT in teaching. To achieve this objective a cross tabulation of level of ICT integration to education by the teacher was carried out and analyzed. The interlink between the levels of education ICT integration in teaching as

presented as shown in Table 4.5.5 whereby most of the teachers who were involved in the study were at status ranging from the level of beginners, average to advanced measure of incorporation of ICT across all the three levels in education (Diploma, B. Ed. and M. Ed.) It was deduced that the extent of merging increases with the degree of education. Majority of the teachers in higher level education are in the advanced level in terms of ICT integration in teaching.

Table 4.5.5: Extent of Education and ICT Integration in Teaching

	Level of ICT Integration						
	Unfamiliar	Newcomer	Beginner	Average	Advanced	Expert	Total
Diploma	0	3	4	3	1	5	16
	0.0%	18.8%	25.0%	18.8%	6.3%	31.3%	100%
B. Ed	1	9	21	32	20	8	91
Highest Academic Qualification	1.1%	9.9%	23.1%	35.2%	22.0%	8.8%	100%
M. Ed	1	1	4	3	5	0	14
	7.1%	7.1%	28.6%	21.4%	35.7%	0.0%	100%
BA/BSC	0	0	0	1	0	0	1
with PGDE	0%	0%	0%	100%	0%	0%	100%
Others (Specify)	0	0	0	0	2	0	2
	0%	0%	0%	0%	100%	0%	100%
Totals	1.6%	10.5%	23.4%	31.5%	22.6%	10.5%	100%

A Chi-square test was conducted to test the null hypothesis that there is absent statistically significant association between level of education and ICT combination in teaching in ICT champion schools in Machakos Sub –County. The hypothesis was tested at a significance level of five percent. The outcomes are conveyed in Table 4.5.6

Table 4.5.6: Degree of Education and Integration of ICT Integration

chi-square tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-square	26.441	20	.048
Likelihood Ratio	24.495	20	.221
Linear-by-Linear Association	.024	1	.877
No. of valid cases	124		

a. 14 cells (24.0%) have expected count less than 5. The minimum expected count is .02

Based on five percent level of significance, the Pearson Chi-Square statistic, $\chi (2) = 26.441$, and $p < 0.048$. Since $p < .048$ is less than 0.05, it means that at 5% level of significance integration of ICT is dependent on level of education. Hence the null hypothesis that it was devoid of statistically importance link between demographic factors (extent of education) and integration of ICT was rejected and the alternative hypothesis taken meaning that there is statistically significant association amongst demographic factors (measure of education) and ICT amalgamation in ICT champion schools.

4.5.5 Level of Education and Integration of ICT as Reported by Principals

It was prudent to analyze the data collected from principals and it was established that teachers with higher education measure were frequently using ICT in teaching compared to teachers of lower cadres.

4.6 Teacher's Attitude towards ICT Integration as Reported by Teacher

The second objective of study was to determine how teacher's attitude influenced incorporation of ICT in champion schools. Participants were requested to provide from the Likert scale the degree in which were in agreement by the given statements

which was meant to deduce their attitude. To achieve this the percentage of responses in each statement was calculated and the outcome given as depicted in the table 4.6.1.

Table 4.6.1: Responses on Attitudes of Teachers about Integration of ICT

Aspects of Teachers Attitudes	Strongly disagree	Disagree	Undecided	Agree	Strongly agree	Mean
I integrate ICT in teaching in my subject	6.7%	12.5%	5.8%	57.5%	17.5%	3.67
I believe integration of ICT in teaching is very useful to teacher and the learner	0.8%	0.8%	3.3%	43.1%	52.0%	4.45
Computers can help the teacher to meet individual differences of learners.	0.8%	4.9%	5.7%	52.0%	36.6%	4.19
ICT integration increases the level of creativity of the teacher.	1.6%	1.6%	3.2%	39.5%	54.0%	4.43
I feel embarrassed to integrate ICT in teaching in presence of my students who are more competent than me in ICT use	42.3%	23.6%	5.7%	15.4%	13.0%	2.33
Integration of ICT is necessary for the young teachers	2.4%	5.7%	1.6%	26.0%	64.2%	4.44
I prefer traditional approaches of teaching than integration of ICT in teaching.	42.3%	23.6%	12.2%	15.4%	6.5%	2.20
I find integration of ICT in teaching time consuming and tiresome.	37.4%	26.8%	11.4%	17.9%	6.5%	2.29

Table 4.6.1 shows that the respondents generally had a positive perception on the ICT element in teaching. 73% of respondents concurred to be integrating ICT in their classes subject, 93% were in agreement that combining ICT in teaching was useful to both teacher and the learner while 94% agreed that ICT integration increases the level of creativity of the teacher. However, a worrying 28% of respondents felt embarrassed to integrate ICT in teaching in presence of their students who were more competent

than them in ICT use while 24% viewed ICT integration as time wasting and quite tiresome. This was an indicator of the negative attitude, unpreparedness and a absence of right ICT incorporated teaching skills.

A Chi-square test was conducted to exam the null hypothesis at significance level of five percent, that there is no statistically significant connection amongst teacher’s attitude and merger of ICT in teaching ICT champion schools in Machakos Sub – County. The results are exhibited in Table 4.6.2

Table 4.6.2: Influence of Teachers’ Attitude and ICT Combination

Chi-Square Tests			
	Value	Df	Asymp. sig (2-sided)
Pearson Chi-square	43.565 ^a	20	.002
Likelihood Ratio	43.012	20	.002
Linear-by-linear Association	14.835	1	.000
No. of Valid cases	120		

a. 12 cells (20.0%) have expected count less than 5. The minimum expected count is .12.

The first question was used to test the null hypothesis (I integrate ICT in teaching in my subject). Pearson Chi-Square statistic, $\chi(2) = 43.565$, and $p < 0.002$. Since $p < 0.002$ is less than 0.05, it means that at 5% degree of significance, combination of ICT is dependent on teacher’s attitude. The ones with positive attitude integrate (though not all of them) while the ones with negative attitude do not integrate ICT in teaching. Hence the null hypothesis that non statistically significant connection between teacher’s attitude and incorporation of ICT was rejected and the alternative hypothesis taken, meaning that there is a statistically significant association between teacher’s attitude and ICT merger in teaching of ICT champion schools in Machakos Sub-County.

4.6.1 Teacher Attitude and Integration of ICT as Reported by Principal

The study proceeded to establish the influence of teacher's attitude and ICT integration in teaching in ICT champion schools in Machakos Sub- County. The responses from the interview schedule summarized from interviewing the school principals indicated that they too were in agreement that merging of ICT in teaching made ideal learning experience and enhanced teacher collaborations although not all embraced it in teaching.

4.7 Subject Specialization and Integration of ICT as Reported by Teachers

The third aim of the study was to investigate the influence of teacher's subject specialization on ICT combination in teaching of ICT champion schools in Machakos Sub-County. The respondents were requested to indicate their teaching subjects and frequency of incorporating ICT in teaching. To achieve this, the percentage of teachers in each teaching subject was first worked out and the results conveyed in figure below.

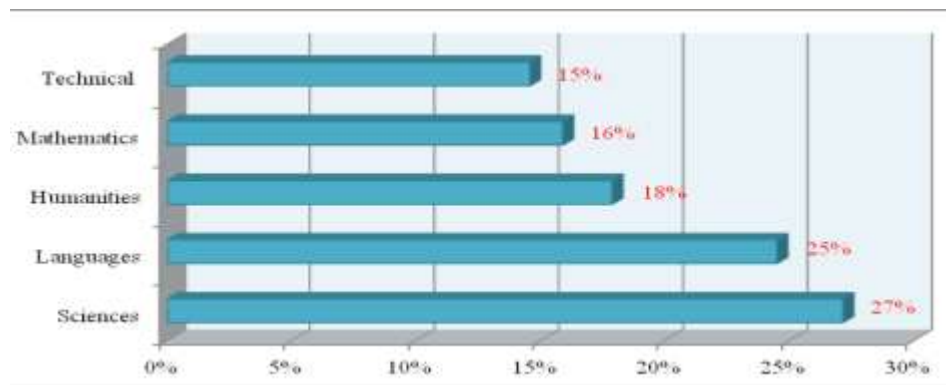


Figure 4.7.1: Respondents of Subject Specialization

From Figure 4.7.1, it is evident that teachers with Science subjects as their specialization were 27% of the respondent's followed by Languages 25%, Humanities 18%, and Mathematics 15% while Technical subjects were the least at 15%.

4.7.1 Frequency of Merging of ICT in Teaching

To underscore the frequency of amalgamation of ICT in teaching, the respondents were requested to indicate the frequency of merging of ICT in their teaching subjects. Table 4.7.1 presents a summary of the expected responses which ranged from “Never, Once in a month, Monthly, Weekly to Daily” across the listed teaching subjects.

Table 4.7.1: Frequency of Combination of ICT in Teaching as Reported by Teachers

Subjects	Once in a					Mean	Std. Dev.
	Never	month	Monthly	Weekly	Daily		
Mathematics	22.6%	32.3%	19.4%	19.4%	6.5%	1.94	1.234
Sciences	4.3%	17.0%	29.8%	38.3%	10.6%	2.93	1.027
Geography	5.3%	36.8%	31.6%	15.8%	10.5%	2.37	1.100
CRE/ History	27.3%	15.2%	21.2%	21.2%	15.2%	2.27	1.446
Computer studies	13.6%	4.5%	13.6%	9.1%	59.1%	3.69	1.495
Languages	17.1%	29.3%	19.5%	29.3%	4.9%	2.20	1.200
Others	6.3%	12.5%	12.5%	37.5%	31.3%	3.44	1.238
Overall	14%	22%	22%	26%	16%	1.94	1.234

The expected responses which were “Never, Once in a month, Monthly, Weekly and Daily” were assigned values ranging from 0 to 4 respectively for the purposes of analysis and interpretation. The weighted means per teaching subject computed using the Likert scale are tabulated in Table 4.7.2

Table 4.7.2: Rating of ICT Integration per Teaching Subject

Subject	Mean score (out of a scale of 4)	Std. Deviation	Interpretation
Mathematics	1.94	1.234	Almost monthly
Sciences	2.93	1.027	Almost Weekly
Geography	2.37	1.100	Monthly
CRE/History	2.27	1.446	Monthly
Computer studies	3.69	1.495	Nearly Daily
Languages	2.20	1.200	Monthly
Others	3.44	1.238	Weekly

The summarized responses from the principals indicated Computer studies and sciences, (Biology, Physics and Chemistry) as the teaching subjects in which ICT has been most integrated. Further, the analyses also indicate integration of ICT is influenced by subject specialization.

A Chi-square exam was conducted to test the null hypothesis (at a significance level of five percent) that absence of statistically important association between teaching subject and combining ICT in classes of ICT champion schools in Machakos Sub – County. The results are presented in Table 4.7.3.

Table 4.7.3: Results of Pearson’s Chi Square Tests for Teaching Subjects on ICT Integration

ICT programmes	Value	Asymp. Sig. (2-sided)	Decision on null hypothesis
Mathematics	14.625	0.552	Accept
Sciences	22.664	0.123	Accept
Geography	15.147	0.514	Accept
CRE/History	20.513	0.426	Accept
Computer studies	20.345	0.205	Accept
Languages	20.023	0.219	Accept
Others	13.796	0.614	Accept

Results on Chi-square statistic tests show the computed p- values are higher than 0.05. This leads to acceptance of null hypothesis that none statistically significant association between subject of specialization and ICT merger in teaching in ICT champion schools in Machakos Sub-County.

4.7.2 Influence of Subject Specialization on ICT Integration as Reported by Principals.

The study set out to investigate the influence of subject specialization in incorporating ICT in teaching ICT champion schools whereby principals were used as respondents. It was established that the frequency of ICT integration is highest in computer studies and sciences and lowest in humanities and languages.

4.8 Influence of Teacher Level of Training in Emerging of ICT in Teaching as Reported by Teachers

The fourth purpose was to ascertain the influence of teacher’s level of training in ICT amalgamation of ICT in champion schools. The participants were requested to

manifest if they trained in ICT integration during pre-service or in-service. They were also requested to indicate the period of training in given ICT programmes. To achieve this objective the percentage of teachers who trained in pre-service and in-service was computed and a cross tabulation of given ICT programme and frequency of training by the teacher was carried out and results were given.

The responses show that majority of teachers were trained in integration of ICT pre service at 55% compared to those 54% who trained in service in integration of ICT. The findings do not show striking difference that would explain differences in ICT integration by the teachers based on their level of training. The analyses are shown in Figure 4.8.1. In most schools interviewed, in-service training on integration of ICT was done once over the last 3 years with less than 3 teachers in attendance.

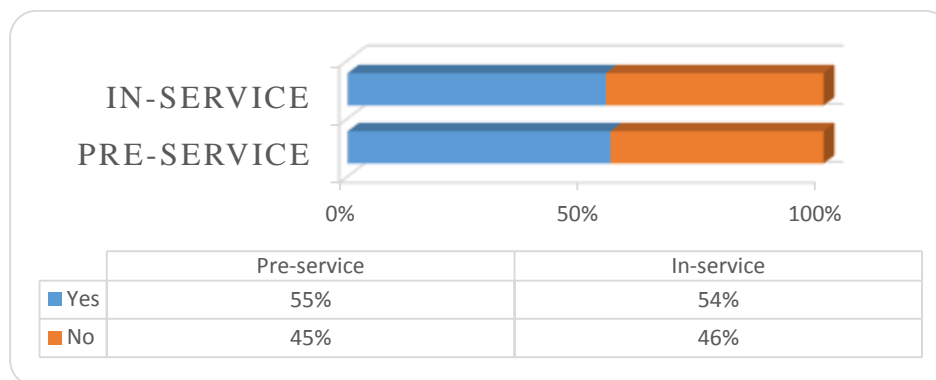


Figure 4.8.1: Responses on Period of Training in Integration of ICT in Teaching

In order to assess the measure of training of the teacher in listed ICT programmes, a question item that utilised a 5-point Likert-scale with expected responses varying from “Never, Once in 10 years, Once in 5 years, Once in a year to Once in a term” was presented to the respondents. These responses were awarded a value of 0 to 4 respectively to distil the analyses and provide meaningful interpretation. A weighted mean was calculated and the results are presented in Table 4.8.2.

A preamble of the responses is exhibited in Table 4.8.2.

Table 4.8.2: Degree of Training in ICT Programmes

Subjects	Never	Once in 10years	Once in 5 years	Once in a year	Once in a term
	Microsoft word	13.7%	18.8%	20.5%	17.1%
Power point	24.6%	11.5%	17.2%	21.3%	25.4%
Ms Excel	26.5%	11.1%	15.4%	18.8%	28.2%
Surfing (browsing)	12.1%	16.4%	15.5%	11.2%	44.8%
Use of subject specific software for teaching e.g. graphing calculators	46.3%	5.8%	6.6%	14.0%	27.3%
Use of E-Learning materials from KICD.	33.3%	8.9%	10.6%	12.2%	35.0%
Overall	26%	12%	14%	16%	32%

Table 4.8.3: Rating of the Extent of Training of Teachers in ICT Programmes

ICT Programmes	Mean score (out of a scale of 4)	Std. Deviation	Interpretation
Microsoft word	2.88	1.423	Once in a year
Power point	2.64	1.528	Once in a year
Ms Excel	2.64	1.580	Once in a year
Surfing (browsing)	3.25	1.485	Once in a year
Use of subject specific software for teaching e.g. graphing calculators	2.13	1.754	Once in a 10 years
Use of E-Learning materials from KICD.	2.58	1.721	Once in a year

The respondents indicated to have attended training in most of ICT programmes (Microsoft Word, Power Point, Ms Excel and Surfing (browsing)) but only once

yearly. Teachers indicated to be most trained in surfing or internet browsing followed by Microsoft Word, Power Point but training in using specific software for teaching (e.g. graphing calculators, Geographic Information System (GIS) applications, Auto cards for Art and design) was least sought after as it was only attended once in 10years. The responses from the interview schedules by the principals were in agreement.

A Chi-square examination was conducted to try the null hypothesis (at a significance level of five percent) that there is no statistically significant connection among training in ICT Programmes and ICT incorporation in teaching in ICT champion schools in Machakos Sub –County. The results are displayed in Table 4.8.4

Table 4.8.4: Outcomes of Pearson’s Chi Square Tests for ICT Programme on ICT Integration

ICT Programmes	Value	Asymp. Sig. (2-sided)	Interpretation
Microsoft word	23.725	0.255	Accept
Power point	48.504	.000	Reject
Ms Excel	30.519	.620	Accept
Surfing (browsing)	22.980	0.290	Accept
Use of subject specific software for teaching e.g. graphing calculators	17.883	0.595	Accept
Use of E-Learning materials from KICD.	17.022	0.625	Accept

Only one Chi-square statistic is less than 0.05. Pearson Chi-Square statistic for Power Point; $\chi^2(2) = 48.504$, and $p < 0.000$. Since $p < 0.000$ is less than 0.05, it means that at 5% level of significance combination of ICT is reliant on ICT training of teachers

especially on power point presentation. Hence the null hypothesis that no statistically significant relationship between teachers level of training and ICT integration in teaching in ICT champion schools in Machakos Sub-County was rejected and the alternative hypothesis taken, meaning that there is statistically significant relationship between PowerPoint presentation and ICT integration in teaching in Machakos Sub-County

4.8.1 Influence of Teacher Measure of Training in Combination of ICT in Teaching as Reported by Principals

The study is meant to ascertain the influence of level in training in integration of ICT in teaching in ICT champion schools. It was established that many teachers have trained in surfing and Microsoft word but very few in specific software for teaching.

4.9. Influence of Teaching Experience on Merging of ICT in Teaching as Reported by Teachers

The fifth aim of study was to determine the influence of teacher's experience in teaching on ICT integration in teaching in ICT champion schools in Machakos Sub-County. The study strived to investigate this position by presenting to the respondents question items relating to the period of service in the profession and how these years of teaching experience may have influenced their competence in ICT integration in classrooms. The analyses is been discussed by the following paragraphs. The analyses have been discussed in the following paragraphs.

4.9.1 Respondents by Teaching Experience

Among the respondents who were involved in the study, majority, 60%, had a experience in teaching of less than 10 years, 18% had experience of 11-20 years, 16% being teaching for 21-30 years meanwhile 6% and 2% had a teaching experience of 31-40 year and 41 years and above respectively. Figure 4.9.1 summarizes the findings.

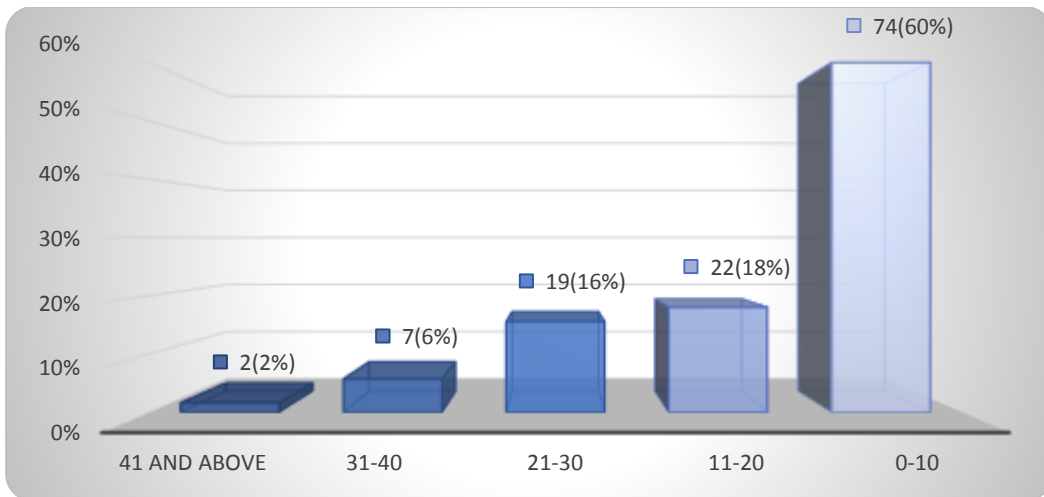


Figure 4.9.1: Respondents by Teaching Experience

Source: Research Findings

The respondents were also requested to indicate their first time to amalgamate ICT in teaching as exhibited in Figure 4.9.2. The majority of teachers interviewed had integrated ICT in teaching for the first time in less than 10 years ago (83%) while 7% of teachers had not integrated ICT in teaching.

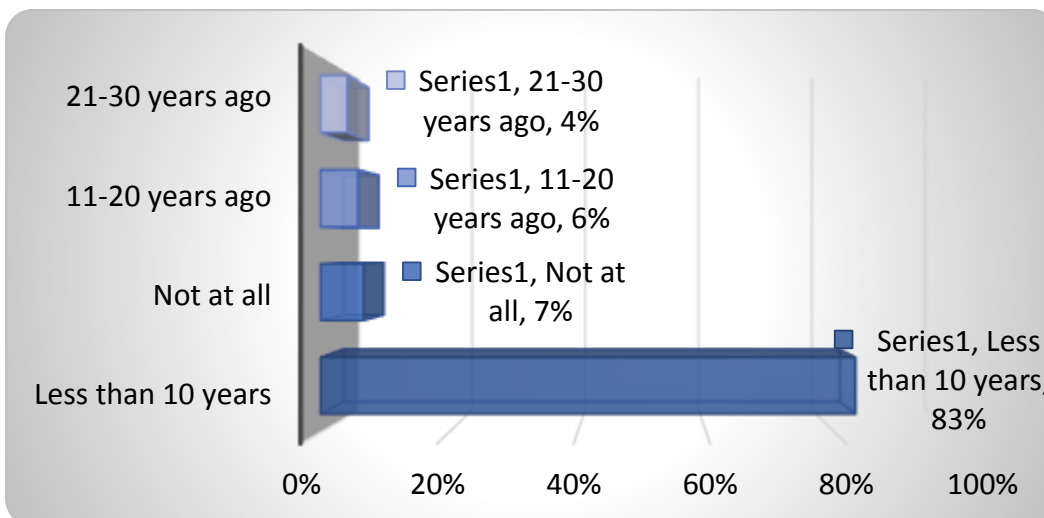


Figure 4.9.2: First Time to Integrate ICT in Teaching

Further tests in measuring whether the first time of integrating ICT in classroom associated with period of experience showed that majority of all teachers irrespective of their years of experience had integrated ICT in teaching for the first time in less

than 10 years. This indicates that ICT integration was relatively a new phenomenon in secondary schools.

Table 4.9.3: Cross Tabulation of First Time of Integrating ICT and Teaching Experience

		First time to integrate ICT in Teaching				Total
		Less than 10 years	11-20 years ago	21-30 years ago	Not at all	
Years of teaching Experience	0-10	86%	6%	0%	3%	100%
	11-20	82%	5%	0%	14%	100%
	21-30	83%	11%	0%	6%	100%
	31-40	57%	0%	14%	29%	100%
	41 and above	100%	0	06	0	100%
Weighted means		83%	6%	4%	7%	100%

4.10 Relationship of Teaching Experience with Integration of Teaching ICT

The results of this study depict that with aspect of teaching experience, 42% of teachers were average in integrating ICT in teaching, 20% were at an advanced level while 10% were at an expert level. In regard to how the years of experience influenced the extent competence in ICT integration, the teachers with of 0-10 years' experience span in the profession of teaching were the highest number on competence measure –average, advanced and expert levels while those with 31-40 years in experience of teaching was the majority in lower levels of competence in ICT integration as revealed in Table 4.10.1

Table 4.10.1 Relationship between Years of Experience and Competence in ICT Incorporation

		Competence in ICT Integration						
		Unfamiliar	Newcomer	Beginner	Average	Advanced	Expert	Total
Years Of Teaching Experience	0-10	1	4	9	30	18	10	72
		1.4%	5.6%	12.5%	41.7%	25.0%	13.9%	100.0%
	11-20	3	2	2	10	4	1	22
		13.6%	9.1%	9.1%	45.5%	18.2%	4.5%	100.0%
	21-30	1	5	3	8	2	0	19
		5.3%	26.3%	15.8%	42.1%	10.5%	0.0%	100.0%
	31-40	2	0	2	3	0	0	7
		28.6%	0.0%	28.6%	42.9%	0.0%	0.0%	100.0%
	41 and above	0	0	0	0	0	1	1
		0%	0%	0%	0%	0%	100%	100%
Totals		6%	9%	13%	42%	20%	10%	100%

A Chi-square test was conducted to test the null hypothesis lack of statistically significant relationship connection teacher’s years in teaching experience and ICT integration in ICT champion schools in Machakos Sub –County. The results are shown in Table 4.10.2

Table 4.10.2: Influence of Teaching Experience on ICT Integration

Chi-Square Tests

	Value	Df	Asymp. Sig (2-sided)
Pearson Chi-Square	37.249 ^a	20	.065
Likelihood Ratio	32.617	20	.048
Linear-by-Linear Association	10.809	1	.001
No of Valid Cases	121		

a. 23 cells (76.7%) have expected count less than 5. The minimum expected count is .06. Chi-square test was done at a significance level of five percent.

The Pearson Chi-Square statistic, $\chi^2(2) = 37.249$, and $p < 0.065$. Since $p < 0.065$ is greater than 0.05, it means that at 5% level of significance integration of ICT is not dependent on years of teaching experience. Hence the null hypothesis is accepted. This means that lack of statistically significant link among teaching experience and ICT integration in teaching in ICT champion schools.

4.10.1 Influence of Teaching Experience on ICT Integration as Reported by Principals

Further analyses of the interview schedules by the principals revealed that majority of teachers had less than 10 years in the teaching profession the same group merged ICT in classroom more than any other group. They also indicated that teachers with over 30 years teaching experience almost did not integrate ICT in teaching.

4.11 Summary of Hypothesis Testing

Based on the study objectives the following null hypotheses were tested using Pearson's chi square test;

Table 4.11 Summary of Hypothesis Testing

Hypotheses	Pearson's chi-square $p < 0.05$	Decision on Null
Ho ₁ : There is no statistically significant relationship between teacher's demographic factors (age, gender and extent of education) and ICT integration in teaching in ICT champion schools in Machakos sub-county	Age: $\chi (2) = 34.901, p < 0.003$ Gender: $\chi (2) = 20.148, p < 0.028$ Level of Education: $\chi (2) = 26.441, p < 0.048$	REJECT REJECT REJECT
Ho ₂ : There is no statistically significant relationship between perception's attitude and ICT integration in teaching in ICT champion schools in Machakos Sub –County	$\chi (2) = 43.565, \text{ and } p < 0.002.$	REJECT
Ho ₃ : There is no statistically important association between teacher's subject specialization and ICT integration in teaching in ICT champion schools in Machakos Sub –County.	Computed p values are greater than critical p value across all teaching subjects	ACCEPT null hypothesis
Ho ₄ : There is no statistically significant relationship between teacher's degree of training and ICT merging in teaching in ICT champion schools in Machakos	Computed for each ICT program: Only $\chi (2)$ for Power Point is significant	Accept null hypothesis for all ICT programmes except for

Sub-County.	Power point
<p>Ho₅: There is no statistically significant relationship between teacher's years of teaching experience and ICT integration in teaching in ICT champion schools in Machakos Sub-County.</p>	<p>$\chi (2) = 37.249$, and $p < 0.065$. ACCEPT</p>

CHAPTER FIVE

DISCUSSION AND INTERPRETATION OF RESEARCH FINDINGS

5.1 Introduction

The study was anchored on the following five objectives: to establish the influence of teacher's demographic factors on ICT integration in teaching in ICT champion schools; to determine the influence of teacher attitude on ICT integration in teaching in ICT champion schools; to investigate the influence of teacher's subject specialization on ICT integration in teaching in ICT champion Schools; to establish the influence of teacher's level of training on ICT integration in teaching in public secondary schools and to establish the influence of teacher's teaching experience on ICT integration on teaching in ICT champion schools in Machakos Sub –County. Based on the research findings the objectives are discussed below.

5.2 Influence of Demographic Factors.

This is the first objective of the study: to establish the influence of teacher's demographic factors on ICT integration in teaching in ICT champion schools in Machakos sub-county. The demographic factors which were considered in this study are; age, gender and level of education. Each of the three demographic factors has been handled separately.

5.2 .1 Influence of Age on Integration of ICT

This is the first of the three demographic factors; influence of age on integration of ICT in teaching. It was found out that there is a significant relationship between age and integration of ICT in teaching in ICT champion schools in Machakos Sub – County. Integration of ICT was found to be dependent on age of the teachers with young teachers being more likely to adopt ICT than the old teachers. The findings are consistent with the findings of the principals who alluded that young teachers integrate ICT in teaching with a lot of enthusiasm and the enthusiasm dwindles with age. The findings are consistent to the findings of Makgato (2012), UNESCO (2014) and Lentilalu (2015) who alluded that old teachers who are comfortable with the

traditional way of teaching do not want new and innovative methods of teaching. Old teachers use of technology though they perceive it as useful is limited by ease of use because their experience with technology is very short, bearing in mind that most of them as evidenced by this research did not have both pre –service and in-service training in use of ICT in teaching. This can be boosted through training and constant sensitization to change the attitude and sustain ICT use.

5.2.2 Influence of Gender on Integration of ICT

This was the second of the three demographic factors; influence of gender on integration of ICT in teaching. It was established that 51% were males while female respondents were 49%. From the findings, the proportion of male teachers who were average 31.7%, advanced 27% and expert level at 15.9% was larger than for female teachers within the similar levels. These findings are consistent with those of principals who posited that male teachers frequent in combining ICT teaching than the female teachers.

5.2.3 Influence of Level of Education on Integration of ICT

This was the third demographic factors; influence of the level of education on combination of ICT in education. The results indicate that most of the teachers (73%) had first degree in education as their highest qualification. This was proceeded by the ones with Diploma (14%) and masters' in education (11%). The study established that, Teacher sat higher levels of education were found to be at higher level of integration. This implies that absence of significant relationship between level of education ICT merging in classed of ICT champion schools at Machakos Sub – County. There is consistency between the information derived from teachers and the one from principals who alluded that the rate of integration increases with the level of education. The findings are in accordance to a study by Clark (2000) that argues that teachers on higher levels of qualification especially masters level used ICT in their learning. They perceived it beneficial and convenient to apply, intended to use it and the actual ICT use was good compared to those in lower levels. Continuous training will help to make the situation sustainable since technology is dynamic and there is need to keep updating.

5.3 Teacher's Attitude towards ICT Integration

This was second objective: influence of teacher attitude on combination of ICT in schools. This study established that teachers generally had a positive perception on amalgamation of ICT in classrooms. Majority (73%) of the respondents agreed to have been combined ICT in their classrooms subject. Regarding result of merging ICT in teaching, 93% agreed that teaching by merging ICT was useful to both teacher and the learner while 94% agreed that ICT integration increases the level of creativity of the teacher. However, negative attitudes were evident as 28% of respondents indicated to have felt embarrassed to integrate ICT in tea teaching in presence of their students who were more competent than them in ICT use while 24% deemed ICT integration as time wastage and quite tiresome. The findings of quantitative data are commensurate to those of qualitative data from the principals who argued that teachers are positive in the incorporation of ICT though not all embraced it for teaching.

The findings extensively concur with Bukaliya and Mubika (2012) who established that those teachers with negative attitudes in ICT were not able to use computers and were consequently not likely to adjust use instructional technologies than the participants with positive perceptions. This implies that there is presence of significant association among teacher's attitudes and merging of ICT for ICT champion schools in Machakos Sub –County. Viewed benefit is directly impacted by perceived convenience of application. This can be mitigated by examining antecedent and assessors of perceived benefit and perceived ease of use (Wixon and Toddd, 2005). In this case teacher characteristics are the main impeding factors and can be overcome through training in integration of ICT so as to increase their efficacy.

5.4 Influence of Subject Specialization on Integration of ICT in Teaching

This was the third purpose of the study; to investigate the influence of teacher's subject specialization on amalgamating ICT classes for ICT champion Schools in Machakos Sub- County. Based on the study outcomes, 27% of teachers had Science subjects (biology, physics or chemistry) as their teaching subjects 25% were for Languages, Humanities 18%, Mathematics 15% while Technical subjects were the

least at 15%. The integration of ICT was more prevalent in computer studies where ICT was being used almost on a daily basis, technical subjects' findings usage was on weekly basis while for sciences, (biology, physics and chemistry), and languages, CRE/History, mathematics and geography had ICT integrated in teaching on a monthly basis.

Statistical chi-square test has shown that absence of statistical significant relationship amongst subject specialization of teaching ICT combination for ICT champion schools in Machakos Sub –County. These results further imply that ICT integration can be done equally in any teaching subject provided that teachers perceive it to be gainful and also find it easy to utilize. These results are inconsistent with the literature reviewed whereby Selwyn (2007) posits that ancient computers were the specialty of mathematics science and technology. It means that all teachers with time have perceived the usefulness of integration in ICT in teaching, their attitude is generally positive and they intent to use it but it's impeded by perceived ease of use. Teachers' skill in integration of ICT is inadequate. This can be demystified by training in integration of ICT so that the positive attitude and perceived usefulness can be matched by high actual system use, high productivity and teacher satisfaction.

5.5. Influence of Teacher Level of Training in ICT Amalgamation for Teaching

This was the fourth purpose; to establish influence of teacher's level of training in the amalgamation of ICT in classroom for ICT champion for Machakos Sub-County Schools. Based on this objective, the study determined that most teachers were trained in integration of ICT in pre service training at 55% compared to in-service training at 45%. The study established that teachers sought to acquire competencies in listed ICT programmes with training in Microsoft Word, Surfing (browsing), Power Point and Ms Excel attended once yearly. Teachers attended training in using specific software for teaching once in 10 years. Teachers decried the infrequent training on ICT amalgamation for teaching which was conducted annually for some schools while in others it occurred once in three years despite its immense importance in improving ICT competencies. Where such training was conducted, the attendees were largely male teachers. The data is consistent to data collected from principals.

This means that there is an important link among training in Power Point application, (one of the ICT programmes,) and ICT amalgamation for ICT TEACHING ICT champion schools in Machakos Sub –County. Training in Power Point application increases ICT merger for teaching. Though teachers purport to have been trained in a number of ICT programmes it's imperative to note that the kind of training they have had is substandard or it does not match with dynamics of technology since their level of integration is still low despite the fact that they perceive it to be useful and their attitude is positive. Policy interventions are recommended to demystify that scenario in all ICT Champion schools in Machakos Sub-County through regular training in all ICT Programmes and soft wares relevant to their teaching subjects.

5.6 Teaching Experience in Terms of Years

This was the fifth objective; to establish the influence of teacher's experience in teaching ICT champion schools in Machakos Sub –County. Based on the number of span of experience in teaching, majority of teachers' (60%) had a teaching experience of less than 10years while 2% had a teaching experience of 31-40years. Majority of teachers 83% had integrated ICT in teaching for the first time in less than 10 years. The first time of integrating ICT in teaching was closely linked to years of experience as majority of all teachers irrespective of their years of experience had integrated ICT in teaching for the first time in less than 10 years. In regard to teaching experience in years and competence in integration of ICT, 42% of teachers were average, 20% were at an advanced level while 10% were at an expert level. In regard to how the years of experience influenced the extent of competence in ICT merger, the teachers possessing of 0-10 period in years of experience in the profession of teaching were the most on higher levels of competence –average, advanced and expert levels while those with 31-40 years in experience of teaching, were the majority in lower levels of competence in ICT integration.

This implies that statistically significant association among the years of teaching experience and integration of ICT in teaching in ICT champion schools in Machakos Sub –County. These results are consistent with the literature reviewed whereby Deen Swarray, Gillwald and Morrell (2012) allude that long serving teachers

demonstrated low self-efficacy in technology application in teaching. Perceived gains is impacted by viewed ease of use directly. Long serving teachers though their attitude is positive are technophobic because their ability to integrate is very low emanating from inadequate training and low hands on experience in ICT. Regardless of perceived benefits and deemed ease of use of technology, strategies need to be taken to ensure that the teachers feel confident in their ability to use it. It should be under their controllability. All barriers should be removed and sufficient support provided to boost their self-efficacy.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This section gives conclusions and recommendations of the study on the basis formulated research aims in chapter one.

6.2 Conclusions

6.2.1 Influence of Teacher Demographic factors and Integration of ICT

The first objective was to determine the influence of teacher's demographic aspects (age, gender and extent of education) and ICT merger in teaching in ICT champion schools in Machakos sub-county. In regard to age, the study concluded that, age of teachers influences the integration of ICT in teaching. This was based on the fact that, teachers aged below 30 years were more desirable to combine ICT in teaching than the ones over thirty years. Thus, to bridge the difference between the age brackets, there is need for more training, increased exposure and sensitization to deflect the negative attitude and the use of incentives.

With respect to gender as the second demographic factor, it was concluded that, female teachers lagged behind in integrating ICT in teaching.

In regard to extent of education, the study concluded that the measure of education influences integration of ICT in teaching. This is because to the reality of teachers who are holders of masters are all at higher level of competence in ICT merging in teaching.

6.2.2 Influence of Teacher's Attitude and Integration of ICT

With regard to the second aim which was establishing the influence of teacher's attitude on teaching ICT integrated for in ICT champion schools in Machakos Sub County, it was concluded that teachers had a perceived attitude in integrating ICT although not all embraced it, because the younger teachers were more receptive and adopted ICT much more easily compared to the older teachers. Mitigation measures

should be taken especially on the long serving teachers to change their attitude and also make it easy for them to use through training.

6.2.3 Influence of teacher's Subject Specialization and Integration of ICT

The third aim sought to investigate the influence of teacher's subject specialization in the combination of ICT for teaching. This study concluded that subject specialization doesn't influence combination of ICT in teaching though particular subject content demanded the utilization of Information communication technologies in classes such as computer lessons and Sciences subjects. Test results on significance of influence of teaching subjects on integration of ICT reveal no significant relationship which implies that teachers of all subjects have significant opportunity for integrating ICT in its teaching

6.2.4 Influence of Teacher's level of Training and Integration of ICT

With regard to influence of teacher's level of training on ICT combination for teaching in ICT champion schools in Machakos Sub - County. In-service training was cited as of paramount importance in equipping teachers with extra knowledge on integration of ICT. Concerning the measure of training in ICT programmes, the study concluded that more frequent trainings on ICT programme especially power point presentation would improve the competencies applicable in ICT teaching. Training of Power Point application increases ICT incorporated teaching.

6.2.5 Influence of Teacher's Years of Teaching Experience and Integration of ICT

With reference to influence of span of teaching experience on ICT incorporation in teaching in ICT Champion schools of Machakos sub-county, this study concluded that the years of teaching experience in teaching service had no direct impact on ICT merger in teaching. This was evidenced by the fact that the teachers with of 0-10 span of experience in the teacher profession were the higher number with higher levels of competence; average, advanced and expert levels while those with 31 years and above, were the majority in the lower levels of competence.

6.3 Recommendations

Focused on the study findings, the researcher makes several recommendations; the government should empower teachers through training preferably on the job training to equip all in ICT competencies. This training should be done in a way to ensure teachers of the same age bracket are trained together so as to meet their individual differences.

There is need for clear policy guidelines and effective commitment to training of teachers in use of subject specific equipment in ICT integration in teaching especially to female teachers. Such a policy must have clear and positive incentives for participation.

More sensitization workshops are needed to deflect the negative attitudes and also increase appreciation of ICT incorporation in teaching by teachers. This can be organised by the Ministry of Education (MOE).

6.4 Suggested Areas for Further Research

Further research can be done investigating the institutional factors which influence the integration of ICT in teaching and learning in randomly selected secondary schools in Machakos County or any other county /sub county in Kenya. This will help provide comparative analyses of both ICT champion schools, centres of excellence and the other cluster of schools.

A study can be conducted on the cost benefit analyses for combination ICT in teaching and learning. This could help understand the real value /outcome in the investment in ICT being made by institutions.

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APPENDICES

APPENDIX I

LETTER OF INTRODUCTION

Florence Nduku Nguli,
Department of Educational Administration and Planning,
South Eastern Kenya University,
P.O BOX 170,
Kitui.

Dear Sir/Madam,

RE: PERMISSION TO CARRY OUT ACADEMIC RESEARCH

I am a post graduate student at South Eastern Kenya University pursuing a Master's Degree of Education in Curriculum Studies. Currently I am undertaking a research entitled "**The influence of teacher characteristics on integration of ICT in teaching in ICT champion schools in Machakos Sub -County**". Your school has been selected to participate in the study through survey and you have been selected as a respondent. Since the questionnaire forms an integral part of the study you are kindly requested to objectively respond to it and give any other additional information you might feel is necessary for the study. I wish to assure you that the information you will provide will be used strictly for academic purposes only and will be treated with utmost confidentiality.

Thank you.

Yours faithfully,

Florence Nduku Nguli.

APPENDIX II

INTERVIEW FOR PRINCIPALS

This research anticipates to collect information on the teacher characteristics influencing integration of ICT in teaching in ICT champion schools in Machakos Sub-County. Your school has been chosen to participate. Please respond by writing the most applicable answer in the questionnaire. To express your opinion, use the space provided.

Part I –Demographic factors

Age

(i) Please categorize your teachers in terms of age

.....

(ii) Is there age divide in terms of integration of ICT in teaching.....

(iii) According to your opinion, which age bracket of teachers integrates ICT In teaching frequently?

.....

(iv) Why do you think this age bracket integrate ICT in teaching?

.....

(v) What can be done to enhance ICT integration among the age bracket lagging behind?.....

.....

Gender

(i) With reference to gender distribution of teachers in your school, how many males and females do you have?.....

(ii) Which gender integrates ICT more in teaching among your teachers?
.....

(iii)According to your opinion, does gender influence ICT integration in teaching in your school?
.....

(iv)What do you think should be done to achieve gender parity in ICT integration in teaching in your school?.....

Influence of Level of education and integration of ICT

(i)What is the frequency of integration in ICT of the teachers who are holders of the following education levels?

Level of education	Frequency of integration of ICT in teaching
Diploma	
Degree	
Post graduate diploma in education	
Masters	
Doctorate	

(ii)According to your opinion, does level of education of your teachers influence integration of ICT in teaching?.....

(iii) Give reasons for your answer in the above question.....

Part 2: Influence of teacher attitude towards integration of ICT in teaching

(i)What is your opinion towards the following statement regarding integration of ICT in teaching?

STATEMENT	OPINION
Integration of ICT in teaching is a waste of time.	
Use of computers in teaching makes teaching difficult.	
ICT integration makes teaching interesting to both the learner and the teacher.	
I prefer use of ICT in teaching compared to traditional methods of teaching	
ICT integration helps teachers to collaborate with their peers about teaching whether in or out of school	

Part 3: Influence of Subject specialization

(i) Are there some subjects where teachers find it easy to integrate ICT in teaching than others?.....

(ii)In which subjects do teachers integrate ICT in teaching more frequently?

.....

.....

(iii) What is the frequency of ICT integration in the following departments in your school?

Subject	Frequency of ICT integration
Languages	
Mathematics	
Biology	
Physics	
Geography	
CRE	
History	
Computer studies	
Others (specify)	

(iv) According to your opinion does subject specialization influence integration of ICT in teaching?.....

.....

(v) What do you think should be done to enhance integration of ICT in all subjects in your school?.....

.....

Part 4: Influence of teacher level of training in ICT integration

(i) Have you been trained in integration of ICT in teaching during the following teacher development programmes :

Pre-service (during teacher training).....

In-service (on the job training).....

(ii) Have your teachers been trained in the following ICT programmes?

ICT Programme	Training.
Microsoft word	
Power point	
Excel (spread sheet)	
Surfing(browsing)	
Use of subject specific software for teaching like graphing calculator for teaching mathematics or GIS for Geography)	
Use of E-learning materials from KICD	

(iii) How frequent does training of teachers in integration of ICT take place in this school?.....

.....

(iv) Comment on teachers' attendance to in-service training in ICT integration in teaching in this school.....

.....

.....

(v) What is an estimate number of female and male teachers attending the training.....

.....
(vi) What is the frequency of training in ICT integration by teachers in your school?.....

(vii) How many teachers have been in-serviced on ICT integration in the last two years?.....

.....
(viii) In which way has the in-service benefited the teachers?
.....

Part 5: Influence of teaching experience in years

(i) Please give categories of your teachers in terms of teaching experience in years.....

(ii) In regard to the teaching experience of teachers in this school, what categories of teachers integrate ICT in teaching more?.....

.....
(iii) Give suggestions on what you think should be done to make all teachers integrate ICT in teaching.....

.....
(iv) In regard to teaching experience in years and frequency of ICT integration in teaching, please give me the frequency for the following.

Teaching experience in years	Frequency of integration of ICT in teaching
0-5	
5-10	
11-15	
16-20	
21-25	
26 and above	

APPENDIX III

TEACHERS' QUESTIONNAIRE

The researcher anticipates to collect information on teacher characteristics influencing integration of ICT in teaching in ICT champion schools in Machakos Sub -County. Please respond by writing the most applicable answer in the questionnaire. To express your opinion, use the space provided please.

Part I –Demographic factors

Age (years)

51 – 60 41 – 50 31 – 40 20 – 30

Gender Male Female

Level of education and ICT integration

(i)What is your highest academic qualification?

(a) Diploma (b) B.ED (c) M.ED (d) BA/BSC with PGDE
(e) OTHERS (specify

(ii) In regard to level of education and knowledge of ICT, please read the descriptions below and tick the one that best describes your status. Whereby

- 1) **Unfamiliar:** I have no experience with the ICT integration.
- 2) **Newcomer:** I have attempted to integrate ICT in teaching, but I still require help on a regular basis.
- 3) **Beginner:** I am able to perform basic functions in a limited number of ICT applications.
- 4) **Average** I am able to perform basic functions in a limited number of ICT applications.

5) **Advanced:** I have acquired the ability to competently integrate ICT in teaching.

6) **Expert:** I am extremely proficient in using ICT in teaching.

Part 2: Attitude towards ICT integration

The following statements relate to attitude towards ICT. Using the key (Where: 1 - Strongly disagree; 2 – Disagree; 3 – undecided; 4 – Agree; 5 – Strongly agree) tick one to indicate the extent to which you agree with each statement.

No.	Statement	Response				
		1	2	3	4	5
1.	I integrate ICT in teaching in my subject					
2.	I believe integration of ICT in teaching is very useful to teacher and the learner					
3.	Computers can help the teacher to meet individual differences of learners.					
4	ICT integration increases the level of creativity of the teacher.					
5	I feel embarrassed to integrate ICT in teaching in presence of my students who are more competent than me in ICT use					
6.	Integration of ICT is necessary for the young teachers					
7.	I prefer traditional approaches of teaching than integration of ICT in teaching.					
8.	I find integration of ICT in teaching time consuming and tiresome.					

Part 3: Influence of Subject Specialization

Please indicate your teaching subjects

Mathematics Languages Sciences Humanities

Technical

Indicate the frequency of integration of ICT in teaching in your subjects of specialization (use the table below.)

Subject	Never	Once in a term	Monthly	Weekly	Daily
Mathematics					
Sciences					
Geography					
CRE/History					
Computer studies					
Languages					
Others					

Part 4; Influence of teacher level of training in integration of ICT in teaching

(i) Please tick appropriately. Have you been trained in the following in your teaching career?

Training	Yes	No
Pre-service		
In-service.		

(ii) Please read the following ICT programme and tick the answer that best describes your level of training in ICT integration.

ICT progarmme	Never	Once in 10 years	Once in 5 years	Once in a year	Once in a term
Microsoft word					
Power point					
Excel					
Surfing (browsing)					
Use of subject specific soft ware for teaching eg graphing calculators					
Use of E-Learning materials from KICD.					

Part 5; Teaching Experience in Terms of Years

(i) For how long have you been in the teaching profession?

31 – 40 21 - 30 11 – 20 0 – 10

(ii) When was your first time to integrate ICT in teaching?

Less than 10 years 11 – 20 years ago

21 – 30 years ago Over 31 years ago

Not at

(iii) In regard to teaching experience in years and competence in integration of ICT in teaching, tick the option that best describes your status.

- 1) **Unfamiliar:** I have no experience with the ICT integration.
- 2) **Newcomer:** I have attempted to integrate ICT in teaching, but I still require help on a regular basis.
- 3) **Beginner:** I am able to perform basic functions in a very limited number of ICT applications.
- 4) **Average** I am able to perform some basic functions of ICT applications.
- 5) **Advanced:** I have acquired the ability to competently integrate ICT in teaching.
- 6) **Expert:** I am extremely proficient in using ICT in teaching.

APPENDIX IV

PERMISSION TO PROCEED FOR DATA COLLECTION



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. 020-4213859 (KITUI)
Email. directorbps@seku.ac.ke

Our Ref: E55/MAC/20421/2013

Date: 19th October, 2017

Florence Nduku Nguli
Re g. No. E55/MAC/20421/2013
Masters of Education in Educational Administration and Planning
C/O Dean, School of Education

Dear Nguli

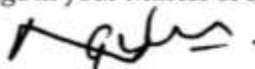
RE: PERMISSION TO PROCEED FOR DATA COLLECTION

This is to acknowledge receipt of your Master in Educational Administration and Planning Proposal document entitled: *"Influence of Teacher Characteristics on Integration of Information Communication and Technology in Teaching in ICT Champion Schools in Machakos Sub-County."*

Following a successful presentation of your Master Proposal, the School of Education Board of Examination in conjunction with the Directorate, Board of Postgraduate 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. Gideon M. Kasivu and Dr. Leonard M. Kamau. 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. FELIX NGUNZO KIOLI, PH.D
DIRECTOR, BOARD OF POSTGRADUATE STUDIES

Copy to: Deputy Vice Chancellor, Academic, Research and Students Affairs
Dean, School of Education
Director, Machakos Campus
Chairman, Department of Education Administration and Planning
Dr. Gideon M. Kasivu
Dr. Leonard M. Kamau
BPS Office - To file

**APPENDIX V
DATA COLLECTION PERMIT**

**THIS IS TO CERTIFY THAT:
MS. FLORENCE NDUKU NGULI
of SOUTH EASTERN KENYA UNIVERSITY,
13-90100 MACHAKOS, has been
permitted to conduct research in
Machakos County**

**Permit No : NACOSTI/P/18/76270/20615
Date Of Issue : 20th April, 2018
Fee Received :Ksh 1000**

**on the topic: INFLUENCE OF TEACHER
CHARACTERISTICS ON INTEGRATION OF
INFORMATION COMMUNICATION AND
TECHNOLOGY IN TEACHING IN ICT
CHAMPION SCHOOLS IN MACHAKOS
SUB-COUNTY**



**for the period ending:
17th January, 2019**

.....
**Applicant's
Signature**


.....
**Director General
National Commission for Science,
Technology & Innovation**

CONDITIONS

1. The License is valid for the proposed research, research site specified period.
2. Both the Licence and any rights thereunder are non-transferable.
3. Upon request of the Commission, the Licensee shall submit a progress report.
4. The Licensee shall report to the County Director of Education and County Governor in the area of research before commencement of the research.
5. Excavation, filming and collection of specimens are subject to further permissions from relevant Government agencies.
6. This Licence does not give authority to transfer research materials.
7. The Licensee shall submit two (2) hard copies and upload a soft copy of their final report.
8. The Commission reserves the right to modify the conditions of this Licence including its cancellation without prior notice.



REPUBLIC OF KENYA



**National Commission for Science,
Technology and Innovation
RESEARCH CLEARANCE
PERMIT**

Serial No.A 18287

CONDITIONS: see back page

APPENDIX VI

RESEARCH AUTHORIZATION FROM MACHAKOS COUNTY
COMMISSIONER



THE PRESIDENCY

MINISTRY OF INTERIOR AND COORDINATION OF NATIONAL GOVERNMENT

Telephone: 21009 and 21983 – 90100
Email Address: countycommasaku@gmail.com.
Fax No. 044-21999

OFFICE OF THE
County Commissioner
P.O. Box 1 - 90100
MACHAKOS.

When replying please quote

REF NO: CC/ST/ADM 5/9 VOL II/157

22nd January, 2018

RE: RESEARCH AUTHORIZATION – FLORENCE NDUKU NGULI

The National Commission for Science, Technology and Innovation has authorized the above named researcher to carry out a research on “***Influence of teacher characteristic on Integration of Information Communication and Technology in teaching in ICT champion schools***” in Machakos Sub County for the period ending **17th January, 2019**

Please be notified and accord her necessary assistance.

**COUNTY COMMISSIONER
MACHAKOS
P.O. Box 1 MACHAKOS**

A handwritten signature in blue ink, appearing to read 'Felix Nzioka'.

FELIX NZIOKA
FOR: COUNTY COMMISSIONER
MACHAKOS

APPENDIX VII
RESEARCH AUTHORIZATION: COUNTY DIRECTOR OF EDUCATION

MINISTRY OF EDUCATION
STATE DEPARTMENT OF EDUCATION

Telegrams: **"SCHOOLING"** Machakos
Telephone: Machakos (
Fax: Machakos
Email -cdemachakos@yahoo.com
When replying please quote



OFFICE OF THE
COUNTY DIRECTOR OF
EDUCATION
P.O. BOX 2666-90100,
MACHAKOS

MKS/ED/CDE/U/1/VOL.2/167

22/1/ 2018

Florence Nduku Nguli
South Eastern Kenya University
P.O Box 170-90200
KITUI

RE: RESEARCH AUTHORIZATION.

Reference is made to the letter from National Commission for Science, Technology and Innovation Ref: **NACOSTI/P/18/76270/20615** dated **18th January, 2018.**

You are hereby authorized to carry out your research on, **"Influence of teacher characteristics on Integration of Information Communication and Technology in Teaching in ICT Champion Schools in Machakos Sub-County,"** for a period ending **17th January, 2019.**



SAMWEL BOTO
COUNTY DIRECTOR OF EDUCATION
MACHAKOS

APPENDIX VIII
RESEARCH AUTHORIZATION: SUB-COUNTY DIRECTOR OF
EDUCATION

MINISTRY OF EDUCATION

Telegrams: "SCHOOLING" Machakos
Telephone: Machakos (044) 21800
Fax: Machakos (044) 20646
Email – officemachakos@yahoo.com

When replying please quote

Our Ref: M:KS/GA/60/A/264



SUB-COUNTY EDUCATION OFFICE
P.O. BOX 28,
MACHAKOS.

22th January, 2018

TOM IT MAY CONCERN

RE: AUTHORITY TO COLLECT DATA
FLORENCE NDUKU NGULI

The above named person is a student in South Eastern Kenya University, she is collecting data 'Influence of Teacher Characteristics on integration of Information Communication and Technology in Teaching in ICT Champion schools in Mahakos Sub county'.

Please accord her the necessary assistance.

A handwritten signature in blue ink, appearing to read 'David Ndung'u', written over a circular official stamp.



DAVID NDUNG'U
FOR: SUB COUNTY DIRECTOR OF EDUCATION
MACHAKOS SUB COUNTY