

**DETERMINANTS OF PRINCIPALS' INTEGRATION OF INFORMATION
AND COMMUNICATION TECHNOLOGY IN PUBLIC SECONDARY
SCHOOLS IN MACHAKOS SUB-COUNTY, KENYA**

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**A Research Project Submitted to the School of Education in Partial Fulfilment of
the Requirements for the Award of Degree of Master of Educational
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DECLARATION

This research project is my original work and has not been presented for award of a degree, diploma, or certificate in any other university.

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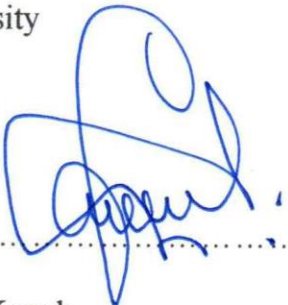
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LIST OF ABBREVIATIONS AND ACRONYMS

CBC	Competency Based Curriculum
CBET	Competency Based Education and Training
CDF	Constituency Development Fund
CDs	Compact Discs
CUE	Commission for University Education
EMIS	Education Management Information System
GOK	Government of Kenya
HOD	Heads of Department
ICT	Information and Communication Technology
IT	Information Technology
K.C.S.E	Kenya Certificate of Secondary Education
KIC	Kenya Institute of Curriculum Studies
KNEC	Kenya National Exams Council
KSSHA	Kenya Secondary Schools Heads Association
LAN	Local Area Network
MoE	Ministry of Education
MoEST	Ministry of Education Science and Technology
NACOSTI	National Council for Science, Technology and Innovation
NEMIS	National Education Management Information System Organization.
NGO	Non-Governmental Organization
OECD	Organization for Economic Cooperation and Development
ROMs	Read Only Memory

SPSS	Statistical Package for the Social Sciences
TAM	Technology Acceptance Model
TSC	Teacher Service Commission
UNDP	United Nations Development Plan
UNESCO	United Nations Education, Scientific and Cultural
UTAUT	Unified Theory of Acceptance and Use of Technology
WWW	World Wide Web

ABSTRACT

Operative ICT integration is very crucial for the management of the public secondary schools in the modern world of technology. This study sought to evaluate the determinants of principals' integration of ICT in public secondary schools in Machakos Sub-County, Machakos County Kenya. The objectives of the study were to: examine the influence of principals' characteristics on ICT integration, investigate how principals' level of ICT literacy affect ICT integration, determine the effects principals' provision of ICT resources on ICT integration and to examine the effects of principals' attitude on ICT integration in public secondary schools in Machakos Sub-County. The study was grounded on two theories: Unified Theory of Acceptance and Use of Technology (UTAUT) developed by Venkatesh, Morris, Davis, and Davis (2003) who aimed at explaining how users accepted IT, their intentions and behavior and the second theory was the Technology Acceptance Model (TAM) by Davis (1989) which was based on factors influencing user adoption and acceptance of technology. The study adopted a descriptive research design. The target population of the study consisted of 44 principals and 528 heads of department (HOD) of the public secondary schools in Machakos Sub-County. A simple random sampling and purposive sampling was utilized to select a sample of nine public secondary schools in Machakos Sub-County where nine principals and 105 heads of department participated in the study. The quantitative data was collected by means of a well-structured questionnaire for heads of departments (HODs) and qualitative data was collected through interviewing the principals to evaluate the determinants of principals' integration of ICT in public secondary schools in Machakos Sub-County, Machakos County. Quantitative data was analyzed through descriptive statistics which included the use of percentages, pie charts, bar graphs, tables and frequencies while qualitative data was analyzed thematically. A pilot study was done among three principals and 30 heads of department of public secondary schools in Kathiani Sub-County and Cronbach alpha (α) was used to test the reliability of the instruments. Validity was proven through expert judgment. Reliability coefficient (r) between the two sets of scores was obtained using Cronbach Alpha Method. If a reliability coefficient of $r \geq 0.75$ was obtained, then it indicated a high internal reliability and the instrument yielded reliability coefficient of 0.75 (75%). The study therefore concluded that principals' characteristics, level of literacy, provision of resources and attitude had significant influence ICT integration. The qualitative data was presented in form of narrative and integrated within the quantitative data. The study concluded that principals' attitude, characteristics, level of ICT literacy and provision of resources influenced the integration of ICT in public secondary schools of Machakos Sub-County, Kenya. The study recommended that the Ministry of Education which is responsible for ensuring that schools offer quality education should allocate an adequate budget to facilitate provision of resources for ICT integration and also train the principals on ICT changes and development to improve their ICT skills.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Information Communication Technology (ICT), according to United Nations Development Plan (UNDP, 2001) has been defined to include the full range of electronic technologies and techniques used to manage information and knowledge. ICT integration in public schools means using digital tools and platforms like computers, internet and communication networks to go beyond basic ICT skills and transform teaching and learning by enhancing curriculum (UNESCO, 2011). Currently worldwide most of the public secondary schools are trying to integrate information technology in learning and teaching.

Felton, (2006) states that in Europe, appropriate use of ICT in school education is considered a key factor in improving quality at this educational level. The European Commission is promoting the use of ICT in learning processes through its eLearning Action Plan, one of the aims of which is “to improve the quality of learning by facilitating access to resources and services as well as remote exchange and collaboration” (Commission of the European Communities 2001, p2). Pelgrum, (2004) argues that in the past decade the use of Information Communication Technology (ICT) in education sector and teaching has been a significance in most European countries but the growth has been lop-sided. Most of continents are facing challenges in adopting information communication in managing the schools.

OECD, (2011) states that in most developed countries such as UK, schools have entrenched the practice of Information Communication Technology (ICT) in teaching and learning into the curriculum and establish high level of operational and suitable use

to sustain teaching and learning. Those countries which have integrated ICT into their education structure for the reason that of its insightful implications such as enabling teachers and students to build rich multi-sensory, interactive environments with almost unlimited teaching and learning potential (UNESCO, 2011). Computers and internet can be used to increase teachers' basic skills and subject mastery, to provide resources that can later be used in classroom, and to help teachers build familiarity with specific instructional approaches (Unwin, 2004).

Clark and Mayor, (2003) indicates that by the end of the 1970s is when the first computers arrived in Africa in the educational institutions. For Africa countries to make development in education need to integrate ICT, however African countries have faced a lot of challenges for instance lack of resources making it to be least in integrating ICT in education relative to other countries globally. This arises from the fact that many developing countries in Africa are still slow in ICT integration.

Studies such as done by Tondeur, Van Keer, Braak and Valcke, (2008) show that sub-Saharan Africa compared with developed countries is lagging behind in ICT literacy, availability of relevant content, affordability and access hence this makes the adoption is slow or absence of ICT in school management. As Wang and Woo (2007) put it, ICT implementation depends on a school's positive communication regarding ICT. Paryono & Quito, (2010) states that African classrooms and schools have also been shaped by ICT.

ICT policies in the East African Community began taking shape in the early 2000s (Farrell and Isaacs 2007), The Ugandan government's most significant ICT investment in the educational sector is the Education Management Information System (EMIS) which aims at providing quality education statistics in a timely, cost-effective and

sustainable manner. This is done through data capture on school facilities and pupil details which is coordinated at the district level and uploaded to the system for national compilation and processing. Districts have been equipped with internet-connected computers and associated peripherals and officials trained in their use (Uganda. MoES Draft ICT Policy, 2005).

Kenya's advancement in ICT integration in the education sector is progressively becoming complex and multidimensional thereby demanding a huge amount of resources in terms of human, financial and physical resources to ensure that secondary schools administration is effective and efficient (Mbatia, 2014). Hence the government of Kenya started to place ICT (Information and Communication Technology) as upper project on presentation such that, it is well synchronized with various sectors of the economy. Integration of ICT in public secondary school environments is reflected to be portion of the broad technological innovation of administration and instruction as well as the electronic government. To enable implementation of ICT policy in the education sector the government of Kenya has over the years capitalized heavily in connecting ICT infrastructure in the country. There has been laying of fiber optic cable across the country; enablement of development of telecommunication, donation of computers, multimedia laboratories, linking schools to Local Area Network (LAN) and other accessories.

The National ICT Policy (2019) promotes the integration of digital technologies in teaching and learning across all levels of basic education and vocational training to prepare the current and future work force for the demands of the digital age. The ICT policy states that improving digital literacy skills among learners is a priority in the educational curriculum, particularly at the basic education level. The Ministry of

Education (2021) asserts that acquiring 21st century skills in the Competency-Based Curriculum (CBC) and Competency-Based Education and Training (CBET) requires digital literacy as a core competency in the teaching and learning process. The ICT policy states that digital literacy integration into education enhances learning outcomes in all educational levels. This is anchored on the Kenyan 2010 constitution, Basic Education Act 2013, the Sessional Paper No.1 of 2019, and international protocols. ICT integration in public schools fosters the learner with the 21st century skills like communication and collaboration, critical thinking, problem solving and creativity through technological learning enabling the learner to develop digital literacy, information literacy and media literacy adapting for future careers.

To guarantee operational ICT integration in school administration the government of Kenya has positioned in place Vision 2030 which purposes at creating Kenya a recently technologically advanced middle-income country providing quality life for the citizens by the year 2030. The vision of Ministry of Education Science and Technology (MoEST) is to facilitate ICT as a universal tool for education and training. In order to achieve this vision, in every educational institution, teachers, learners and the respective community should be equipped with appropriate ICT infrastructure, competencies and policies for usage and progress (GoK, 2006). According to Farrell (2007) the government of Kenya placed considerable emphasis on the importance of ICT in schools. ICT integration in public schools fosters the learner with the 21st century skills like communication and collaboration, critical thinking, problem solving and creativity through technological learning enabling the learner to develop digital literacy, information literacy and media literacy adapting for future careers.

The introduction of innovative technological applications in schools is connected with changes not only at the school level but also in carrying out administrative tasks such as Kenya Certificate of Secondary Education (K.C.S.E) online registration, timetabling, keeping learner records, NEMIS, library system, instructional supervision, students administration (krishnaveni & meenakumari ,2010) ,personal administration, financial administration and library services . For the above benefits to be reaped the school principals should provide support and visionary leadership (Fu, 2013). Also train the teachers on application of ICT skills and knowledge on teaching and learning, preparing notes and lesson plans using available resources.

Blake (2000), states that ICT has been mostly integrated in administration of staff which will include work allotment and recruitment of administrative staff and teaching, monitoring their attendance and managing leave and in performance appraisal. Background or suitable training to feel confident in dealing with technology is required (Stuart 2009). Yuen, Law and Wong (2003), founded out that to enhance the daily school routine schools have to introduce ICT in programming, solving individual or groups problem and updating the evaluation of school programme. School administration is a key determinant for the realization of desired outcomes and success in schools and hence it is viewed as critical by all education stakeholders. Ng, Miao and Lee (2006) observe that the twenty first century school administrator faces numerous challenges emanating from ICT integration.

Afshari, (2012) states that secondary school leadership is a significant factor in the actual ICT integration in school administration. Studies have shown that principals are key factor in integrating ICT in school administration because they are the managers hence, they apply the skills to manage learning and teaching in the school. Cox (2009)

found out that use of ICT in school management made their administration more efficient.

ICT has been integrated into public schools in Kenya over technology for both teaching and administrative purposes which include using interactive digital whiteboards, e-book, online educational platforms, digital learning tools and devices for learners to contact resources and participate in hand-on activities. This integration enhances learning efficiency, provides access to a wider range of educational materials, facilities collaborative and interactive lessons and helps teachers manage administrative tasks and student records.

The status of ICT integration in public schools is regularly varying and limited with many schools besieged to change past basic uses like typing exams to truly leveraging technology to improve teaching and learning. While the government may have guidelines and allocate devices, effective ICT integration is hindered by factors like insufficient teacher training, minimal technical support, limited or costly internet access and general minimal understanding of how to use ICT effectively within curriculum.

ICT integration is important in public secondary schools because it enhances learner enthusiasm and contact to information hence providing vital digital skills for the future. It also advances teaching and learning effectiveness through engaging resources therefore streamline school administration and capitals management.

Some of the current challenges in integrating ICT in public secondary schools include insufficient funding for the hardware and software, minimal essential infrastructure like stable internet and power, limited teacher training and resistance to new technologies

and significant digital divide among schools and students, insufficient time for teachers to adapt to ICT tools and poor maintenance of existing ICT resources.

The current study intends to examine whether principal's characteristics affect the integration of ICT in public secondary schools where these traits include age, gender and academic qualification whereby they influence the principals adopting and supporting use of ICT in school management. The study attempted to find out principals' attitude towards integrating ICT in school management, their interest and use of IT. The principals require the skills to apply and use ICT in school administration. The study also attempted to link principals' level of ICT literacy with integration of ICT in public schools where there is need for training on the developments in ICT, the software's and programs. The study attempted to examine whether principals' provision of ICT resources have influence on the IT use in school management among the principals in Machakos Sub-County.

According to Machakos County Director Office (2025) only nine public secondary schools in Machakos Sub-County which have integrated ICT in school management. It is in this light the study aims to examine the extent to which principals' characteristics, principals' level of ICT literacy, principal's provision of ICT resources and principals attitude affect principal's integration of ICT in school administration Machakos Sub-County.

1.2 Statement of the Problem

While some countries have reported up to 41% of ICT integration in school management, administration and learning the portion remains substantially low in Kenya despite the huge amounts invested in ICT (Ng, Miao and Lee, 2010). According to Machakos County Director Office (2025) only nine public secondary schools out of

44 public secondary schools in Machakos Sub-County which have integrated ICT in school management. RoK (2006) asserted that Kenyan public secondary schools there is a substantial technological delay lag. Despite the importance of ICT in schools and the strategies developed by the government and other stakeholders, as formulated in sessional paper no. 1 of 2019, research has revealed that several schools were not efficiently implementing ICT to support teaching, learning and management in school. The increase in school population, complex goals/objectives, resources and programs within the school, call for a better use of information system technologies. Therefore, the aim of this study is to determine the determinants of Principals' implementation of ICT integration in Public Secondary Schools in Machakos Sub- County.

1.3 Purpose of the Study

The study intended to investigate the determinants of Principals' integration of ICT in administration of Public Secondary Schools in Machakos Sub-County.

1.4 Objectives of the Study

The following research objectives guided the study;

- i. To examine the influence of principals' characteristics on integration of ICT in public secondary schools in Machakos Sub-County.
- ii. To investigate how principals' level of ICT literacy affect integration of ICT in public secondary schools in Machakos Sub-County.
- iii. To determine the effects of principals' provision of ICT resources on integration of ICT in public secondary schools in Machakos Sub-County.
- iv. To examine the effects of principals' attitude on integration of ICT in public secondary schools in Machakos Sub-County.

1.5 Research Questions

- i. To what extent does the principal's characteristics influence integration of ICT in public secondary schools in Machakos Sub-County?
- ii. How do the principals' level of ICT literacy have influence on integration of ICT in public secondary schools in Machakos Sub-County?
- iii. In what ways does the principal's provision of ICT resources influence integration of ICT in public secondary schools in Machakos Sub-County?
- iv. How does principals' attitude influence integration of ICT in public secondary schools in Machakos Sub-County?

1.6 Significance of the Study

The research may aid the government in realization of the targeted Vision 2030 through growth and development because education is a key sector that determines the growth and development of the Country.

In addition, this research may also be beneficial to school principals and teachers as they want to learn the benefits of ICT integration in school administration and teaching. ICT may help improve on the collection, analysis, synthesis, storage, distribution and sharing of information to improve school leadership and governance.

It may also may assist MoEST in formulation of policies and strategies enhancing education, policy makers in making decision hence enhancing efficiency and effectiveness administrative duties in secondary schools, the parents may benefit by communicating with the teachers on progress of their kids.

KNEC (Kenya National Examination Council) may also gain by defining which method of instruction can be applicable for better achievements in examinations in schools. The study may similarly help future investigators who will get firsthand

information and meet experts in various fields, other researchers and fellow investigators. The study outcomes may be used to facilitate ICT integration in learning and teaching progression for both teachers and students.

It may also help the teacher educators in universities to have change on teaching methods from the traditional teacher-centered approaches to heuristic styles.

The Commission for University Education (CUE) and Kenya Institute of Curriculum Development (KICD) may benefit from the findings on how to enable further improvements in equipping the principals with required management skills in ICT through teacher training curriculum.

Teacher Service Commission (TSC) may also use the findings in selection and promotion of principals and recruitment of teachers. Also Kenya Schools Heads Association (KSSHA) may benefit from the findings of the study through conducting principals' seminars and conferences.

1.7 The Scope of the Study

The research aimed at evaluating the determinants of principals' integration of ICT in Public Secondary schools. There are many public secondary schools in the country but the research aimed to concentrate on those public secondary schools in Machakos Sub-County. It was assumed that the public secondary schools in the County gave a reflection of what is happening in other parts of the country. The target population of the study consisted the 44 principals', 528 heads of departments (HOD) of the 44 public secondary schools in Machakos Sub-County

1.8 Limitations of the Study

The limitations for this study were; Some respondents did not answer to all the items given in the questionnaires. To curb this the researcher used interview with the principals to supplement the data. It was difficult to guarantee that the respondents were honest in their responses. This was addressed by clarifying to the respondents the ICT concepts and terms during the administration of the research instruments and assuring them that privacy will be held. The study was descriptive in nature using both quantitative and qualitative methods. Nevertheless, the study was restricted to one sub-county which indicates there is need for attention before generalizing the results to a bigger population.

1.9 Delimitations of the Study

This study focused on the public secondary schools in Machakos Sub-County. Although the demographics of Machakos Sub-County is verified, the small population and sample size limited the implementation of this study in other counties and regions. Besides, the duration of this study also limited the number of observations analyzed. The methodology used was only limited to primary sources. This study focused exclusively on utilization of ICTs in administration but did not focus on ICTs utilization on other aspects in education like teaching and learning. The study focused only on the four determinants; principals' characteristics, level of ICT literacy, minimum level of ICT resources and principals' attitude but there are other determinants.

1.10 Assumptions of the Study

The study was based on assumptions that there were some principals who were integrating ICT in management. The study also assumed that public secondary principals in Machakos Sub-County had the required knowledge about ICT integration in school management and were using the same to perform their duties in managing the

schools. It was assumed that the respondents were familiar with the concept of implementing ICT integration in school management hence the information that they gave in the questionnaires was honest and reliable and was able to provide the information necessary for the study.

1.11 Operational Definition of Terms

Administration	This is the formalized system implemented by the relevant authority to, supervise, plan and make decisions about various activities that takes place in an institution.
Attitude	It is basically the way a school principal thinks, perceives and feels about ICT integration in school administration.
ICT Resources	These are the ICT tools that can be used for the purposes of secondary school administration. For example, computers, internet, telephone, printers and scanners
Information Communication Technology (ICT)	Refers to a diverse set of technological tools and resources used to transmit, store, create, share, or exchange information.
Integration	Refers to using any ICT tool such as the internet, e-learning technologies, CDs and ROMs to assist in the administration of the school.
Level of ICT literacy	Is the ability of handling a wide range of various computer applications for various purposes in the appropriate way.
Public Secondary Schools	These are intermediate schools between the primary and the tertiary levels that are sponsored and financed by the government.
Determinants	These are the factors that influence/determining the nature or the results of something.
Principal's Characteristics	These are the administrative traits possessed by the principals as administrators.

ICT Integration	It is the procedure of defining where and how technology fits in the teaching and learning set-up.
Training	This involves advancing or getting more skills and knowledge on applying ICT in teaching and learning.
School Level and System Level	These are categories of different schools we have and the resources used.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents detailed information on review of literature on determinants of principals' integration of ICT in public secondary schools and tries to evaluate its effects on the administration of the various public secondary schools. The review is divided into the following; ICT integration, principals' characteristics, principals' level of ICT literacy, minimum level of ICT resources, principals' attitude.

2.2 Information Communication Technology Integration in Schools

In Australia, Felton, (2006) conducted a quantitative study on 369 secondary school principals to assess the level of their ICT integration and their perceived competencies in ICT integration. 95.2% of the principals utilized computers at home and school. The study also revealed that the main ways of ICT integration was sending school and related personal related e-mails as well as receiving them and accessing the World Wide Web (www) while construction of spreadsheets, databases and presentations was much less common. A study by Gakuu and Kidombo (2010) on pedagogical integration of ICT in selected Kenyan secondary schools observed that most secondary schools in Africa use computers as an object of study rather than a tool for teaching and learning. The results of the study showed that ICT integration in school administration is influenced by the school's ICT policy and school managers' level of ICT skills.

According to Wango (2009), to have legible and presentable work computers have to be integrated in secondary school management. For instance, we have lesson plan, records of work, teacher's notes, class lists, results analysis, classroom tests and schemes of work; allowing availability of making more copies to the students, parents

and teachers. For instance, making report cards for the students and newsletters; therefore official papers can easily be modified to advance arrangement, appearance and truthfulness using the cut and paste skill; Enormous quantities of data relating to students, employees, schemes of work ,examination results, pictures of school purposes and mails can be simply put in storage on a computer; A modest programme can do a huge sum of work like editing, typing a document, accounting, examination results analysis and grouping students by type of class or dorms.

Sife, Lwoga, and Sanga, (2007) reported that administrative support is critical to the successful integration of ICTs into teaching and learning processes. It can be argued that administrators can provide the conditions that are needed, such as putting in place an ICT policy, incentives and resources. He stated that for the adoption of ICTs to be effective and sustainable, administrators themselves must be competent in the use of the technology, and they must have a broad understanding of the technical, pedagogical, administrative, financial, and social dimensions of ICTs in education. Schiller, (2003) indicated that Integration has a sense of completeness or wholeness through which all the basic elements of the system are faultlessly joint together to make it complete. Empirica (2006) argues that importance of ICT in educational management is quite evident worldwide especially in Europe and USA and ICT was first used in educational institution in North America in 1970s

The experience Kenya is undergoing on integration of ICT has been little even with the ministry of education and government purpose to support ICT integration resourcefulness and this is due to some factors like inadequate resources, skills and technical assistance.

2.3 Principals' Characteristics and ICT Integration in Public Secondary Schools

The principal characteristics included academic qualification age and gender. On academic qualification scales that measure individual use of computers and the internet and the attitude towards computers tend to increase with literacy proficiency of individuals (Borgans & Ter Weel, 2004). Principals' academic qualification is a significant characteristic of a leader during ICT integration process. According to investigation carried out on the relationship between skills and using of ICT (Mohammed 2012) also his findings revealed that as self-skills improve and personal ICT competencies reach high level, interest in ICT is increased.

The younger and less experienced teachers use computers in broad micro transformation fashion and they are more likely to be ICT proficient (Jurich & Haddad, 2005). On age factors, the middle-aged principals are more interested and competent in application of ICT in school administration. The young principals are more skillful in adopting ICT in administration and management of the schools. Chigona, W., Miller, L., Naidoo, M., and Van Belle.J.P. (2006) describe that the comparatively young age of high integrators of ICT is due to the perception of the older teachers that they are nearly retiring from teaching. Researches done in Australia indicate that, the older age profile of principals in the region may have particular consequences for certified improvement in ICT (Schiller 2002). Kabbar and Crump (2006) pointed out that young, male contestants with a comparatively greater educational background were more likely to be integrators than older female contestants with no or little education.

According to the World Bank (2009), gender refers to the socially constructed roles and socially learned behaviors and expectations of women and men in a particular society. The overview of Information Communication Technology (ICT) into the

educational sector produced new social categorizes and gender discriminations (Markauskaite, 2005) he also pointed out that the discovery of the computer has been seen as a male domain. Venkatesh and Morris (2000) demonstrated that female operators used a computer less than males, and recommended the male gender to be one of the greatest significant variables when investigating PC integration in the household.

Literature review showed that in a study that were carried out in five of the 17 countries surveyed in West, East, North and South Africa it revealed that there are occasions where extra women had better knowledge of the internet than men such as Cameroon. However, some studies revealed that gender variable was not a predictor of ICT integration in teaching (Norris, Sullivan, Poirot & Soloway, 2003)

2.4 Principals' Level of ICT literacy and ICT integration in Public Secondary Schools

Schiller (2003) explored the level of the use of computers by principals and their perceived competencies in using various elements in Australia. The study findings showed that a 93.5 percent of the principals used computers in their homes and schools. Their main competence was in the basic packages, such as word processing, databases and sending and receiving emails.

Research on Principals' literacy in Information Communication Technology (ICT) founded out that the syllabuses used for training teachers in developing countries like Kenya faces a lot of prosecutions such as teaching the practical aspect of the technology and ignoring organizational and social traits of ICT hence graduates have shortage organizational and managerial abilities (Makhanu (2010).

Training of school leaders on ICT can have impact on their management. Lack of access to computer hardware and software is one of the reasons that administrators may not use computer technology Chisenga (2006) who also states that Principals should have knowledge and skills applicable on these facilities. Albirini (2006) founded out that before using information and communication technology in the school management and classroom teaching pre-service teacher education can perform an important character in providing chances for carrying out tests with information and communication technology.

A study by Gakuu and Kidombo (2010) on pedagogical integration of ICT in selected Kenyan secondary schools observed that most secondary schools in Africa use computers as an object of study rather than a tool for teaching and learning. The results of the study showed that ICT integration in school administration is influenced by the school's ICT policy and school managers' level of ICT skills. Agba, (2003) in a study done in Tanzania exposed those inadequate skills was one of the challenges limiting integration of ICT resources in Makerere University. Mbatia, (2014) recommended that ICT literacy among principals plays a key role

2.5 Principals' Provision of ICT Resources and ICT integration in Public Secondary Schools

ICT facilities and resources include computer, computer laboratory, electricity, computer network, software, internet and hardware. Using recent hardware and software resource is key to future diffusion of technology (Gulbahar, 2005). The availability of ICT resources for instance hardware and software in public secondary schools in Kenya is a crucial condition to the effective integration of ICT by the

principals in school administration in areas like maintenance of school supplies records and teacher's performance records.

The National ICT in Education Strategy (MoE, 2006), founded out that most of the public secondary schools in Kenya have some computer equipment but due to the high cost the schools often consist of one computer in the office of the school head and very few public secondary schools have enough ICT tools for teachers and students. Even schools that do have computers, the student-computer ratio is 150:1 (Farrel 2007).

Twinomujuni (2011), in his research findings founded out that the high cost of information and communication technology tools is a barrier to information and communication technology implementation in school, others take a different position and consider cost of infrastructure as a less important factor. According to Farrel (2007), some schools with ICT infrastructure have acquired it through initiatives supported by parents, the government, NGOs, or other development agencies and the private sector and this may not be the case in all secondary schools. Relying on support from development agencies like United States agency for international development, world vision and parents to provide for information and communication technology tools might leave many schools unequipped with information and communication technology tools.

To provide the conclusion of this gap, this study will examine the level to which the cost of information and communication technology infrastructure and minimum level of ICT resources has hindered implementation of ICT integration in public secondary schools.

In most Sub Saharan Africa, inadequate technological resources such as lack of hardware and software and the internet, limit individual and school community members to access ICT thereby posing a barrier to its integration with the school administration as well as teaching and learning (Menda 2006). According to Visscher (2003) and Tearle (2004) studies in the United Kingdom, the Netherlands, Malaysia and South Africa agree with the fact that school administrators require facilitation with appropriate ICTs and related infrastructure to optimize ICT integration in their administrative duties.

2.6 Principals' Attitude and ICT integration

Attitude is a predisposition feeling to react in a dependably favorable and unfavorable manner with respect to a certain drive (Jimoyiannis & Komis 2007). On a study on attitude of school principals' and teacher's attitude towards Computers Pelgrum, (2004) noted that the attitude of the school principal will determine if this innovation is going to succeed or fail. Jones and Preece, (2006) reported that both students and teachers need to learn to trust the technology for technological performance as well as enhance the uptake and reduce resistance to technology. Disabled principals find it hard to use ICT tools (Jimoyiannis & Komis 2007). Computer anxiety and teachers' attitudes and beliefs towards the computer use in classroom are two main factors that affect the success of the integration of the ICT into the classrooms (Carter, Cotton, Gibson, simoni, 2013). The personal readiness of school principals to integrate ICT in management is crucial for a school to be developed technologically (Johnstone & Woudbury, 2003).

According to, Gakuu (2006) successful implementation of the ICT initiative it is pointed out that attitude of the principals to the ICT integration in secondary schools is

a serious matter that requires thoughtfulness and examination. He also upholds that as the leader of the school, the principal embraces a very tactical situation in manipulating the decisions and the arrangements of other members of the school community. For example, the attitude that the principals hold to Information Communication Technology (ICT) integration in public secondary schools will significantly distress the teachers and by lee way, attitude of the students, actions and decision towards ICT integration resourcefulness. It is for that reason vital to evaluate the attitude of the principals to the integration of ICT in public secondary schools and institute the part played by principal's attitude towards ICT in influencing the willingness to integrate ICT.

The rationale behind this is that if the system or service will enhance person's job performance it will be considered as useful and thus a person will have a higher motivation to integrate or also refer others use the system as it will help gain positive user-performance relationship.

2.7 Summary of Literature Review

This chapter will present a review of literature in determinants of principals' integration of ICT in public secondary schools. The literature review was acquired from the internet, journal books, government documents and reports. Literature review in previous research suggests that principals' characteristics, principals' level of ICT literacy, minimum level of ICT resources and principals' attitude towards ICT are paramount factors that determine the effectiveness of principals' implementation of ICT integration in the administration of public secondary schools. In the ICT era, school principals must have computing competencies (Felton, 2006). Principals should

practice technology and understand how it can be integrated effectively in school administration, learning and teaching (Schiller, 2003).

Stuart and Remus (2009) discovered the relationship between ICT literacy of school leaders and the purpose to integrate information and communication technology and the outcomes showed that principals who perceived themselves as technology leaders have great intensities of ICT literacy and that they regularly integrate ICT in their administrative and instructional chores. However, capability in operating a computer and utilizing software assistances school principals to be operational in as far as ICT integration is apprehensive.

Therefore, principals as technology leaders should be fluent in ICT integration as aspects such as word processing, spread sheets and presentation software (Attaran & Vanlaar, 2001). Principals should also know how to use the internet to communicate with their staff and the broader community. If school leaders use ICT and realize the advantages of its integration in education administration then ICT integration is likely to be implemented. Anderson and Dexter (2005) suggested that professional development opportunities should be provided for school principals to promote their level of ICT integration and to increase their productivities. In fact, effective training programs help the principals to integrate ICT for accessing and finding information and new knowledge. Furthermore, it helps them to develop processes for effective decision making and problem solving which eventually results in better accountability. In fact, ICT integration has proved to be able to markedly improve the role of principals in the educational process.

2.8 Theoretical Framework.

This study was based on two theories: Technology Acceptance Model (TAM) by Davis 1989 and Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh, Morris and Davis, (2003). These theories were appropriate for the study because they aimed at explaining the intentions of user on system information and their usage behavior. They also predicted on acceptance, adoption and use of information technologies. Several theories can be used to discuss determinants of Principals implementation of ICT integration in Public Secondary Schools.

2.8.1 Technology Acceptance Model (TAM)

Technology Acceptance Model was developed by Davis (1989) which is used to explain the information system usage. The theory includes two factors which are perceived ease of use and perceived usefulness. The model predicts the acceptance, adoption and use of information technologies. The user believes that a particular system will enable him /her perform a particular task for instance in education sector the principals will use ICT tools like computers, printers, scanners, CDs, internet in student administration (student enrollment, registration, results analysis), financial administration (payment of works, school fees payment, auditing), instructional supervision (teaching and learning, preparation of lessons).

It is believed that using a particular technology would free from effort (Davis 1989) therefore in this context principals perceive ease of use of ICT resources viewed as a factor influencing the integration in teaching process and their competence, skills and ability will depend on training, level of school and level of resources.

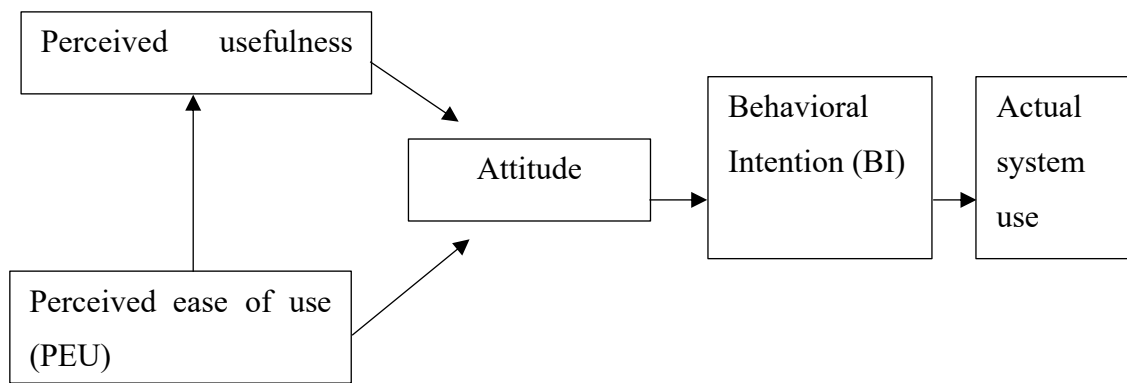


Figure 2.1: Technology Acceptance Model

According to this theory for people to adopt and innovate they should be convinced that performance will improve and get the benefits of technology and the skills to apply. The theory also suggests that when users are offered with changes in technology some aspects affect their decisions and believes on performing their job and will be from effort. Hence principals will notice that the resources of ICT will improve their performance. The theory is relevant to the study because it shows how the principals will adopt ICT to improve their performance in management through innovating in ICT resource.

2.8.2 Unified Theory of Acceptance and Use of Technology (UTAUT)

This theory was developed by Venkatesh and others who aimed at explaining how users accept information technology. The theory intents to explain the intensions of users on system information and their usage behavior. The theory states that there are four basic determinants:

- i. Performance Expectancy (PE)
- ii. Effort Expectancy (EE)
- iii. Social Influence (SI)
- iv. Facilitating Conditions (FC)

Venkatesh, Morris and Davis, (2003) defined performance expectancy (PE) as the degree to which an individual believes that using the technology will help him or her to attain gains in job performance. Users find technology useful to them because it enables them to accomplish their duties and activities in time effectively and fast, in education set up principals find technology useful in management and administration; Effort expectancy (EE) as the degree of ease associated with the use of the technology. Age and gender affect the use of technology among the users and it depends whether the technology is easy to use in education sector principals age and gender affect their use of technology where the old will not be interested and the male will perform more effective; and social influence (SI) as the degree to which an individual perceives that important others believe that he or she should use the technology. Facilitating conditions (FC) is the degree to which an individual believes that organizational and technical infrastructure required for the support of the technology exists (Venkatesh, Morris & Davis, 2003). Facilitating conditions also involves essential training of the technology operators. These may include resource and technology factors concerning compatibility issues that have an impact on usage (Teo & Noyes, 2011).

Venkatesh, Morris and Davis, (2003) defined user behavior (UB) as the degree to which a person accepts and uses a new technology and behavioural intention (BI) as the measure of the strength of one's intention to perform a specific behavior. Voluntariness of use is the degree to which an individual perceives the use of the technology as being based on free will (Venkatesh, Morris, & Davis, 2003). The theory too proposes that the outcome of these four determinants is weakened by four other variables: age, gender, experience and voluntariness of use as illustrated in figure 1.2 below.

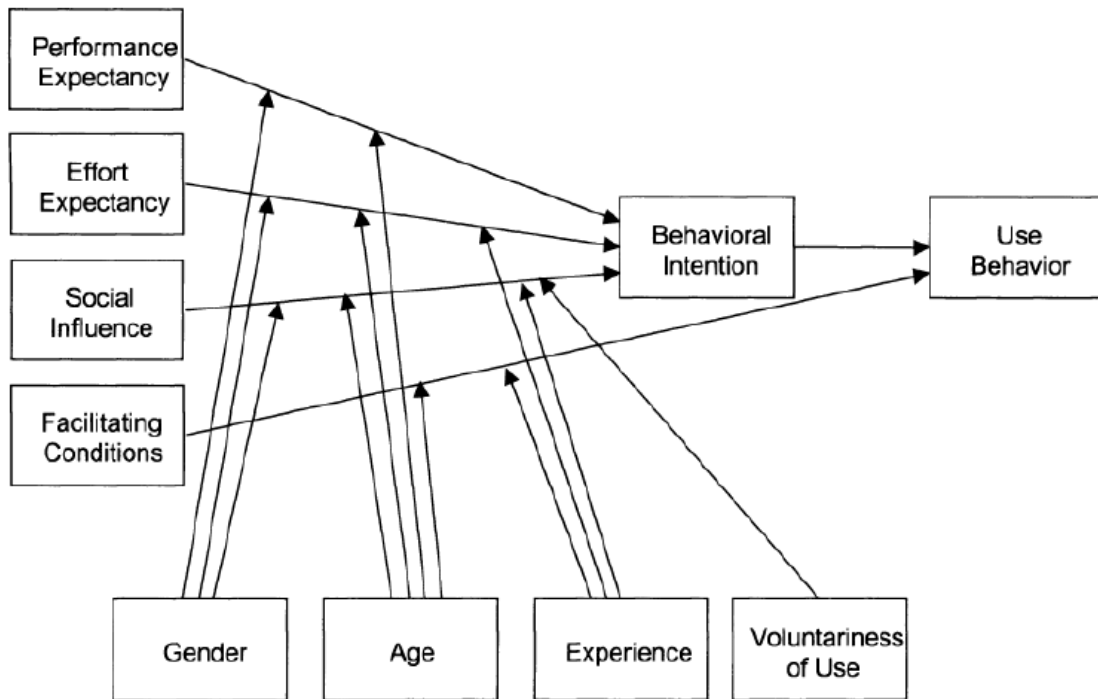


Figure 2.2: Unified Theory of Acceptance and Use of Technology

The theory supports for job effectiveness, ease of use, social influence and existing infrastructure. Recently principals have learnt the efficiency ICTs has led to teaching practice and have always attained the required skills to advance on their capability level. In addition, education stakeholders like the school board members, school administrators, community and government officials will be inspiring teachers to change from the age old “chalk and talk” method of teaching and hold teaching methods that promote innovativeness.

The theory is relevant to this study because it shows some of the factors affecting the integration of ICT in public secondary schools like age and gender depending perception and believe on whether the technology is easy for use and the benefits attained and will it help them attain the job performance.

2.9 Conceptual Framework

A conceptual framework is a diagram research tool, which is intended to assist the researcher to develop awareness and understanding of the situation under study.

Independent Variables

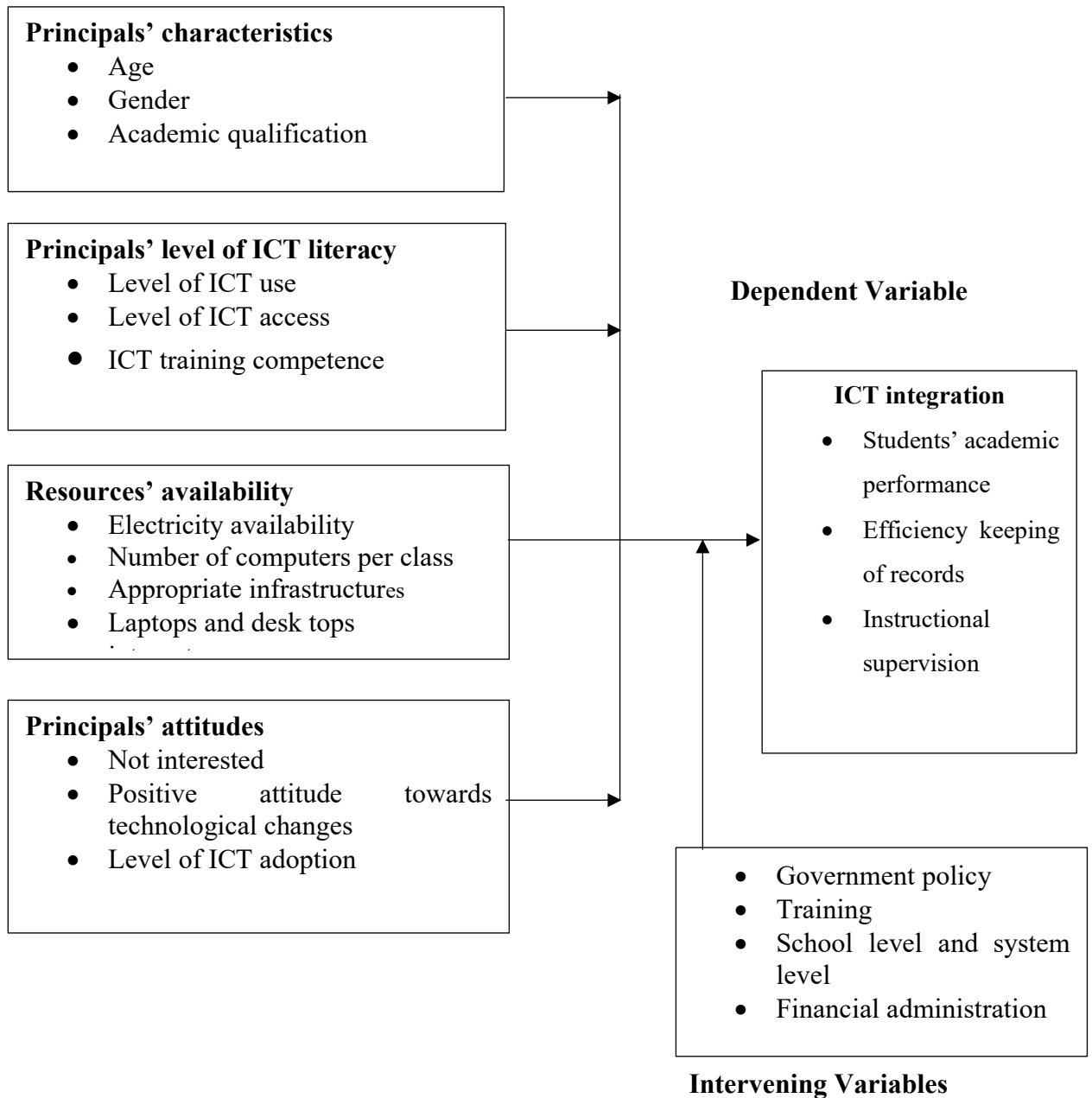


Figure 2.3: Conceptual Framework

Realization of the ICT integration vision in education depends on availability of various variables in schools including among others: Computers, education software, ICT skills and internet connectivity. These variables are taken to affect ICT usage in administration where plans, policies and implementation strategies guide the whole processes. Supportive environment is required in terms of finances, resources availability and technical assistance to principals. Indicators of ICT integration include; competent use of internet, ICT use in administration process like employment of personnel and student administration. Therefore, the independent variables will directly influence the dependent variables (ICT integration) in management to be effective in secondary schools the principals should have the skills to use, be interested in ICT and government ensure availability of the resources. The intervening variables include government policy on ICT integration, training and school and system level which can generally affect the integration. Where if the policy is not made then can be optional

2.10 Research Gaps

Having reviewed the literature, it is clear that integration of ICT in various public secondary schools worldwide is still very low. This is regardless of the fact that determinations by development partners, national governments and non-governmental organizations have seen many of these schools get computers. The role of school culture, leadership support, and vision in successful ICT integration is often overlooked. More research is needed to understand how these factors influence teacher adoption, student engagement, and the overall effectiveness of ICT initiatives. Methodological gaps; other studies have used correlation research design e.g. Ghavifekr, S. & Rosdy, W.A.W. (2015) while the current study used descriptive research design. The current study therefore attempted to link these gaps through

conducting a study on the determinants of principals' integration of information and communication technology in public secondary schools in Machakos Sub-County, using descriptive research design.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter entails the research methodology that was applied throughout the study in achieving the research objectives. Research methodology is the systematic theoretical analysis of the methods applied to a field of study. It presents the research design, location of the study, target population, sample size, sampling procedures, research instruments, validity and reliability of research instrument, data collection procedures, pilot test, data analysis techniques. Mixed research approach was employed that is combination of both quantitative and qualitative methods.

3.2 Research Design

This study adopted the descriptive research design because the method was suitable for this study because it describes the characteristics or behavior of a particular population in a systematic and accurate fashion and uses questioners and interview to collect information about people's attitude, beliefs, feelings and lifestyles. The study was on determinants of principal's ICT integration in public secondary school's management. The design was appropriate as the researcher wished to establish the degree of relationship between ICT integration and the variables such as age, gender, experience, educational level attitude towards ICT and the challenges faced by principals in integrating ICT in school management. Descriptive survey design was appropriate for the study since it described the features of a large population and results were significant even when analyzing multiple variables. According to Schreiber and Asner-self (2011) this research method is able to collect background information and also the researcher has minimal opportunity to influence respondents' responses.

3.3 Location of the Study

The locale of the study was Machakos Sub-County which is 63 Km southeast of Nairobi. It covers an area of 629 km². Machakos Sub-County is 1620m above sea level. Borders Kathiani on North, Mwala on East, Athi River on West and Kajiado on South. It is usually prone to frequent droughts. Agricultural productivity is therefore low in the County. Agriculture is subsistence practiced mostly with fruits, maize and beans. Large amount of produce is traded in open air markets within the sub-county.

Machakos Sub-County was selected even though efforts taken by the Kenyan government on improving principals' implementation of ICT, there is still a low rate of ICT integration in secondary schools within the sub-county. Additionally, the sub-county was chosen because of easy data collection, convenience in terms of time, finance, and accessibility of respondents to conduct a research study from the area.

3.4 Target Population

The population of the study consisted of nine principals and 105 head of departments of the nine targeted public secondary schools in Machakos Sub-County during the time of study.

3.5 Sampling Technique and Sample Size

Sampling is the process of selecting a number of individuals or objects from a population such that the selected group contains elements representative of the characteristics found in the entire group (Orodho & Kombo, 2002). Simple random sampling method and Purposive sampling technique were used in the study to select the public secondary schools where nine principals and 105 heads of the department participated in the study. Simple random sampling was used as responses could be generalized to the whole population while purposive sampling technique was used to

select individuals with knowledge or experience with the phenomenon of interest. According to Mugenda and Mugenda (2013), 10 to 30% of a population sample can be used to determine the traits of the whole population. In this regard, 20% of the school principals and heads of departments (HOD) was taken for this study.

Table 3.1: Target Population and Sample Size

Groups	Population Size	Sample Size	Sample Percentage	Sampling Technique
Principals	44	9	20%	Purposive Sampling
HODs	528	105	20%	Simple Random
Total	572	114	20%	

3.6 Data Collection Instruments

Data was mainly collected using questionnaires, interviews and checklists which were well structured to suit proper data collection. Questionnaires, interviews, and checklists were the most appropriate for this study work because they were the typical method through which descriptive data was collected.

3.6.1 Questionnaires

They were extensively used to gather data on current conditions, practices, opinions, and attitudes quickly and in a precise way (Orodho, 2009). In addition, questionnaires were used because they offered considerable advantages in their administration (Kothari, 2004). The questionnaires were administered to the heads of the department. Questionnaires were preferred for this study because they produced countable information set for statistical analysis.

3.6.2 Interview

Interview was administered to the principals which was structured. To capture the perspectives of the respondents through verbal interaction between the interviewer and the interviewee qualitative interview was essential (Mugenda & Mugenda 2003). In the present study, one principal from each of the nine schools was interviewed once during visits to schools using the interview schedule (Appendix 2) to allow opportunity for in-depth probing and clarifying collected data from the questionnaires. The responses were recorded as notes when the respondents talked, to avoid problems caused by note taking during the interview, the interviewer used shorthand notes. The researcher has to decide which questions to ask and distinguish between five categories of questions namely demographic information (gender, education level, experience), principal characteristics in ICT integration, principals' level of ICT literacy in ICT integration, minimal level of ICT integration and principals' attitude in ICT integration.

3.6.3 Checklist

In this study, observation was conducted using the observation schedule in the course of visits. Field notes were taken during the visits to the schools in order to ascertain information asked for in the questionnaire. The checklist in Appendix IV provided information on availability of equipment and activities carried out using ICT.

3.7 Data Collection Procedure

The researcher obtained an introductory letter from Machakos University permitting conducting of the research. This enabled her to apply for a research permit from the National Council for Science, Technology and Innovation (NACOSTI). This was followed by a formal letter from the office of the sub-county director issued to the principals of the targeted public secondary schools in Machakos sub-county. The

researcher then visited the public secondary schools and formally introduce herself to the administration in order to be allowed to collect the data.

When the validity and reliability of the research instruments was established, the researcher was authorized to conduct the research from the relevant authorities. Once granted the authority, the researcher was sent an advance letter to the nine sampled schools explaining the purpose of the study. All issues pertaining to the rights and responsibilities of the research subjects were explained and the confidentiality of the information gathered assured. The researcher gave adequate instructions to the sampled respondents (105 HODs) who then filled the questionnaire and were discouraged from discussing to avoid biasness. Also, the researcher conducted face to face interview with 9 Principals.

3.8 Pilot Study

A pilot study was carried out in three public secondary schools in the neighboring Kathiani Sub-County as part of the main study. This is a kind of research that happened prior to the main study. Piloting helped in improving reliability and the validity of the data collection procedures as well as in familiarizing with the data collection process (Mugenda & Mugenda, 2005). The purpose of the pilot study was to test logistics and gather information in order to improve the quality of questionnaires, semi-structured interviews and efficiency of data collection procedures to be applied in the research work. Pilot study was also done to identify potential problems and areas of improvement.

3.8.1 Validity of the Research Instruments

The study used content validity which referred to the extent to which a measuring instrument provided adequate coverage of the topic under study (Kothari, 2008).To

ensure validity of data collection instrument, expert opinion were sought from other scholars who were familiar with the topic. Tichapondwa (2013) recommended that the supervisors who were experts in the study area analyzed items framed in a questionnaire to check if they counterpart the demanded neutrality and criteria (clarity and intelligibility). The instruments used for the study were subjected to scrutiny by experts in the areas of educational management in Machakos University. Their corrections on length, ambiguities, wording and structure of the interview schedule and questionnaire were used to restructure and modify the instrument.

3.8.2 Reliability of the Research Instruments

To improve the reliability of the instruments, the researcher, with the help of her supervisors, critically assessed the consistency of the responses on the pilot questionnaires to make a judgment on their reliability. The researcher examined the research instruments for appropriateness of items so as to identify any ambiguous and unclear items. Such items were restated to ensure that the respondents clearly understood them. Test-retest technique was used to establish reliability of the test items. In this case, the test items were administered twice to a group of respondents.

Reliability coefficient (r) between the two sets of scores was obtained using Cronbach Alpha Method. If a reliability coefficient of $r \geq 0.75$ was obtained, then it indicated a high internal reliability and the instrument yielded reliability coefficient of 0.75 (75%). This is because according to Kothari (2005), any Cronbach Alpha value between 0 and 1 implied high internal consistency.

The formulae for Cronbach's alpha is:

$$\alpha = \frac{N \cdot \bar{c}}{\bar{v} + (N-1) \cdot \bar{c}}$$

Where:

- N = the number of items.
- $\bar{c}$ = average covariance between item-pairs.
- $\bar{v}$ = average variance

3.9 Data Analysis Procedures

The study used primary data, both quantitative and qualitative in nature. The quantitative data was analyzed using descriptive statistics where frequencies, percentages and tables were applied. To determine the determinants of principals' integration of information of information and communication technology in public secondary schools correlation analysis was used. This was done with the help of SPSS Version 26. The data findings were presented in tables, charts and other graphs. Qualitative data analysis approach was used to analyze data collected through interviews. The responses were then grouped thematically guided by the objectives of the study.

Table 3.2: Data Analysis Matrix

Objectives	Independent Variable	Dependent Variable	Statistical Tool
To examine the influence of principals' characteristics on ICT integration in public secondary schools in Machakos Sub-County	Principals' characteristics	ICT integration	Frequencies, percentages, pie chart, graphs
To establish how principals' level of ICT literacy affect ICT integration in public secondary schools in Machakos Sub-County.	Principals' level of ICT literacy	ICT integration	Frequencies, percentages, pie chart, graphs
To determine the effects of principals' provision of ICT resources on integration of ICT in public secondary schools in Machakos Sub-County	Minimum level of ICT resources	ICT integration	Frequencies, percentages, pie chart, graphs
To examine the effects of principals' attitude on ICT integration in public secondary schools in Machakos Sub-County	Principals' attitude	ICT integration	Frequencies, percentages, pie chart, graphs

3.10 Ethical Considerations

Ethical considerations included voluntary participation and informed consent from the respondents. The researcher personally administered the questionnaires to the HODs, and interviewed the principals in the selected schools. The consent to participate in the research was applied. An information letter explaining information of the study and the suitable consent letter was spread to partakers and clarification given for them being involved in the study. The respondents were then given a verbal clarification of study objectives. Respondents were assured that utmost confidentiality was observed.

3.11 Logical Considerations

In this study the researcher obtained authority to conduct research from Machakos University. Approval was also sought from the management of the school where data collection was conducted. To conduct this study, a research permit was sought by the researcher from the National Council for Science, Technology and Innovation (NACOSTI) before embarking on the study. A visit to the Machakos Sub-County Education Office was made to discuss the research. Logical challenges included insufficient funds and minimal time during data collection

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents data analysis, interpretation, presentation and discussion of the findings. The responses were analyzed into frequencies, percentages, and presented in tables, figures and in narration form. The purpose of the study was to investigate the determinants of principals' integration of Information and Communication Technology in public secondary schools in Machakos Sub-County, Kenya. Data analysis was done in accordance with the objectives of the study which were:

- i. To examine the influence of principals' characteristics on integration of ICT in public secondary schools in Machakos Sub-County.
- ii. To investigate how principals' level of ICT literacy affect integration of ICT in public secondary schools in Machakos Sub-County.
- iii. To determine the effects of principals' provision of ICT resources on integration of ICT in public secondary schools in Machakos Sub-County.
- iv. To examine the effects of principals' attitude on integration of ICT in public secondary schools in Machakos Sub-County.

4.2 General and Demographic Information

Provided in this section is information on questionnaires return rate, background information of gender of the participants, and ICT integration in the participating schools.

4.2.1 Questionnaire Return Rate

To satisfy the objectives of the study, data was collected from respondents through questionnaires. The questionnaires were administered as designed in the sampling

design (section 3.5). As per the sampling design, nine principals and 105 HODs were sampled to take part in the study. This presented a total sample size of 114. However, although data was collected from all the intended nine principals (100%), in turn 87 HODs – representing (83%) returned their duly-filled questionnaires. Therefore, data for this study was collected from 96 respondents, representing a total return rate of 92%. The researcher was satisfied that the return rates were adequate for data analysis. This view is supported by Best and Khan (2006), who indicated that a response rate of 50% is considered adequate, 60% good and above 70% very good. Therefore, in view of this, the response rate was considered very good and exceeded the threshold postulated by Best and Khan (2006). Results of the questionnaires return rate are summarized in Table 4.1.

4.3 Response Rate

The study had a sample size of 114 respondents. Out of the total respondents, 105 were heads of departments who were to fill in questionnaires and the remaining 9 principals were to be interviewed. The summary of the response rate is shown in table 4.1.

Table 4.1: Response Rate

Respondents	Sample Size	Participants	Non-Participants	Response Rate (%)
Principals	9	9	0	100
HODs	105	87	18	83
Total	114	96	18	92

Table 4.1 indicates 96 respondents had filled in the questionnaire giving a response rate of 92%. This is supported by Best and Khan, (2006) who indicated that a response rate of 50% is considered adequate, 60% good and above 70% very good. Therefore, in

view of this, the response rate was considered very good and exceeded the threshold postulated by Best and Khan.

4.4 Demographic Factors

They were categorized as gender, education level and working experience.

4.4.1 Gender of the Respondents

Of the principals who participated in this study, five were male (56%) while four were female (44%). On the other hand, of the participating HODs, 39 were males (45%) while females were 48 (55%). Therefore, a total of 44 of the participants in this study were male while 53 were female. This information is as presented in Table 4.2.

Table 4.2: Gender of the Respondents

Participants	Males	%	Females	%	Total	%
Principals	5	56	4	44	9	100
HODs	39	45	48	55	87	100
Total	44	100	52	100	96	100

4.4.2 ICT Integration in the Participating Schools

1. Gender

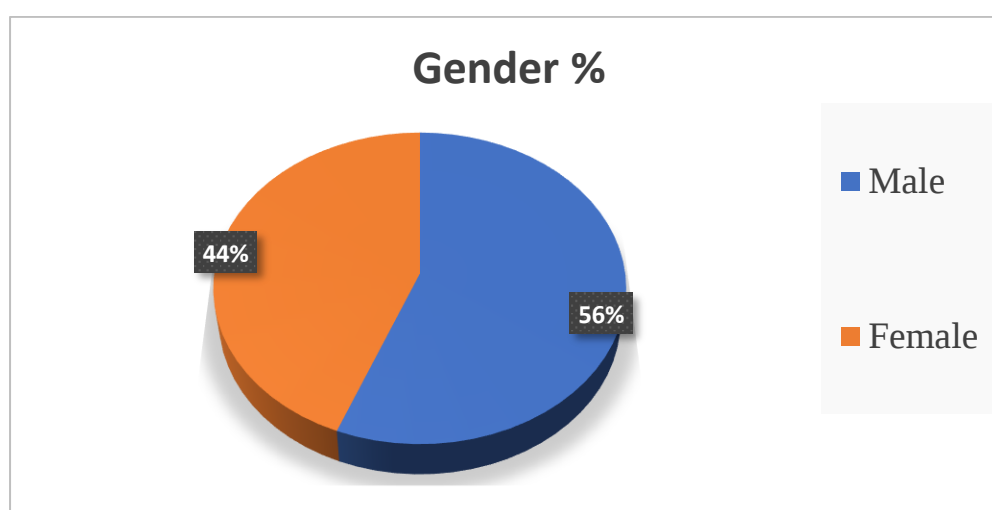


Figure 4.1: Gender of Principals

Figure 4.1 illustrates that 56% of the participants were male while 44% were female. This shows that there are more male principals than female principals in Machakos Sub-County. The HODs were also asked to state their gender. This is shown in figure 4.2 below.

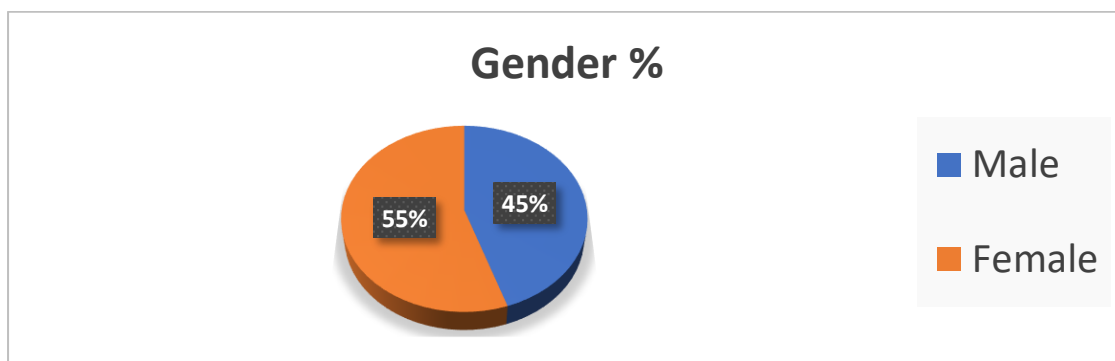


Figure 4.2: Gender of HOD

Figure 4.2 illustrates that 55% of the HODs were female while 45% were male. This shows that there exist gender parity in the distribution of HODs in public secondary schools in Machakos Sub-County.

4.4.3 Highest Level of Education Principals

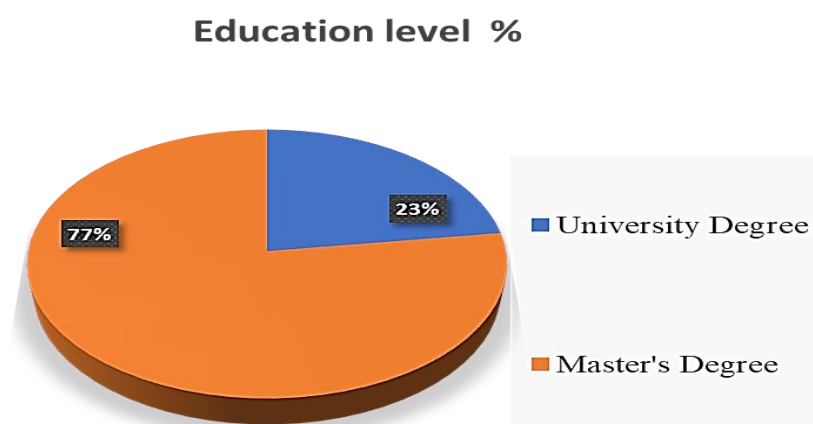


Figure 4.3: Highest Level of Education of the Principals.

From the study findings on figure 4.3 shows that 23% of the respondents had attained university degree as their highest level of education. 77% of the respondents had attained master's degree as their highest level of education. This indicates that majority of the respondents had master's degree hence were qualified to integrate information and communication technology in public secondary schools in Machakos Sub-County.

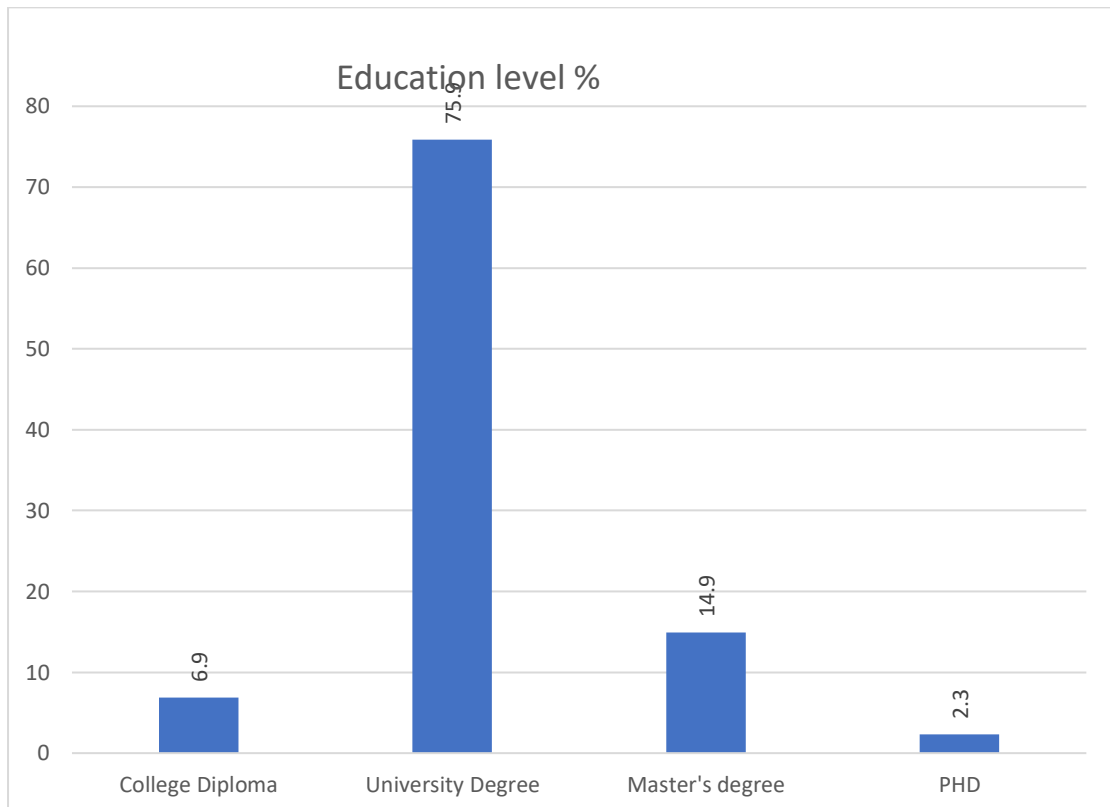


Figure 4.4: Education Level of HOD

From the study findings in figure 4.4 shows that 6.9% had attained a college diploma as their education level. 75.9% had attained university degree as their education level. 14.9% had attained master's degree as their education level. 2.3% had attained PHD as their education level.

4.5 Work Experience of Respondents

The data obtained is shown below.

4.5.1 Principals Work Experience

Principals were asked to state the period of time they have in the management of the school as principal. This is shown in figure 4.5.

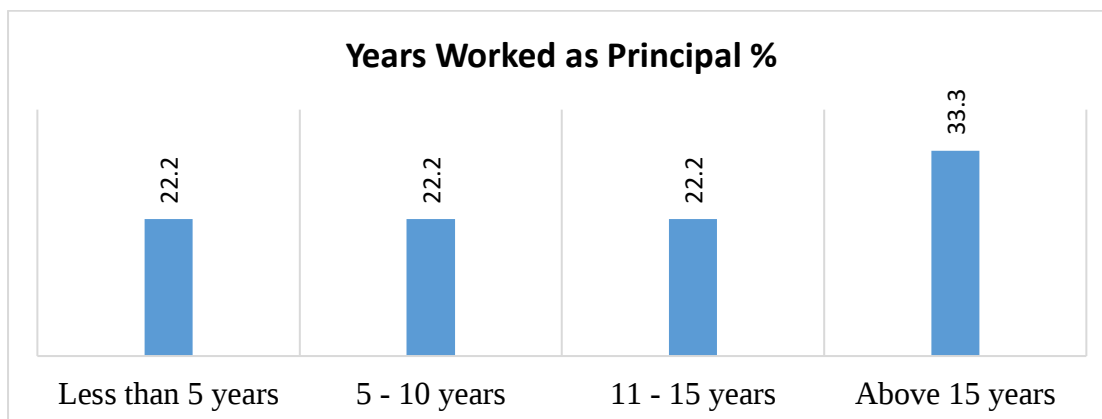


Figure 4.5: Years Worked in the School by Principals

Information in figure 4.5 shows 22.2% of the respondents had less than five years working experiences. 22.2% had 5-10 years of work experience. 22.2% had 11-15 years of work experience. 33.3% had above 15 years of work experience.

4.5.2 HODs Work Experience

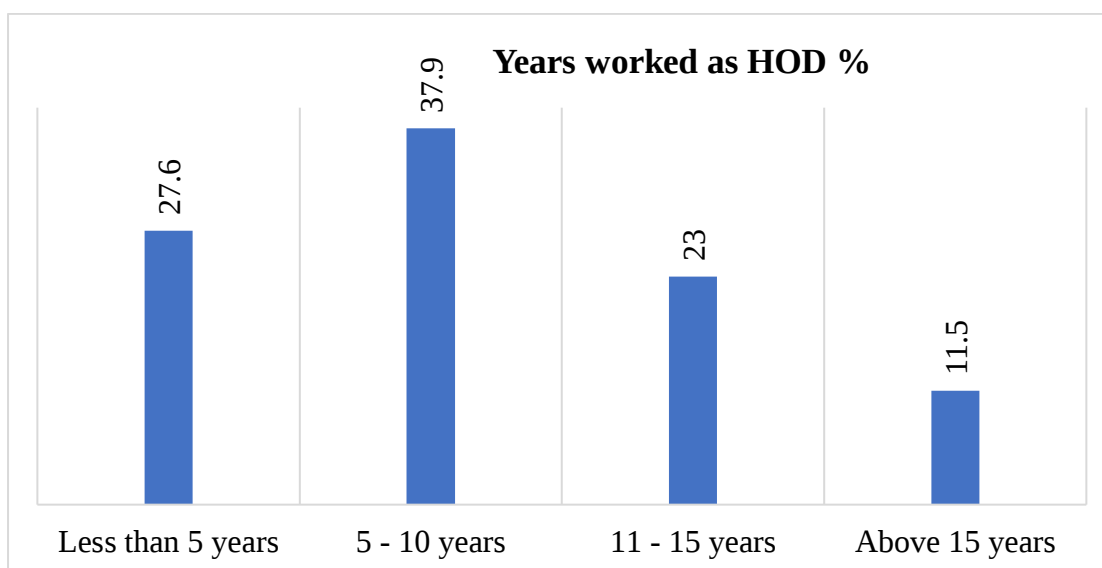


Figure 4.6: Years Worked in School by HODs

From the study findings in figure 4.6 shows that 27.6% had less than 5 years of work experience. 37.9% had 5-10 years of work experience. 23.0% had 11-15 years of work experience. 11.5% had above 15 years of work experience.

4.6 Heads of Department Responses on Principal's ICT Integration in Public Secondary Schools.

The research sought to find out from the heads of department the determinants of principals' integration of ICT in public secondary schools. The findings are shown below.

4.6.1 Influence of Principals' Characteristics on Integration of ICT in Public Secondary Schools in Machakos Sub-County.

In the first objective, the study sought to examine the influence of principals' characteristics on ICT integration in Machakos Sub-County. This was done using descriptive statistics of frequency, tabulations pie chart and percentages. Thematic analysis was also done for the qualitative data findings.

Descriptive Findings.

The findings obtained are shown below.

4.6.2 Middle-aged Principals Have Positive Attitude Towards ICT Compared to Retiring Principals.

1. Age of the principals

The findings obtained are shown below.

Table 4.3: Middle Aged Principals

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	22	25.3	25.3	25.3
Agree	61	70.1	70.1	95.4
Strongly Disagree	4	4.6	4.6	100.0
Total	87	100.0	100.0	

From the information in table 4.3 shows that 95.4% of the respondents agreed that middle aged principals had positive attitude as compared to retiring principals. 4.6% of the respondents disagreed that middle aged principals had positive attitude as compared to retiring principals. Therefore, majority of the respondents agreed that middle aged principals had positive attitude as compared to retiring principals.

The findings concur with (Jurich & Haddad, 2005) that the younger and less experienced teachers use computers in broad micro transformation fashion, and they are more likely to be ICT proficient. The older principals ought to adopt ICT as any other new mechanism that is required to improve teaching and learning processes.

The findings revealed that majority of the older generation lack the educational knowledge of using ICT which makes it more challenging to adopt it due to lack of understanding. However, the younger generation of principals are able to adopt and enforce technology because of the knowledge they possess and the experience they've garnered through ICT utilization.

4.6.3 Males are more interested in ICT Compared to Females

2. Gender of the principals

Table 4.4: Males More Interested in ICT Compared to Females

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	10	11.5	11.5	11.5
Agree	64	73.6	73.6	85.1
Undecided	2	2.3	2.3	87.4
Disagree	4	4.6	4.6	92.0
Strongly Disagree	7	8.0	8.0	100.0
Total	87	100.0	100.0	

From the study findings, 12.6% of the respondents disagreed that males are more interested in ICT as compared to females. 85.1% of the respondents agreed that males

are more interested in ICT as compared to females. 2.3% of the respondents were undecided. The findings agree that males were more interested in ICT as compared to females. The above findings were in tandem with Markaskaite (2005) who pointed out that the discovery of the computer has been as a male domain

One of the principals said;

“The middle-aged principals have the interest and are excited to use ICT unlike the retiring principals who are resistant to ICT integration.”

The findings concluded that the use of computers and ICT in general was easily adopted by the younger generation because it was introduced to them at an early stage in their academic journey. The older principals ought to adopt ICT as any other new mechanism that is required to improve teaching and learning processes. The findings imply that old stereotypic behavior that associates complex and technical stuff the male gender seems to hinder the feminine society from exploiting new opportunities in ICT thus slowing down the process of adopting its integration.

4.6.4 Principals' Background Affects Integration of ICT

3. Background on Technology of the principals

Table 4.5: Principals' Background

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	50	57.5	57.5	57.5
Agree	21	24.1	24.1	81.6
Undecided	7	8.0	8.0	89.7
Disagree	5	5.7	5.7	95.4
Strongly Disagree	4	4.6	4.6	100.0
Total	87	100.0	100.0	

Findings also established that 10.3% of the respondents disagreed that principals' background affect integration of ICT. 8% of the respondents were undecided on whether principals' background affect integration of ICT. 81.4% of respondents agreed that principals' background affect integration of ICT. The findings revealed that principals' background affect integration of ICT in agreement with Schiller (2003) asserting that for the implementation of ICT to be operational and maintainable, administrators themselves must be knowledgeable in the use of the technology, and they must have a comprehensive understanding of the technical, pedagogical, administrative, financial, and social dimensions of ICT in education.

The findings show that the background of using technology, comes from both learning and practically using the technology. These findings are in agreement with Stuart and Remus (2009) who discovered that the relationship between ICT literacy of school leaders and the purpose to integrate ICT showed that principals who perceived themselves as technology leaders have great intensities of ICT and they regularly integrate ICT in their administrative and instructional chores.

4.6.5 Academically Qualified Principals Understand ICT Integration Better

4. Academic Qualification of the principals

Table 4.6: Academically Qualified Principals

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	60	69.0	69.0	69.0
Agree	17	19.5	19.5	88.5
Undecided	4	4.6	4.6	93.1
Disagree	4	4.6	4.6	97.7
Strongly Disagree	2	2.3	2.3	100.0
Total	87	100.0	100.0	

Information in table 4.6 showed that 6.9% of the respondents disagreed that academically qualified principals understand ICT integration in a better way. 4.6% of respondents were undecided on whether academically qualified principals understand ICT integration in a better way. 88.5% of respondents agreed that academically qualified principals understand ICT integration in a better way. The findings affirm the fact that academically qualified principals understand ICT integration in a better way.

4.6.6 Experience of the Principals Matters in ICT Integration

5. Experience in ICT and Management

Table 4.7: Experience of the Principals

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Agree	57	65.5	65.5	65.5
Agree	26	29.9	29.9	95.4
Undecided	2	2.3	2.3	97.7
Strongly Disagree	2	2.3	2.3	100.0
Total	87	100.0	100.0	

Information in table 4.7 show 2.3% of the respondents were undecided on whether the experience of the principals matters in ICT integration. 95.4% of respondents agreed that the experience of the principals matters in ICT integration. The findings show that 2.3% of the respondents disagree that the experience of the principals matters in ICT integration. The findings concur with Peralta and Costa (2007) asserting that teachers with more experience with computers have greater confidence in their ability to use them effectively.

One of the principals said:

“The adoption and use of ICT is influenced by a period of time served in, management and principals who had served for long period in management tend to have exposure to ICT.”

The findings concluded that for ICT integration to be successful, passion, determination, and skills must be combined to bring about a seasoned implementation. Experience, which is an output of the three aforementioned traits is what school leaders ought to possess or being in the process of acquiring those skills. Any challenges that may come along can be handled due to the existence of tools of trade that mitigate any obstacles.

4.7 Investigate how Principals' Level of ICT Literacy Affects Integration of ICT in Public Secondary Schools in Machakos Sub-County.

For the second objective, the study sought to investigate how principals' level of ICT literacy affects ICT integration in public secondary schools in Machakos Sub-County. The objective was addressed through descriptive and qualitative analysis techniques. Quantitative analysis was used on the data and the findings are below based on percentages and frequencies.

Table 4.8: Influence of Principals' Level of ICT Literacy Affecting ICT Integration

Statement	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
I apply and use ICT knowledge in preparing professional documents	0 (0.0%)	0 (0.0%)	0 (0.0%)	34 (39.1%)	53 (60.9%)
I know computers and their functions	0 (0.0%)	0 (0.0%)	2 (2.3%)	33 (37.9%)	52 (59.8%)
I can construct a learning website	10 (11.5%)	31 (35.6%)	15 (17.2%)	24 (27.6%)	7 (8.0%)
I create teaching aids with computers	2 (2.3%)	9 (10.3%)	2 (2.3%)	43 (49.4%)	29 (33.3%)
I use the internet to update and check professional documents for my teachers and students	0 (0.0%)	0 (0.0%)	3 (3.4%)	28 (32.2%)	56 (64.4%)
I teach my teachers and students how to find information on the internet	0 (0.0%)	6 (6.9%)	2 (2.3%)	30 (34.5%)	49 (56.3%)

From the table 4.8, all the respondents agreed that they applied and used ICT knowledge in preparing professional documents. Therefore, the respondents agreed that they applied and used ICT knowledge in preparing professional documents.

The findings were consistent with the assertions of Chisenga (2006) asserting that principals should have the skills and knowledge of how to use a computer and its software packages and ensure that there are enough computing resources that can be distributed in the school.

The table shows that 2.3% of the respondents were undecided that principals knew about computers and their functions. 97.7% agreed that principals know about

computers and their functions. Further, the findings showed that principals knew about computers and their functions.

The findings agree with Schiller (2003) and Chisenga (2006) who argued that training of school leaders on ICT can have impact on their management; lack of access to computer hardware and software is one of the reasons why administrators may not use computer technology.

The findings show that 47.1% of the respondents disagreed that principals can construct websites. 17.2% of respondents were undecided on whether principals can construct websites. Further, 35.6% of the respondents agreed that principals can construct websites. The findings show that majority of respondents disagreed that principals can construct websites.

The findings also lend credence to the assertions by Sandlots (2001), explaining that teachers who acquired knowledge and skills on use of computers led to increased levels of classroom implementation of computers.

The table shows 12.6% of the respondents disagreed that they could create teaching aids with computers. In addition, 2.3% of respondents were undecided on whether they could create teaching aids with computers. 82.7% of respondents agreed that they could create teaching aids with computers. The findings revealed that majority of the respondents agreed that they could create teaching aids with computers.

The findings concur with Albirini (2006), ICT integration can be used to efficiently manage lesson plans, outcomes and prepare objectives that can be covered in upcoming lessons.

Findings indicated that 3.4% of respondents were undecided on whether they use the internet to update and check professional documents for my teachers and students. 96.6% of respondents agreed that they use the internet to update and check professional documents for my teachers and students. The findings imply that majority of respondents agreed that they use the internet to update and check professional documents for my teachers and students.

The findings agree with Schiller (2003) who mentioned that availability of sufficient ICT resources facilitates efficient use and personal proficiency. Principals should ensure that their learning institutions have sufficient resources to ensure that at least there is internet and PC's that can effectively function and serve all the people in the school society.

The study findings show that 6.9% disagreed that the principal guides teachers and students on how to find information on the internet. 2.3% of respondents were undecided on whether the principal guides teachers and students on how to find information on the internet. 90.8% of respondents agreed that the principal guides teachers and students on how to find information on the internet. The findings imply that majority of the respondents agreed that the principal guides teachers and students on how to find information on the internet.

The researcher also interviewed principals to determine the influence of the principals' level of ICT literacy affects implementation of ICT integration. A school manager who was an interviewee asserted the following:

“It is challenging for a principal to commence the implementation of ICT if he/she lacks basic understanding of the benefits that can be derived. As school leaders we must learn the basic computer packages to have grasp of how to work with computers.”

In another outcome, a principal said;

“Most of us we are not updated on the changes and developments in ICT integration. Most of the principals lack skills in new software’s, programs, websites and have no formal trainings.”

These findings concur with Visscher (2003) and Tearle (2004) who indicated that school administrators require facilitation with appropriate ICT and related infrastructure to optimize ICT integration in their administrative and academic duties.

The findings support that to ensure that principals and teachers have knowledge about computers and their functions, it should be mandatory that holders of positions of management in secondary schools must possess basic knowledge and experience in computer packages. Additionally, schools must ensure that there are enough computer resources for staff and students to facilitate use by management and continuous knowledge development for students. This will gradually enhance ICT integration in secondary schools in Machakos sub-county.

The findings concluded that ensuring that teachers are well trained in using ICT equipment will enhance their teaching and learning processes. Additionally, ICT integration can be used to efficiently manage lesson plans, outcomes and prepare objectives that can be covered in upcoming lessons. Principals should ensure that their learning institutions have sufficient resources to ensure that at least there is internet and PC’s that can effectively function and serve all the people in the school society.

4.8 Determine the effects of principal’s provision of ICT resources on integration of ICT in Machakos Sub-County.

The third objective sought to determine the effects of principals’ provision of ICT resources on ICT integration in public secondary schools in Machakos Sub-County. This was based on descriptive and thematic analysis using data collected from the heads

of the department using a semi-structured questionnaire. Quantitative analysis was used on the collected data. This was based on descriptive statistics on the effects of principal's provision of ICT resources on implementation of ICT integration. The findings are shown below.

Table 4.9: Effects of Minimal level of ICT Resources on ICT integration

Statement	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
The Internet is used in our school	7 (8.0%)	7 (8.0%)	0 (0.0%)	40 (46.0%)	33 (37.9%)
Projectors and whiteboards are used in our school for teaching and learning purposes	14 (16.1%)	23 (26.4%)	0 (0.0%)	29 (33.3%)	21 (24.1%)
Compact discs are used in storing administrative information	11 (12.6%)	12 (13.8%)	0 (0.0%)	36 (41.4%)	28 (32.2%)
We have adequate computer resources	5 (5.7%)	5 (5.7%)	7 (8.0%)	50 (57.5%)	20 (23.0%)
There are scanners and printers for printing exams and documents	4 (4.6%)	4 (4.6%)	0 (0.0%)	20 (23.0%)	59 (67.8%)
Power points are greatly used in presentation purposes	7 (8.0%)	28 (32.2%)	0 (0.0%)	26 (29.9%)	24 (27.6%)
There is a standby power generator in our schools and an electricity supply	36 (41.4%)	21 (24.1%)	5 (5.7%)	9 (10.3%)	16 (18.4%)

Information in table 4.9 indicate that 83.9% of the respondents agreed that internet is used in their school. However, 16% of the respondents disagreed that internet was used in their school.

The findings of the study indicate that 57.5% of respondents agreed that projectors and whiteboards are used in our school for teaching and learning purposes. However, 42.5% of the respondents disagreed that projectors and whiteboards are used in our school for teaching and learning purposes.

The findings support MoE (2016), public secondary schools in Kenya are expected to have computer equipment that aid teaching and learning, and that they are always provision in the Constituency Development Fund (CDF). The implication of this findings is that in future, the government ought to allocate more resources to ensure that every class has the resources because in some cases, these resources are shared and there may be timetable clashes where two classes expect to the same resources leading to indifference on who to issue and who is to be neglected.

The study findings show that 26.4% of the respondents disagreed that compact discs are used in storing administrative information. 73.6% of respondents agreed that compact discs are used in storing administrative information. The findings showed that compact discs were used in storing administrative information within the selected schools. The findings agree with Gulbahar (2005) who asserted that the availability of ICT resources for instance, hardware and software in public secondary schools in Kenya is a crucial condition to the effective implementation of ICT by the principals in school administration in areas like maintenance, storage systems other performance related activities.

The findings of the study showed 80.5% of respondents agreed that they have adequate computer resources. However, 11.4% of the respondents disagreed that they had adequate computer resources and undecided in each case. The study findings are congruent with those of Menda (2006), having sufficient computer resources enables

individuals and school community members to access ICT services which enhances the integration within the school environment. The findings imply that availability of computing resources facilitates continuity in the adaptation and growth of embracing ICT. Users gradually develop confidence, tasks are handled efficiently, and there is cohesiveness in the working environment.

Information in table 4.9 show that 9.2% of the respondents disagreed that, there are scanners and printers for printing exams and documents. 90.8% of respondents agreed that there are scanners and printers for printing exams and documents.

The findings indicated that 40.2% of the respondents disagreed that power points are greatly used for presentation purposes. 57.5% of respondents agreed that power points are greatly used in presentation of purposes.

Findings showed that 65.5% of the respondents disagreed that there is a standby power generator in our schools and an electricity supply. 28.7% of respondents agreed that there is a standby power generator in our schools and an electricity supply. 5.7% of the respondents were undecided. The findings agree with Gulbahar (2005) use of recent hardware software resources is key to future diffusion of technology.

The researcher also interviewed principals to establish the effects of principal's provision of ICT resources on ICT integration in Machakos sub-county. The responses of the principals were congruent with those of head of departments. One of the respondents asserted:

“Allocation of resources has never been an easy task. Budgets may have been created; plans made but it is always a daunting responsibility. The priorities of the school management significantly affect how the budget is created. This mainly depends on the funds available, needs and wants of the school”,

Another principal stated;

“To ensure that ICT resources are available and ensure fairness in its budgeting, a SWOT analysis must be done to ensure that if resources are to be allocated, there must be an expected value that must be derived.”

The findings from this study were in tandem with the data collected from the respondents. Implying that in future, the government ought to allocate more resources to ensure that every class has the resources because in some cases, these resources are shared and there may be timetable clashes where two classes expect to the same resources leading to indifference on who to issue and who is to be neglected. It was vital to note that external storage systems were used to store information. \

However, there are more advanced and secure external storage systems such as USB's and external hard disks. Cloud platforms offer the best backup and recovery options at a very affordable cost. Public secondary schools in Machakos sub-county should seek to implement these mechanisms for safe storage. Availability of computing resources facilitates continuity in the adaptation and growth of embracing ICT.

Users gradually develop confidence, tasks are handled efficiently, and there is cohesiveness in the working environment. From a technological perspective, an organization is only as good as its computing resources and their functionality. Ensuring that you have the optimum items needed as tools of trade and their working efficiently means that the organization appreciates the importance of utilizing ICT as a means to an end.

4.9 Examine the Effect of the Principals' Attitude on Integration of ICT in Machakos Sub-County

The fourth objective sought to examine the effects of principals' attitude on ICT integration in public secondary schools in Machakos Sub-County. Descriptive findings

and qualitative ones were adopted in addressing the objective. Quantitative analysis was used on the collected data. This was done through descriptive statistics related to examine the effect of the principals' attitude on ICT integration in Machakos Sub-County. The findings obtained are shown below.

Table 4.10: The Effects of the Principals' Attitude on ICT Integration

Statement	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
ICT integration is good for school administration	0 (0.0%)	0 (0.0%)	0 (0.0%)	14 (16.1%)	73 (83.9%)
I have strong interest in ICT integration	0 (0.0%)	0 (0.0%)	0 (0.0%)	35 (40.2%)	52 (59.8%)
Principals' not are interest on ICT affect administration	14 (16.1%)	7 (8.0%)	8 (9.2%)	33 (37.9%)	25 (28.7%)
Principals' are not concerned about ICT integration systems	10 (11.5%)	29 (33.3%)	5 (5.7%)	18 (20.7%)	24 (27.6%)
I am interested in acquiring further ICT knowledge	0 (0.0%)	0 (0.0%)	0 (0.0%)	35 (40.2%)	52 (59.8%)
ICT is difficulty to understand	48 (55.2%)	34 (39.1%)	4 (4.6%)	1 (1.1%)	0 (0.0%)

Information in table 4.10 indicate that all the respondents agreed that ICT integration was good for school administration. The findings imply that ICT integration was good for school administration. The study findings are congruent with those of Anderson and Dexter (2005) ICT integration helps in development of processes for effective decision making and problem solving which eventually results to better accountability. Further, the findings showed that the schools had strong ICT integration for administrative functions.

The findings of the study indicated that all the respondents agreed they have strong interest in ICT integration. The findings support Gakuu (2006) posited that for successful implementation of the ICT initiative, the principals' attitude is a serious matter that requires thoughtfulness and examination. The findings revealed that majority of the schools had principals who were concerned about ICT integration systems in school.

The findings imply that training is the best way to deal with challenges of perception and beliefs for teachers and principals who have issues in adopting ICT. They must be shown how the pros outweigh the cons of not implementing ICT.

The study findings in table 4.10 shows 24.1% of the respondents disagreed that principals not interested towards ICT affect administration of public schools. 66.7% of respondents agreed that principals not interested towards ICT affect administration of public schools. 9.2% of the respondents were undecided on whether principals not interested towards ICT affect administration of public schools.

Finding showed that 44.8% of the respondents disagreed that principals are not concerned about ICT integration systems in school. 5.7% of respondents were undecided on whether that principals are not concerned about ICT integration systems in school. 48.3% of the respondents agreed that that principals are not concerned about ICT integration systems in school.

The findings were consistent with the assertions of Woudbury, (2003) Personal readiness of school principals to integrate ICT in management is crucial for a school to be developed technologically. The findings imply if the perception and attitude of the school leader is positive, it will have a nice down shift towards HODs, teachers and

students. The purported challenge will now be viewing an opportunity for growth and increasing efficiency.

The results showed that all the respondents agreed that they are interested in acquiring further

The findings indicated that 4.6% of the respondents were undecided on whether ICT is difficult to understand. 1.1% of respondents agreed that ICT is difficult to understand. 94.3% disagreed that ICT is difficult to understand. The results of this study were backed by Johnstone (2003) who posited that teachers and students need to learn to trust ICT for technological performance as well as enhance the uptake and reduce resistance to technology. From the findings, ICT was found not to be difficult to understand.

The researcher also interviewed the principals to assess the effect of the principals' attitude on ICT integration in Machakos Sub-County. The responses from the interview with the principals supported the feedback from the heads of the department on their attitude on implementation of ICT in secondary schools. One of the principals said;

“One of the main issues that must be addressed in our county is the attitude and perception of school leaders in implementing ICT in our secondary schools.”

In another statement, one of the principals said;

“The only way that we can solve this issue is through training and awareness.”

In addition, a principal involved in the study said;

“I am interested to have the knowledge and skills on ICT because it makes my work easier as an administrator, I can acquire any information from the internet and use of ICT has reduced the manual work and human workforce.”

These findings concluded that utilization of ICT positively impacts learning institutions and organization because the efficiency of hardware, personal computers and laptops,

the software installed perform a variety of tasks that would have taken a lot of time if the manual approach was used. Though school leaders seem to have great interest in ICT integration for management and administrative purposes, they need to believe that its existence is beneficial.

Additionally, the findings indicated that it important to recognize that there is a difference between having an interest and actualizing that interest. Training is the best way to deal with challenges of perception and beliefs for teachers and principals who have issues in adopting ICT. They must be shown how the pros outweigh the cons of not implementing ICT. If the perception and attitude of the school leader is positive, it will have a nice down shift towards HODs, teachers and students. The purported challenge will now be viewed an opportunity for growth and increasing efficiency.

4.10 Use of IT in Management

The study sought to establish the areas where ICT was integrated in school management and recorded the findings shown on Figure 4.7 below.

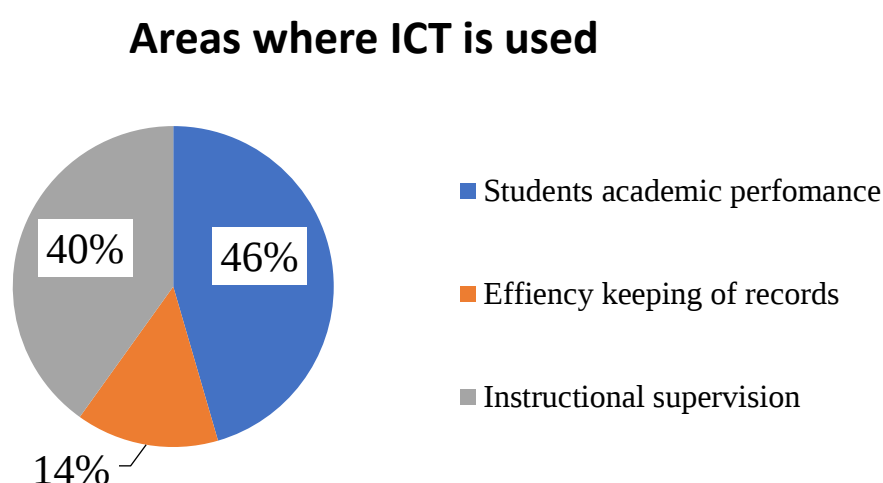


Figure 4.7: Areas of Use of ICT in School Management

From figure 4.7, 14 % of the principals integrated ICT in efficient keeping of records, 40% of the principal's integrated ICT in instructional supervision and 46% of the principal's integrated ICT in student academic performance. This implies that ICT was used in schools and the principals' used ICT in key areas of school management. The findings concur with Wahome (2017) who stated that in management the principals can use ICT to efficiently manage the schools. This study went ahead in pointing out exactly the areas in which ICT was being used in the administration of student academic performance, efficiency keeping of records and instructional supervision. The finding shows that most of the principals used ICT in instructional supervision where they explained that they had computers, internet, projectors in teaching and learning.

Grounded on the outcomes of the study most of the public secondary schools in Machakos Sub-County have used ICT especially in collection of fees and payment of workers. This is to ensure transparency in handling school financial resources. ICT has therefore delivered a number of courses that has made work easier in management and observing of the school accomplishments with just a touch of a button.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter summarized the findings of the study, drew conclusions from them and made recommendations.

5.2 Summary of Findings

This section provides a summary of the findings of the research objectives which included; to examine the influence of principals' characteristics on ICT integration in public secondary schools, to investigate how the influence of the principals' level of ICT literacy affects ICT integration in public secondary schools, to determine the effects of principal's provision of ICT resources on ICT integration in public secondary schools and to examine the effect of the principals' attitude on ICT integration

5.2.1 Examine the Influence of Principals' Characteristics on ICT Integration in Machakos Sub-County.

From the findings the analysis indicated that from the principals characteristics (age, gender, experience and level of education) experience and age influenced most this is because principals experience with the use of technology or computer skills enhances their integration of ICT in management (more experience more skills)

5.2.2 Investigate how the Influence of the Principals' Level of ICT Literacy Affects ICT Integration in Machakos Sub-County.

From the findings of the study most of the principals are not updated on the changes and developments in ICT integration. Principals have not been trained on the new software's and faster processor. Other principals have not undergone the formal training or workshops.

5.2.3 Determine the Effects of Principal's Provision of ICT Resources on ICT Integration in Machakos Sub-County.

From the findings of the study most of the principals have more than 15 operating computers in their schools. All the principals were to operate and use computers in the management roles. The principals used computers resources in storing financial records, invoicing, student administration and payment of works.

5.2.4 Examine the Effect of the Principals' Attitude on ICT Integration in Machakos Sub-County.

From the finding most of the principals had interest in ICT integration. Principals had interest in acquiring new knowledge in ICT integration.

5.3 Conclusions of the Study

The study concluded that principals' characteristics have a positive effect on ICT integration in Machakos Sub-County. Specifically, the study concluded that the various principal characteristics were age, gender, experience and level of education where gender and principals' level of education are not significant in principals' integration of ICT in school administration while age and experience influence principal's ICT integration in public secondary schools in Machakos Sub-County.

The specific aspect of the principals' level of ICT literacy affects ICT integration in Machakos Sub-County the study concluded that most of the principal's skills in ICT influence their integration of ICT in school management where they apply, adopt and the skills in administration of the school. The study has shown that most of the principals had inadequate knowledge and skills required for efficient and effective ICT usage. The study concludes that principal's ICT skills positively influenced ICT integration.

The specific aspect of minimum level of ICT resources on ICT integration in Machakos Sub-County, the study revealed that insufficient ICT resources like internet, computers, whiteboards, and computer labs affect the integration of ICT in public secondary schools. The study concluded that available ICT resources were not adequate hence this affected negatively ICT integration.

Finally, the specific aspect of principals' attitude on ICT integration in Machakos Sub-County, the study revealed that principals attitude influenced the integration of ICT in public secondary school's management where principals interest and motivation on usage and adoption of ICT. The study concluded that principals' attitude influenced positively on ICT integration in school management.

5.4 Recommendations of the Study

The study findings led by researcher to suggest the following recommendations.

5.4.1 Policy Makers

It is essential for policymakers like MOE and TSC to develop and implement comprehensive ICT training programs tailored to the diverse proficiency levels of principals and teaching staff. These programs should be mandatory, ensuring that both current and future school leaders are equipped with the necessary skills. Additionally, incentivizing schools that effectively integrate ICT could drive greater adoption; this could include grants, awards, or extra funding. Regular updates to ICT policies are also crucial to reflect technological advancements and address the evolving needs of educational institutions. These policies should cover areas such as resource allocation, data security, and teacher training.

5.4.2 Universities and Teacher Training Institutions

Universities and teacher training institutions play a pivotal role in preparing future educators. Incorporating ICT literacy into the curriculum is vital, ensuring that teachers graduate with practical knowledge of modern educational technologies. Supporting research into effective ICT tools and practices can help schools make informed decisions. Additionally, providing ongoing professional development opportunities for teachers and school leaders will keep them abreast of the latest ICT trends and tools.

Universities should also prioritize the allocation of sufficient and up-to-date ICT resources for both staff and students. Regular assessments and upgrades of these resources are necessary to maintain their effectiveness. Fostering a positive attitude towards ICT among school leaders and teachers is also crucial. Encouraging them to view ICT as an opportunity for growth rather than a challenge, and providing support and training to address any skepticism, can facilitate smoother adoption. Implementing a structured ICT integration plan with clear goals, timelines, and evaluation criteria will ensure a systematic approach to integrating technology into educational practices.

5.4.3 Government and Private Sector

Collaboration between the government and private sector can significantly enhance ICT infrastructure in schools. Providing discounted or free access to technology and internet services is one way to support schools. Promoting advanced and secure storage solutions, such as cloud platforms, and offering training on their use can also improve ICT management. Additionally, fostering public-private partnerships can leverage resources and expertise, creating a more robust framework for effective ICT integration.

5.4.4 Principals

The principals of public secondary schools should be motivated and encouraged to have a positive attitude towards ICT and continuously be trained and even the staff attend trainings sponsored by board of management. Principals should set aside funds to buy resources like internet, software and computer.

5.4.5 Parents

Parents should encourage their children to possess and use internet and buy them phones and laptops so as to raise the level of students' exposure to growing digital world.

5.4.6 School Librarians

School librarians should be included in ICT developments and be skilled in internet information retrieval skills, this enables them to guide the learners with the information, skills and use of library resources to enhance their skills and knowledge in ICT and science subjects.

5.5 Suggestions for Further Research

The study suggested the following.

- i. Further comparative research is required to investigate the influence of ICT integration in learning and teaching to improve learners achievements.
- ii. To evaluate factors affecting ICT integration in administration of secondary schools.
- iii. To investigate the effectiveness of ICT training among the school administrators on ICT integration in public secondary schools.
- iv. The study was carried out in only one Sub-County (Machakos); similar study should be carried out in other sub-counties in Makueni and Nairobi County.

REFERENCES

- Afshari, M., Bakar, K., Luan, W & Siraj, S. (2012). *Factors affecting the transformational leadership role of principals in implementing ICT in schools*. The Turkish Online Journal of Educational Technology, vol.11 (4), pp. 164-176.
- Albirini, A. (2006). *An exploration of the factors associated with the attitudes of high school EFL teachers in Syria toward information and Communication technology*
- Anderson, R. E., & Dexter, S. (2005). *School technology leadership: An empirical investigation of prevalence and effect*. *Educational Administration Quarterly*, 41(1), 49-82.
- Asan, A. (2003). *Computer Technology Awareness by Elementary School Teachers: A Case Study from Turkey*. [Electronic version]. *Journal of Information Technology Education*, 2(3), 153-164.
- Attaran, M., & VanLaar, I. (2001). *Managing the use of school technology: an eight-step guide for administrators*. *Journal of management development*, 20(5), 393-401.
- Blake, R. (2000). *An Investigation of Technology Competencies of School-Based Administrators in Florida Schools*. Dissertations Abstract International.AAT 9977808
- Bo Hu, (2012) *Education for Migrant Children: Policy Implementation in the Changing Urban Education System in China*. An Unpublished M.Ed. Thesis: The London School of Economics and Political Science.
- Borghans, L., & Ter Weel, B., (2004) *are computer skills the new basic skills in Britain* . *labour economics* .11(1);85-98
- Carter, A., Cotton, S. R., Gibson, P., O'Neal, L. J., Simoni, Z., Stringer, K., & Watkins, L. S. (2013). *Integrating Computing Across the Curriculum: Incorporating Technology*. *Transforming K-12 classrooms with digital technology*, 165.
- Chigona, W., Miller, L., Naidoo, M., & Van Belle, J. P. (2006). *School-level ICT Integration Factors in the Western Cape Schools*. *Department of Information Systems, University of Cape Town*. Proceedings of Fourth IEEE International Workshop on Technology for Education in Developing Countries, 10-12 July, Iringa Tanzania, pp. 57 – 61.
- Chisenga, J. (2006). *Key paper presented at the standing conference of African National and University libraries of Eastern, central and southern Africa* at Crawford Hotel Tanzania on 9th -10th July 2006.
- Clark, R. E., & Meyor, R.E. (2003). *Media in teaching*. In M. C. Wittrock (Ed.), *Handbook of research on teaching* (3rd Ed.).

- Commission of the European Communities The eLearning action plan. *Designing tomorrow's education Directorate General for Education and Culture Brussels 2001* [Google Scholar]
- Cox, M. J., Preston, C., & Cox, K. (2009). What Motives Teachers to use ICT? Brighton: British Educational Research Association Conference.
- Davis, F.D. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *MIS Quarterly*, Vol. 13, No. 3, pp. 319-340.
- Earle, R. S (2002) *the integration of instructional technology into public education: promises and challenges* .ET magazine, 42(1), 5-13
- Empirica (2006). *Benchmarking access and use of ICT in European schools 2006: Final report from Head Teacher and classroom Teacher surveys in 27 European countries*. Germany. European commission.
- Farrell, G., & Isaacs, S. (2007). *Survey of ICT and Education in Africa. A Summary Report, Based on 53 Country Surveys*.
- Felton, F (2006). *The Use of Computers by Elementary School Principals. Doctoral Dissertation*,
- Fu, J. S. (2013). ICT in education: A critical literature review and its implications. *International Journal of Education & Development using Information & Communication Technology*, 9(1).
- Gakuu, C. M. (2006). Analysis of the factors and attitudes that influence lecturer's readiness Published at the Department of Extra Mural Studies (<http://ems.uonbi.ac.ke>)
- Gakuu, C. M., & Kidombo, H. J. (2010). Pedagogical integration of ICT in selected Kenyan secondary schools: application of Bennett's hierarchy. *Continuing and Distance Education*, 1(1), 73-94.
- Ghavifekr, S. & Rosdy, W.A.W. (2015). Teaching and learning with technology: Effectiveness of ICT integration in schools. *International Journal of Research in Education and Science (IJRES)*, 1(2), 175-191.
- GOK (2006) *Session Paper No.1 of 2005 on a policy Framework for Education, Training and Research*; Government printer, Nairobi Kenya
- Gulbaha, Y. (2005). *Technology planning: a Roadmap to successful technology Integration in schools*. Journal of computers and education.
- Jhurree, V. (2005). Technology integration in education in developing countries: Guidelines to policy makers. *International Education Journal*, 6(4), 467-483.
- Jimoyiannis, A. & Komis, V. (2007). *Examining teachers' beliefs about ICT in education: Implications of a teacher preparation programme*. Teacher Development.

- Johnston, A., & Woodbury, S. (2003). Educational reform, personal practical theories, and dissatisfaction: The anatomy of change in college science teaching. *American Educational Research Journal*, 40(3), 731-767.
- Jones, A., & Preece, J. (2006). *Online communities for teachers and lifelong learners: A framework for comparing similarities and identifying differences in communities of practice and communities of interest*. *International Journal of Learning Technology*, 2(2), 112–137.
- Jurich, & Haddad; W, D S (2005) *ICT for Education potential & Potency*. New York
- Kabbar, E.F., & Crump, B. J. (2006). *The Factors that Influence Integration of ICTs by Recent Refugee Immigrants into New Zealand*. *Informing Science: The International Journal of an Emerging Trans discipline*, 9, 111-121
- Kahn, J. H. (2006). Factor analysis in counseling psychology research, training, and practice: Principles, advances, and applications. *The counseling psychologist*, 34(5), 684-718.
- Kenney, A. J. (2006). *The Final Hurdle? A new test may finally bring information literacy the recognition it deserves*. *School library journal*. Accessed July 11, 2008 from <http://www.schoollibraryjournal.com/article>.
- Khan, S. H, Hasan, M. & Clement, C. K. (2012) *Barriers to Introduction of ICT into Education in Developing Countries: The Example of Bangladesh*, *International Journal of Instruction*, 5(2).
- Kombo, D.K. & Tromp, D.H.A. (2006). *Proposal and Thesis Writing*. An Introduction. Africa, Nairobi: Pauline publications, GPO, Kenya
- Kothari, C. R. (2004). *Research methodology: Methods and techniques*. New Age International.
- Krishnaveni, R. & Meenakumari, J. (2010). *Usage of ICT for information administration in higher education institutions – a study*. *International Journal of Environmental Science and Development*. 1 (3):282 – 286
- Laaria, M. (2013) *Leadership challenges in the implementation of ICT in public secondary schools, Kenya*, *Journal of Education and Learning* Vol. 2 No. 1:2013 32-43 <http://dx.doi.org/10.5539/jel.v2n1p32>
- Makhanu, E (2010) *Principals' literacy in ICT: towards improving secondary School Performance in Kenya*. PhD thesis, University of South Africa
- Manduku, J, Kosgey, A. & Sang, H. (2012) *Adoption and use of ICT in enhancing management of public secondary schools: A survey of Kesses zone secondary schools in Wareng District of WasinGishu County, Kenya*
- Markauskaite, L. (2006). *Exploring Differences in Trainee Teachers' ICT literacy: Does Gender Matter?* CoCo (Centre for Research on Computer Supported Learning and Cognition). University of Sydney.

- Mbatia, M. (2014). Factors influencing school principals' integration of ICT in administration of public secondary schools in Githunguri sub county, Kiambu County, Kenya. *Unpublished Masters project, University of Nairobi*.
- Menda, A. (2006). ICT in education: content *issues as Kiswahili* reign; connect-online: Applying knowledge to development.
- Ministry of Education, Kenya, (2006) *National Information and Communication Technology (ICT) Strategy for Education and Training* Government printer, Nairobi, Kenya.
- Mohammed A.E. (2013). Exploring the relationship between teaching staff age and their attitude towards ICT.
- Moyle, K. (2006). Leadership and learning with ICT. *Voices from the profession. Teaching Australia. Australia: Australian Institute for Teaching and School Leadership LTD*.
- Mugenda, A. and O. Mugenda, 2013. *Research methods: Quantitative and qualitative approaches*. Nairobi: ACTS Press.
- Mugenda, O. and Mugenda, A. (2005). *Research methods: Quantitative and qualitative approaches* .2nd. Rev. Ed. Nairobi: Act press.
- Ng, W. K., Miao, F., & Lee, M. (2010). Capacity-building for ICT integration in education. *Digital Review of Asia Pacific 2009–2010*, 67-76.
- Norris, C., Sullivan, T., Poirot, J., & Soloway, E., (2003) no access, no use, no impact; journal of research on technology in education, 36(1), 15-27
- OECD (2011) '*Are students ready for a technology rich world?* What PISA studies tell us?
- Ogula, P.A. (2005). *Research Methods*. Nairobi: CUEA publications.
- Orodho, J.A. & Kombo, D.K. (2002). *Research methods*. Nairobi: Kenyatta University, Institute of Open Learning.
- Orodho, J.A. (2009). *Techniques of Writing Research. Proposal and Reports in Education and Social Sciences*. Kanezja, Maseno, Kenya.
- Paryono, P., & Quito, B. G. (2010). *Meta-Analysis of ICT integration in vocational and technical education in Southeast Asia*. Seavern Journals, 2(1).
- Pelgrum, W.J. (2004). *Obstacles to the integration of ICT in education: results from a worldwide educational assessment*. Computer education. 37, 163-178
- Peralta, H., Costa, F.A. (2007). *Teachers' competence and confidence regarding the use of ICT*. Educational Sciences Journal.
- RoK (2006). *National Strategy for Education and Training, Nairobi Government Printers* Gordon, G. (2003). *Do Principals Make a Difference?* Retrieved 30 August, 2007
- Sandland, S. (2001). Beyond training: implementing a new educational programme.

- Schiller, J. (2003). Working with ICT: Perceptions of Australian principals. *Journal of Educational Administration*, 41(2), 171-185.
- Schreiber, J., & Asner-Self, K. (2011). *Educational research: The interrelationship of questions, sampling, design, and analysis*. Wiley.
- Sessional Paper No. 1 of 2019; integration of ICT in education, training and research; and management.*
- Sife, A., Lwoga, E. & Sanga, C. (2007). New technologies for teaching and learning: Challenges for higher learning institutions in developing countries. *International Journal of Education and Development using ICT*, 3(2), 57-67. Open Campus, The University of the West Indies, West Indies.
- Stegall, P. (1998). *The principal—key to technology implementation. Paper presented at the annual meeting of the National Catholic Education Association, Los Angeles, CA.*
- Stuart, L. H., Mills, A. M., & Remus, U. (2009). School leaders, ICT competence and championing innovations. *Computers & Education*, 53(3), 733-741.
- Teachers Service Commission (TSC). (2007). 10 Key Policies. Teachers' Image: Quarterly Magazine, (13)6: 9-11.
- Tearle, P. (2004) *The Implementation of Information and Communications Technology UK Secondary Schools*. Final report. Exeter:
- Teo, T., & Noyes, J. (2011). *An assessment of the influence of perceived enjoyment and attitude on the intention to use technology among pre-service teachers: A structural equation modeling approach*. *Computers & Education* 57(2), 1645-1653.
- Tichapondwa, M.S. (2013). *Preparing your Dissertation at a Distance: A Research Guide*. Vancouver:
- Tinio, V. L (2003) ICT in Education UNDP-APDI Retrieved from <http://www.apdip.net/publication/iespprimes/eprimosedu.pdf>. Accessed April 2008.
- Tomei, L. A. (2005). *Taxonomy for the technology domain*. USA: Information Science Publishing
- Tondeur, J., Devos, G., Van Houtte, M., van Braak, J., & Valcke, M. (2009). *Understanding structural and cultural school characteristics in relation to educational change: the case of ICT integration*. *Educational Studies*, 35(2), 223-235.
- Twinomujuni, J. A. (2011) Problems in ICT implementation in Selected Institution of Higher Learning in Kabale District
- Uganda ministry of education and Sports, National Curriculum Development Centre. (2005). *Draft policy for information and communication technology in the education sector*. Retrieved from <http://www.education.go.ug/ICT/ICT%20policy%20July%202005.pdf>

- UNDP, 2001. *Creating a digital dynamic: Final report of the Digital Opportunities Initiative* (DOI). New York: UNDP. <http://www.opt-init.org/>
- UNESCO. (2011). *Transforming education: The power of ICT policies*. France: UNESCO.
- Unwin, T (2004). *The Technologies identifying appropriate Solutions for developing needs*. Cambridge University Press
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2000). *User acceptance of information technology: Toward a unified view*. *Management Science*, 46(2), 425-478.
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). *User acceptance of information technology: Toward a unified view*. *MIS Quarterly*, 27, 425–478.
- Visser, A., Wild, P., Smith, D., & Newton, L. (2003). Evaluation of the implementation, use and effects of a computerized management information system in English secondary schools. *British journal of educational technology*, 34(3), 357-366.
- Wahome, P. (2017). *ICT and school financial planning: An analysis of data storage and budgeting efficiency* [Master's thesis, University of Nairobi].
- Wang, Q., & Woo, H. L. (2007). Systematic planning for ICT integration in topic learning. *Educational technology & society*, 10(1), 148-156.
- Wango, G. (2009). *School administration and management: Quality assurance and standards in schools*. Nairobi: Jomo Kenyatta Foundation.
- Woodbury, S. & Johnston, A., (2003). Educational reform, personal practical theories, and dissatisfaction: The anatomy of change in college science teaching. *American Educational Research Journal*, 40(3), 731-767.
- Yee, D.L. (2000). *Images of school principals' information and communications technology leadership*. *Journal of Information Technology for Teacher education*, 9(3), 287-302.
- Yuen A.H.K., Law, N., & Wong, K.C. (2003). ICT Implementation and School Leadership: Case Studies of ICT Integration in Teaching and Learning. *J. Edu. Admin*, 41(2):158-170.

APPENDICES

Appendix I: Letter of Introduction to The Respondents

KIVUITU SCHOLAR MBATHA

MACHAKOS UNIVERSITY

PHONE NO. 0707226873

Dear Sir/Madam,

RE; ACADEMIC RESEARCH

I am a post graduate student of Machakos University pursuing a Master's degree in Education Administration. I am currently undertaking a research project on, **determinants of principals' integration of ICT in public secondary schools in Machakos Sub-County, Machakos County Kenya** as a partial fulfillment of my degree course.

Below is a questionnaire that I request you to complete. I assure that all the data received will strictly be confidential and will be used for the purpose of the study. Again, if you feel this data will be of benefit to this institution, it will be mailed to you upon request.

Your cooperation will be highly appreciated.

Yours faithfully

KIVUITU SCHOLAR MBATHA

Appendix II: Interview Guide for the Principals

Instruction

The purpose of this study is to investigate the determinants of principals' implementation of ICT integration in public secondary schools in Machakos Sub-County. I do kindly request you to put a tick against your appropriate choice from the opinions given in the questions below and indicate your opinion in the open questions.

PART A: Demographic Information

1. Indicate gender: Male { }

Female { }

2. What is your highest level of education?

College diploma { }

University degree { }

Master's degree { }

PhD { }

Other qualifications

(E.g. CPA/ACCA/CIFA) { }

3. Years worked in the school

Less than 5 years { }

5-10 years { }

11-15 years { }

Above 15 years { }

PART B: Principals Characteristics in ICT integration

1. Which of the principals' characteristics (which include age, gender, education level, experience) affect ICT integration most and why?
2. According to you which characteristics influences most and how do they influence?

PART C: Principals level of ICT literacy in ICT integration

1. According to you do principals have the skills and knowledge on how to apply and use ICT?
2. Are the principal updated on changes and developments in ICT integration?

PART D: Minimum level of ICT resources in ICT integration

1. How many operating computers do you have in your school? From the following options.

0	1-5	6-10	15-30	>20

2. Which ICT resources are available in your schools for learning and administration purposes? Name them _____
3. Which of the following activities do you use ICT to facilitate your management;
 - a. Communicating to parents
 - b. Student admission
 - c. Storing financial records
 - d. Invoicing
 - e. Payment of workers

PART E: Principals' attitude in ICT integration

1. In carrying out administrative functions in the school using ICT is exciting.
2. My interest on ICT integration is high true or false?

Appendix III: Questionnaire for Heads of Department (HOD)

Instruction

The purpose of this study is to investigate the determinants of principals' implementation of ICT integration in public secondary schools in Machakos Sub-County. I do kindly request you to put a tick against your appropriate choice from the opinions given in the questions below and indicate your opinion in the open questions.

PART A: Demographic Information

1. Indicate gender: Male { }

Female { }

2. What is your highest level of education?

College diploma { }

University degree { }

Master's degree { }

PhD { }

Other qualifications

(E.g. CPA/ACCA/CIFA) { }

3. Years worked in the school

Less than 5 years { }

5-10 years { }

11-15 years { }

Above 15 years { }

Part B: Principals Characteristics in ICT Integration

Indicate by ticking (✓) in the following table how principals' characteristics affect ICT integration. listed below is Likert scale of 5:SA-Strongly Agree, 4: A-agree, 3: U-Undecided 2:D-Disagree, 1: SD-Strongly Disagree

Principals Characteristics in ICT integration	SA	A	U	D	SD
	5	4	3	2	1
Middle aged principals have positive attitude compared to retiring principals					
Males are more interested on ICT compared with females					
Principals background affect integration of ICT					
Academically qualified principals understand better ICT integration					
The experience of the principals matters in ICT integration					

Part C: Principals level of ICT literacy in ICT integration

Indicate by ticking (✓)in the following table how level of ICT literacy affects the ICT integration. Listed below is Likert scale of 5: **SA-Strongly Agree**, 4: **A-Agree**, 3: **U-Undecided** 2: **D-Disagree**, 1: **SD-Strongly Disagree**

Principals level of ICT literacy in ICT integration	SA	A	U	D	SD
	5	4	3	2	1
I apply and use ICT knowledge in preparing professional documents					
I know computer and its function					
I can construct a learning website					
I create teaching aids with computer					
I use the internet in updating and checking of professional documents for my teachers and students					
I teach my teachers and students on how to find information on the internet					

Part D: Minimum level of ICT resources in ICT integration

Fill in the following table with regard to how minimum level of ICT resources affect effectiveness of principals' integration of ICT. Listed below is Likert scale of 5: **VF**-Very Frequent, 4: **F**-Frequent, 3: **N**-Never, 2: **S**-Sometimes, 1: **R**-Rarely

Minimum level of ICT resources in ICT integration	VF	F	N	S	R
	5	4	3	2	1
Internet is used in our school					
Projectors and whiteboards are used in our school in teaching and learning					
Compact discs are used in storing administrative information					
Adequate computer laboratory and computers					
There is Scanners and printers for printing exams and documents					
Power points are greatly used in presentation of purposes					
There is standby power generator in our schools and also electricity supply					

Part E: Principals' Attitude in ICT integration

Tick where appropriate in regards to your attitude towards ICT integration in school administration in your school. Listed below is Likert scale of 5: **SA-Strongly Agree**, 4: **A-Agree**, 3: **NT- Not True**, 2: **D-Disagree**, 1: **SD-Strongly Disagree**

Principals' Attitude in ICT integration	SA	A	NT	D	SD
	5	4	3	2	1
ICT integration is good for school administration					
I have a strong interest in ICT integration for administrative functions					
Principals not interested towards ICT affect administration of public schools					
Principals are not concerned about ICT integration system in school					
I am interested in acquiring further knowledge on ICT and applying it					
ICT is difficulty to understand					

Appendix IV: Checklist For ICT Integration

S/NO	STUDENT ADMINISTRATION	Use of ICT integration in management	
		Always	little
1.	Students admission e.g. registration and admitting new students		
2.	Performance analysis for the students e.g. result analysis		
3.	Keeping students' records		
4.	Communication with parents		

S/NO	FINANCIAL ADMINISTRATION	Use of ICT integration in management	
		Always	little
1.	Storing financial records		
2.	Invoicing		
3.	Payment of workers and fees		

S/NO	INSTRUCTIONAL SUPERVISION	Use of ICT integration in management	
		Always	little
1.	Teaching and learning		
2.	Preparing notes and classes		
3.	Preparing professional documents e.g lesson plan and schemes of work		

Appendix V: University Approval



MACHAKOS UNIVERSITY
OFFICE OF THE DEAN GRADUATE SCHOOL

Telephone: 254-(0)735247939, (0)723805929 P.O Box 136-90100
Email: graduateschool@mksu.ac.ke Machakos
Website: www.machakosuniversity.ac.ke KENYA

REF. MksU/GS/SS/011/VOL.1 26th April, 2022

The Director,
National Commission for Science, Technology and Innovation
P.O Box 30623,
NAIROBI

Dear Sir

RE: SCHOLAR KIVUITU MBATHA (E55/12799/2018)

The above named is a Masters student in the second year of study and has cleared course work. The University has cleared her to conduct a research entitled: "Determinants of Principals Implementation of Information and Communication Technology Integration in Public Secondary Schools in Machakos Sub-County, Kenya."

Kindly assist her with a Research Permit in order to undertake the research.

Thank you.



PROF. RICHARD PETER, PhD
DEAN GRADUATE SCHOOL

KRP/gmk

 ISO 9001:2008 Certified Soaring Heights in Transforming Industry and Economy

**Appendix VI: Research Authorization Letter (County Director of Education
Machakos)**


REPUBLIC OF KENYA
MINISTRY OF EDUCATION
State Department of Early Learning and Basic Education

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

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

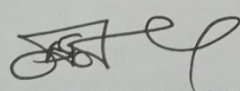
MKS/ED/CDE/R/4/VOL.4/221 Date: June 10, 2022.

Scholar Kivuitu Mbatha
Machakos University
P.O Box 136-90100,
Machakos

RE: RESEARCH AUTHORIZATION

Reference is made to the letter from National Commission for Science,
Technology and Innovation Ref: NACOSTI/P/22/17484 dated
19th May, 2022.

You are hereby authorized to carry out your research on "**Determinants of
Principal's implementation of information and communication technology
Integration in Public Secondary Schools**" in Machakos Sub-county, Machakos
County for a period ending **19th May, 2023.** You are however required to notify
Machakos SCDE's office before you commence your research.


MARGARET MWIRIGI (MRS)
PP COUNTY DIRECTOR OF EDUCATION
MACHAKOS



Appendix VII: Research Authorization Letter (County Commissioner)



OFFICE OF THE PRESIDENT
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.IV/78

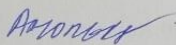
10TH June, 2022

Deputy County Commissioner
MACHAKOS SUB COUNTY

RE: RESEARCH AUTHORIZATION – SCHOLAR KIVUITU MBATHA

The National Commission for Science, Technology and Innovation has authorized the above named student to carry out a research on the topic “***Determinants of principals implementations of information and communication technology integration in public secondary schools in Machakos Sub County***” in Machakos County for the period ending **19th May, 2023.**

Please be notified and accord her the necessary assistance.


A.N WAFULA
For: COUNTY COMMISSIONER
MACHAKOS COUNTY

Appendix VIII: NACOSTI Research Permit

 REPUBLIC OF KENYA Ref No: 686413	 NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION Date of Issue: 19/May/2022
RESEARCH LICENSE	
	
This is to Certify that Miss.. Scholar mbatha Kivuitu of Machakos University, has been licensed to conduct research in Machakos on the topic: Determinants of principals implementation of information and communication technology integration in public secondary schools in machakos sub-county , kenya for the period ending : 19/May/2023.	
License No: NACOSTI/P/22/17484	
Applicant Identification Number 686413	 Director General NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Verification QR Code 	
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Appendix IX: Map of the Study Area

