INFLUENCE OF INFORMATION COMMUNICATION TECHNOLOGIES ON PERFORMANCE OF EDUCATION IN KAKAMEGA COUNTY, KENYA.

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DECLARATION

I declare that this research project report is my original work and has not been submitted for an award in any university.

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This project has been submitted with my approval as the University Nairobi supervisor.

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DEDICATION

This project is dedicated to my late father Evaristus Luyuku Malungu and late mother Twyla Awinja Malungu, a loving mother to many, may their souls rest in eternal peace**.** To my sister Joan Ngoli Malungu and my aunt Eunice Chek for their unrelenting support and always believing in me and for their encouragement

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
BOOT	Build Own Operate Transfer
CEMASTEA	Centre for Mathematics, Science and Technology in Africa
CFSK	Computer For Schools Kenya
EU	European Union
GoK	Government of Kenya
ICTs	Information and communication Technologies
ICT-CFT	Information Communication Technology Competence Framework
INTEL	Integrated Electronics
ISTE	Indian Society for Technical Education
KEMI	Kenya Education Management Institute
KICD	Kenya Institute of Curriculum Development
KIE	Kenya Institute of Education
KISE	Kenya Institute of Special Education
KLB	Kenya Literature Bureau
LAN	Local Area Network
MIT	Massachusetts Institute of Technology
MOEST	Ministry of Education Science and Technology
NACOSTI	National Commission for Science Technology and Innovation
NEMIS	National Educational Management Information Systems
NIIIC	National ICT Integration and Innovation Centre
OLPC	One Laptop per child
OECD	Organization for Economic Cooperation and Development
SDGs	Sustainable Development Goals
TPACK	Technological Pedagogical Content Knowledge
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization.
UNESCO IITE	United Nations Educational, Scientific and Cultural Organizational Institute for Information Technologies in Education
US	United States

USA	United States of America
WAN	Wide area Network

ABSTRACT

Quality education is goal number four of the seventeen Sustainable Development Goals (SDGs) outlined by the United Nations Development Programme whose main aim is to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. Use of Information Communication Technology (ICT) in Education is important it can help children to achieve better results and in the long run become familiar with ICT at an early stage making them better placed and equipped to face the digital world. Integration of ICT into primary curriculum will lead to achievement of quality education by extending the learning experiences such as allowing students to engage in class in a variety of ways, extending learning by taking teaching beyond the four walls of the classroom for anytime anywhere approach, enriches curriculum, expands learning horizons etc thus improving on the performance of Education leading to quality Education. The end result of this is production of learners that are independent and computer literate. This research sought to investigate the Influence of Information Communication Technology on performance of Education in Kakamega County. Mixed methods research design was used in this study. Questionnaires and observation checklist were to gather information. The target population was be 324 respondents representing 72 school principals, 120 computer studies teachers and 132 staff from the 12 sub counties of Kakamega County. A sample size of 175 respondents represented the target population The data collected was entered into a statistical package for social sciences (SPSS) software for analysis and descriptive statistics in which percentages, frequencies and tables were used. Pearson correlation analysis showed that there was a positive relationship between Information Communication Technologies and Performance of Education in Kakamega County. Regression analysis also revealed that the relationship between Information Communication Technologies and Performance of Education in Kakamega County was significant and positive. It was concluded that Information Communication Technologies has an influence on Performance of Education in Kakamega County.

CHAPTER ONE
INTRODUCTION

1.1 Background of the study

Information Communication Technology (ICT) in education refers to the process of teaching and learning with aid of certain medium and technology (Habibi, Mukminin, Riyanto, Sulistiyo, Sofwan et al, 2018). It is the mode of education that uses Information communication technologies to support, enhance and optimize the delivery of information with overall goal of impacting on the overall performance of education. The United Nations Education, Scientific and Cultural Organization, Institute for Information Technologies in Education (UNESCO IITE) was established as an integral part of UNESCO by the general conference of UNESCO at its 29th session in November 1997 with a global mandate for ICT in education. The mission of UNESCO IITE in this age is promoting the innovative use of ICT as enabled solution and best practices, and serving as a facilitator and enabler for achieving sustainable development goal four which highlights inclusion and equity, quality education and lifelong learning through ICT. In 2011 UNESCO IITE launched a new project which is focussed on the role of information communication technologies in education with an aim of facilitating dialogue and building a foundation for effective education through ICT (UNESCO, 2012). Its vision is for ICT policy to be applied in education worldwide and calls upon countries to develop respective policies in support for its goals and implementation. UNESCO IITE is at the fore front of activities concerned with redefining education paradigms to meet the needs of modern society in particular new approaches to education to give an important role to the use of ICT in education.

The rapid growth of the global economy and the information based society has pressurized education systems around the word to integrate ICTs in education. In order to be successful, a country should be improve its education system by implementing effective and robust ICT policies, (Iqbal & Mohammed, 2010). The level of success for ICT integration in education differs in each country around the world. Certain countries especially developed countries for example Finland and the United States of America (USA) have proved that ICT is effective in teaching and learning while at the same time been implemented regularly by teachers, (Aristovnik, 2012). During the last two decades, countries have invested heavily in ICT. The use

of ICT in education and training has been key priority in most European Union (EU) and Organization for Economic Cooperation and Development (OECD countries in the last decade although progress has been uneven. ICT has had major influence on education sector, on organization and on teaching and learning methods, (Aristovnik, 2012). In 1996 the United States (US) issued many policies in education within a framework of a five year plan as a nationwide effort to prepare students for the 21st century skills. It was designed the world at the fingertips of students and later formulated into a policy to bring about a golden age in education. More recently the plan for 2010-2020 is to make the power of technology transform American education, (Tairab and Huang, 2017). The US department of education issued the national education technology plan 2010 which outlined technology related recommendations for states, districts, the federal governments, and other stakeholders to use to achieve educational reforms. The use of internet and computers at school in the US saw a significant progress in the period of 2009-2012, (Drijvers, 2014). There is abundance of computers devices and high internet connectivity; each school has been connected to the internet, classrooms are provided with high speed internet and flexible learning space. the community also favours high internet speed at school, (Wu, 2014).

In Europe and Asia schools have been similarly well equipped with ICT infrastructure. At 95% of European schools computers, laptops, and broadband, interactive whiteboards, learning management systems, and digital cameras, are ubiquitous. Students can access ICT as a way to improve learning outcomes and related competences (Wu, 2014). High quality technology has been introduced in Korea, Singapore, Japan and China where schools have been provided with advanced computer devices and educational platforms as well as high speed internet, a variety of digital learning resources and information terminals for students, (Kihoza, Zlotrikova, Kizito & Kalegele, 2016). Previous research has shown that ICT can lead to improved student learning and better teaching methods thus influencing the performance of education as a whole. A report made by the National Institute of Multimedia Education in Japan proved that an increase in use of ICT in education with integrating technology to the curriculum has a significance and positive impact on student achievements.

In Africa ICT is influencing every aspect of human life. Its playing a salient role at work, in education, business and entertainment. It has a potential of increasing access and improving

relevance and quality of education. It has facilitated acquisition and absorption of knowledge and enhanced educational systems (Fisseha, 2011). Poor policy is a real challenge for the African countries that have attempted to introduce ICT programs in education. Studies show that sub Saharan countries for example in Zimbabwe, some computers are lying idle in classrooms due to lack of trained personnel, electricity or proper facilities like computer laboratories (Kabanda, 2012). Data shows that of the government sponsored ICT initiatives in third world countries, 35% are considered to have totally failed, 50% have partially failed and only 15% to have succeeded (Heeks, 2010). Adomi and Kpangban (2010) found out that the schools face a myriad challenges ranging from poor information infrastructure at 64%, lack of/inadequate ICT facilities at 61%, frequent power interruptions at 57%, poor ICT policy at 63%, inadequate technical support in schools at 52% to lack of/limited ICT skills among teachers at 40%. If Africa aims to better prepare its citizens for the challenges of the 21st century, it must foster thorough integration of ICT in education in order to tap new, attractive, promising and diversified potentials. (Obonyo, 2013). This calls for heavy and continued investment in the education sector coupled with accountability.

Kenya has made significance strides in ICT. This is evidenced by the many innovations that are being incubated and achieved in the country today, Mpesa is just one of them. Heavy investments have been made by the private sector and government in the ICT industry ranging from the fibre optic sea cable to the fast internet and connectivity that Kenyans enjoy today. Kenya is embracing ICT in education. Education curricular is being transformed from text to digital format and integration of ICT to deliver that content. Sessional paper No 1 of 2005 emphasizes that ICT skills play a key role in promoting the economic development of a country (Ministry of Education Science and Technology [MOEST], 2005). As a result the government recognizes the need for ICT literate workforce as a foundation on which Kenya can acquire status of knowledge and economy, and a paradigm shift in education. The government has made education the avenue for equipping the nation with ICT skills in order to create a vibrant sustainable economic growth (Obonyo, 2013). Kenya formulated a national policy on ICT which was launched in 2006 as a response to issues raised in sessional paper No 1 of 2005 (Ministry of Education [MoE], 2006). The ICT policy provides a framework and implementation strategy with measurable outcomes since the inception of the National ICT integration and Innovation

Centre (NIIIC) (Kuvuuka, 2013). Through the economic stimulus project, six secondary schools in each of Kenya's 210 constituencies were provided with 11 computers, I printer, 1 projector, internet connectivity and local area network(LAN) and wide area network(WAN) (MoE, 2012). Teachers were selected and trained at Centre for Mathematics Science and Technology Education in Africa (CEMASTEA) and others at the Kenya Institute of Education (KIE) on ICT integration in teaching and learning. The teachers were trained as 'ICT champions' so that they can do capacity building of the other teachers at the constituency in a cascading way (Kuvuuka 2013). Since 2010 the adoption of ICT integration in education has not picked up to acceptable and sustainable level (Obonyo, 2013). The policy framework of the Ministry of Education indicates that there are a number of challenges concerning access to and use of ICT in Kenya, including high levels of poverty, limited rural electrification and power disruptions (Obonyo, 2013). Most secondary schools have some computer equipment, however this could consist of a few computers in the schools operations. Very few secondary schools have efficient ICT tools for teachers and students. Even schools that have computers, the student-computer ratio is 150:1 (Farell, 2007). The Kenyan government went further to launch a digital literacy programme in 2013 dubbed digi-school targeting learners in public primary schools with an aim of improving performance of education by integrating ICT in learning. The first phase was rolled out in 2016 with the government spending billions of shillings on this project through the ministry of education. 24.5 billion shillings were used in 2013/2014 financial year with a further 17.5 billion being spent in the 2014/2015 financial year to carter fo improvement of ICT infrastructure, digital content creation and development, capacity building of teachers and procurement of ICT devices.

The 21st century has been named as the information age hinged on knowledge-based economy. Use of ICT in education sector, in schools for pedagogical activities and information sourcing has led to a belief that integration of ICT could give learners an advantage in academic performance and the job market, (Delen & Bulut 2011). The potential of ICT in enhancement of pedagogical methods, management of schools, research and general enrichment of the curriculum is great and growing, (Theuri, 2014).

1.2 Statement of the Problem

The consensus ICT impact towards performance of education remains unclear (Aristovnic, 2012). ICT in general enriches the system of education as well as teaching-learning methods and instructional strategies. In order to achieve scholastic performance, both teachers and students are required to work in coordination and integration with each other. Numerous studies have been undertaken to study the relationship between ICT and student performance, however these studies have not been able to establish precisely the impact of ICT on students' performance or performance of education as a whole (Basri, Alandejani & Almadani, 2017).From the review of past literature, it's clear that studies touching on ICT integration in education (Muriuki, 2017, Farrel 2007) have not answered question of Influence of Information Communication Technologies on performance of Education. Kuvuuka (2013) concluded and recommended that the government should put in place monitoring and evaluation mechanism for ICT integration in teaching and learning and that further research need to be done to find out the impact of ICT integration in teaching and learning on performance of education. Based on this research gap and the problem statement, a need arises to investigate the influence of ICT on performance of education. In this regard this study proposed to evaluate manner and extent to which ICT influenced the education sector. It also sought to identify key factors that contribute to performance of education and how they are influenced by ICT.

1.3 Purpose of the Study

The purpose of this study was to examine the influence of Information and Communication Technologies on performance of education in Kakamega County.

1.4 Research Objectives

This research was guided by the following objectives:

1. To determine the extent to which ICT infrastructure influence performance of education in Kakamega County.
2. To examine the extent to which ICT capacity building influence performance of education in Kakamega County.
3. To establish the extent to which use of ICT in education management influence the performance of education in Kakamega County.

4. To determine how ICT funding influences the performance of education in Kakamega County.

1.5 Research Questions

This study sought to answer the following research questions

1. What is the influence of ICT infrastructure on performance of education in Kakamega County?
2. How does ICT capacity building influence performance of education in Kakamega County?
3. Does use of ICT in education management influence the performance of education in Kakamega County?
4. How does ICT funding influence the performance of education in Kakamega County?

1.6 Significance of the Study

The findings of this study are of great significance to the stakeholders and policy makers in the education sector, Kakamega county government, the Kenyan government especially those in the ministries that are tasked with overseeing education and ICT, this includes the Ministry of Education Science and Technology, Ministry of ICT and Ministry of Industrialization. It provides a basis for rational interventions to improve use and implementation of ICT in education and schools, improve on available policies on ICT integration in education and reducing the burden of implementing and sustaining this programmes on the schools. The results are of benefit to the stakeholders by providing actionable information relevant for planning and policy making to improve delivery of these programmes not just in the county but the country as a whole. This study also contributes to the broader literature addressing how to improve implementation of ICT integration in education and achieve better performance of the education system in schools by providing an empirical analysis of challenges faced by schools themselves and the education sector. Specifically, this study seeks to contribute to the literature related to the identification of intervention targets for increasing the effectiveness of ICT in education and achievement of better performance in education in Kenya. This can give rise to interventions with potential to further increase effectiveness of ICT programs in education in Kenya. Findings from this study might also provide indirect insight into how to improve delivery of other ICT

interventions such as achievement of the second pillar of vision 2030 that is; Science, Technology and Innovation.

1.7 Basic Assumptions of the Study

It was assumed that ICT had been integrated in education in Kakamega County. It also assumed that the respondents were willing, would find time, cooperate and give true information

1.8 Limitations of the Study

It was anticipated that factors such as time and financial constraints might not allow the researcher to study all the factors that influence performance of Education in Kakamega County. Issues to do with confidentiality, busy schedules and time constraints for respondents were also anticipated. This was addressed by the researcher giving assurances of confidentiality and assuring them that the study was not meant for any other purpose but purely research. Sampling was used to address time and budget factor so that the study could focus on the representative sample of the population

1.9 Delimitations of the Study

It would have been appropriate to cover all the secondary schools in Kakamega but due to time and financial constraints this study was mainly guided by the Kenya government economic stimulus project where six secondary schools in each of Kenya's 210 constituencies were supported to fully integrate ICT in Education. The study was also guided by the schools that offer computer studies as a subject

The study was also carried out when public schools were in session and during the operation hours of respective offices of other education stakeholders thus making it easy to access and interview the respondents. The road network in Kakamega County was a plus as it was passable making accessibility from one Sub County to another bearable.

1.10 Definition of Significant Terms

Influence: Information Communication Technology and how it affects performance of Education, whether the effect is positive or negative

Information Communication Technology This is hardware, software, networks, data centers, facilities and related equipment used to develop, test, operate, monitor, manage and/or support use of ICT services in Education

Performance: This is the rate of meeting pre-defined objectives, targets and goals to achieve desired results. In this study it refers to achieving set targets and goals in education.

Education: the process of facilitating learning, or the acquisition of knowledge, skills, values, beliefs, and habits

Infrastructure: Information Communication Technologies components including, hardware, software and networks that make a foundation for an ICT integration into Education

Capacity building: To increase the knowledge, output rate, management, skills, and other capabilities of an individual through training so that ICT can be fully integrated into Education

Management: Combination of human and ICT resources are employed to supervise, plan, strategize, and implement structures to execute an education system.

Funding: Providing money or other forms of help to support successful integration of ICT in Education.

1.11 Organization of the Study

This report is organized in five chapters, chapter one gives a brief background concerning the area this research proposed to study. It illustrates what is happening around the world in other countries and brings it down to the locality in which this study will be done. It also justifies the problem statement of the problem and the purposes of the study. It outlines the objectives and research questions that guided this study. Assumptions that were made by this study and the anticipated limitation and delimitations are also captured. Chapter two brings out the aspect of

literature review. It focuses on review of literature related to this study in relation to ICT infrastructure, ICT capacity building, use of ICT in education management, ICT funding and how they influence performance of education in Kakamega County. It briefly talks about information and communication technologies in education in terms of how it is being done and the current challenges. It brings out information communication technology related factors, how they relate to, and how they influence education. It also talks about performance in relation to education. It also discusses the theoretical framework on which this study was based on and illustrates the conceptual framework of this research. Chapter three describes the strategies that were used to carry out research. It contains; research design, target population, sampling procedure, methods of data collection, description of research instrument, data analysis procedures, instrument validity and reliability and operational definition of variables. Chapter four contains analysis of data collected , presentation and its interpretation based on the results. Chapter five contains discussions, conclusions and conclusion based on analyzed data in chapter four

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter focuses on review of literature related to this study in relation to the influence of ICT on performance of education in relation to infrastructure, capacity building, management, funding and how they influence performance of education in Kakamega County. It also discusses the theoretical framework on which this study will be based on and illustrates the conceptual framework of this research.

2.2 Information Communication Technology in Education

Countries are aggressively implementing the use of ICT in education under different schemes all with the aim of integrating ICT in education. These programmes are not only used in the learning or in classroom alone but also in the management of the schools and the education sector as a whole. This programmes are facing a myriad of challenges in their implementation leading to a total failure in some countries. The consensus ICT impact towards performance of education remains unclear (Aristovnic, 2012). ICT in general enriches the system of education as well as teaching-learning methods and instructional strategies. In order to achieve scholastic performance, both teachers and students are required to work in coordination and integration with each other. Numerous studies have been undertaken to study the relationship between ICT and student performance, however these studies have not been able to establish precisely the impact of ICT on students' performance or performance of education as a whole (Basri, Alandejani & Almadani, 2017). These studies have posed two core challenges: first, it is difficult to determine the performance of students since the common approach used by many researchers accredits the curriculum responsible for the performance achievement in terms of grade. However Rose and Kadvakar (2015) criticize this studies blaming them for adopting a narrow approach and suggest alternative approach to consider the influence of ICT on students attitude, competency, and skills in addition to curriculum.

The second challenge lies in technological changes that are rampant in the ICT industry where it is difficult to treat their impact different from their environment. This aspect therefore makes such research attract high contention on the ground that rapid changes in technology would render the used parameters ineffective, therefore no conclusive results can be drawn from such

studies. Furthermore many studies conducted on this subject are based on scientific studies of comparison. These studies establish that adoption of ICT in institutions of learning could improve the respective institution. Additionally most studies have focused on cognitive results. A few recent studies have encountered effective results and positive attitude towards ICT development (Basri et al., 2017). A study by inter-American Development bank for instance found that Peru's program of over one million laptops was beset by difficulties. Most schools lacked internet and some lacked electricity to change the laptops. Only 10.5% of the teachers reported receiving technical support and only 7.0% reported receiving pedagogical support. As a result 40% who had laptops at least two months reported using them three or more times a week (Ames, 2016). In Uruguay 27.4% of the laptops were unusable in 2010 only a year after they were distributed to the students. In Paraguay same problems of disuse, breakage and sustainability was reported (Ames, 2016). Ames (2016) reported that the OLPC program in Birmingham district USA faced a number of problems including lack of use, infrastructural issues and no provision of sustainability. 80.3% of students surveyed indicated they never use the laptops at school with 20.4% using only a little. Ames (2016) notes that less than half the fourth and fifth grade students still had working laptops and even if both computers and internet were working in Birmingham USA and there was a general frustration among teachers with the laptops and broader infrastructure such as the laptops were slow, sluggish and couldn't connect to printers. Studies show that in many sub Saharan countries for example in Zimbabwe, some computers are lying idle in classrooms due to lack of trained personnel, electricity or proper facilities like computer laboratories (Kabanda, 2012). Data shows that of the government sponsored ICT initiatives in third world countries, 35% are considered to have totally failed, 50% to have partially failed and only 15% to have succeeded (Heeks, 2010).

2.2.1 Infrastructure in relation to Performance of Education

Laan (2011) describes Information communication technology infrastructure as a set of Information Technology(IT) components that are the foundation of an IT service both physical components; computer and networking hardware and facilities, and software and network components.

Infrastructure is the main pillar and backbone of implementation of any ICT programme, be it in education, business or any other field. Everything is bound to collapse without basic and sound infrastructure. Issues to with hardware, software, network connectivity, physical facilities like computer labs and power supply need to be addressed. The use of internet and computers at school in the United States saw a significant progress in the period of 2009-2012, (Drijvers, 2014). There is abundance of computers devices and high internet connectivity; each school has been connected to the internet, classrooms are provided with high speed internet and flexible learning space. The Community also favours high internet speed at school, (Wu, 2014). In Europe and Asia schools have been similarly well equipped with ICT infrastructure. At 95% of European schools computers, laptops, and broadband, interactive whiteboards, learning management systems, and digital cameras, are ubiquitous. Students can access ICT as a way to improve learning outcomes and related competences (Wu, 2014).

High quality technology has been introduced in Korea, Singapore, Japan and China where schools have been provided with advanced computer devices and educational platforms as well as high speed internet, a variety of digital learning resources and information terminals for students, (Kihoza, Zlotrikova, Kizito & Kalegele, 2016). Internet connectivity is key to improving quality of education and providing access to learning materials to all students. Digitized books, localized content can be stored on servers for easy access by the laptops used by students and teachers (Hirji, 2010). India national policy on ICT (2012) notes that all computers in school should be part of a single local area network to enable optimum sharing of resources with each school being connected with broadband connectivity capable of receiving streaming audio and video. This will go a long way in ensuring better access of digital learning content. The school network should be guarded against cyber-attacks by implementing security measures such as firewalls. Use of right, relevant and current software that promotes active participatory learning should be incorporated in the laptops such as computer games that promote learning.

India's government through its policy on ICT proposes physical facilities like large rooms with appropriate lighting and ventilation, fitted with durable furniture suitable for optimization of space and long hours and arranged in a layout that can facilitate interaction among students and teachers. It also emphasizes on safety issues by encouraging fitting of fire extinguishers and use

of appropriate fire drills. It touches on safety of the devices against damage and theft by encouraging securing them and covering them with insurance policy (Hirji, 2010).

In African countries, such as Tanzania, Rwanda, and Uganda, governments began to provide schools with infrastructure and the main target to introduce technology to the schools has been to enhance the quality of education. Despite many efforts and initiatives to introduce ICT to schools, there have been different obstacles such as insufficient amounts of computers, low Internet connectivity, and a lack of educational software packages (Zervas, Chatzistavrianos & Sampson, 2002)

Grace (2012) notes that Government of Kenya has made ICT equipment available to teachers but still the infrastructure support is not sustainable thus the inadequate infrastructure affects implementation either positively or negatively based on availability or lack thereof. Infrastructure is therefore a driving factor in ensuring that ICT is successfully integrated into education to positively impact and influence performance of education. Kenya ICT policy provides a framework and implementation strategy with measurable outcomes. Through the economic stimulus project, six secondary schools in each of Kenya's 210 constituencies were provided with 11 computers, I printer, 1 projector, internet connectivity and LAN/WAN (Ministry of Education 2012). Since 2010 the adoption of ICT integration in education has not picked up to acceptable and sustainable level (Obonyo, 2013). The policy framework of the Ministry of Education indicates that there are a number of challenges concerning access to and use of ICT in Kenya, including high levels of poverty, limited rural electrification and power disruptions (Obonyo, 2013). Most secondary schools have some computer equipment, however this could consist of a few computers in the schools operations. Very few secondary schools have efficient ICT tools for teachers and students. Even schools that have computers, the student-computer ratio is 150:1 (Farell, 2007)

The government has been spending money running into billions of shillings on ICT projects in education through the ministry of education. 24.5 billion shillings were used in 2013/2014 financial year with a further 17.5 billion being spent in the 2014/2015 financial year to carter for improvement of ICT infrastructure, digital content creation and development, capacity building of teachers and procurement of ICT devices in primary schools. (Muriuki, 2017). Other government programmes like rural electrification and the last mile through Kenya power has

made it possible to connect far flung and remotely located schools to be connected to the power grid making it possible for the much needed electricity to be available in the schools. Individual schools are also investing in computer labs for students and computer infrastructure in form of systems ranging from school management systems to students and financial management systems (Muriuki, 2017).

2.2.2 Capacity Building and Performance of Education

Capacity building is the process by which individuals and organizations obtain, improve, and retain the skills, knowledge, tools, equipment and other resources needed to do their jobs competently allowing them to perform at a high capacity (Potter and Brough, 2004)

Countries around the globe have increased development of teachers in ICT, using models and frameworks of competencies like UNESCO ICT- competency framework (Tairab, 2016). UNESCO ICT competency framework for teachers (ICT-CFT) was developed in 2011. This was an update to the version that was published in 2008 and was as a result of successful continued partnership between Integrated electronics (INTEL), Indian Society for Technical Education (ISTE) and Microsoft. This framework was and is to act as a framework for international benchmark which sets out competences required to teach effectively with ICT (UNESCO, 2011). The framework is an important statement by UNESCO on how teacher education, particularly in developing countries can increase the effectiveness of teachers and enable students to become engaged and productive members of the society. Teacher professional development is one of the main factors affecting ICT use in education (Tay & Lim, 2015). Teacher professional development is to make it possible for students to acquire learning skills, suitable knowledge and useful ways of educational application (Tairab and Huang, 2017).

In the US teacher development focuses on skills and competences in ICT with regard to importance of standards to prepare teachers in meaningful ways of using technology in the classroom (Tairab and Huang, 2017). In Europe, application of ICT for improving teacher competencies is one of the main reasons to promote and exploit the potential of ICT in education. Some frameworks and models were developed and consisted of competencies thus enabling teachers to integrate ICT into classrooms, teaching and improve student skills. The frameworks of competencies consist of categories of competencies, each category is divided into sub competencies, and teachers have to be proficient in this competencies (UNESCO, 2011). In

Asian countries like Japan, China and Singapore, professional development for teachers has been the focus in development of ICT in schools (Tairab & Huang, 2016). A philosophy of "Thinking Schools, learning nation" focuses on offering a broad professional development for all teachers at all levels and for all contents not just primary schools. (Locwood & Cornell, 2013). Some of the obstacles that UNESCO ICT-CFT faces is fear of change, ICT-CFT publications not being available in local language, lack of awareness of country's support for ICT-CFT, local opposition or lack of support for ICT-CFT and budget restrictions.

Zehra (2010) reports that every teacher who had been interviewed on indicated a strong desire for additional information and assistance working with the laptops, troubleshooting technical issues and large emphasis on their role in working effectively with the laptops in classrooms. Some teachers expressed initial fear and reluctance to introduce the laptops into their classrooms especially if they had never used technology before. This shows that there is a disconnect in teacher training and overall capacity building of the teachers who are a fundamental building block of this particular program needs. Ames (2016) established that teacher training was uneven across the Uruguay. Some teachers had been trained only for five hours while some had never been trained to assist children to use the computers. Many schools were also remote making it impossible for teachers to ask for support. To make teachers familiar with the laptops. Teachers also felt inadequately prepared to use the laptops in class. It also noted that creative use of the devices was uncommon for those teachers who tried to integrate them in teaching. This has prompted Plan Ceibal to adopt measures to support teachers such as offering digital resources to encourage best practices in classrooms.

African countries like Tanzania and Rwanda have designed ICT competence frameworks for teachers to address the needs of the 21st century and develop education in line with UNESCO ICT-CFT (Tairab & Huang, 2017). Professional development of teachers is important for the successful integration of ICT in education and improving of performance of education. Stakeholders in the education sector should be involved to support ICT in teachers' development, models and frameworks, particularly Technological Pedagogical Content Knowledge (TPACK), technology integration planning models, in addition to standards and suitable policies (Vanderlinde & Aesaert, 2014)

It is important to note that without proper teacher capacity building and training the influence of ICT on performance of education and its integration in education will run into headwinds since teachers are the actual end implementers, they are the ones doing the actual teaching and interacting with students.

2.2.3 Use of ICT in Education Management in relation to Performance of Education

To manage is to forecast and to plan, to organize, to command, to co-ordinate and to control.(Gulshan, 2011).For educational management, ICT resources need to be readily available and accessible. Education cannot take place without the required and much needed resources. UNESCO has designed e-learning tools and materials for free access to provide teachers not just in teaching and learning process but also for students and learners and the education system as a whole (Vanderlinder & Aesaert, 2014). UNESCO has put forward a vision for introducing comprehensive ICT curricula, formulating goals and learning controls. All stakeholders are encouraged to view ICT literacy as a basic need of any student (Tay and Lim, 2015). ICT developments and strategies employed in education by many countries around the globe points to two approaches: First is to formulate policy for curriculum based ICT, the second is to attach significance to and prioritize ICT in the educational process (Tairab and Huang 2017). The education sector no longer just uses ICT in teaching and learning alone. Institutions and education sector are today making use of ICT systems to do various activities that support educational management. In the US the policy lies in using power of technology in both curricula and assessment to improve overall education quality (US department of education technology, 2016). The USA established a K 1-12 online learning and blended learning by using digital resources and virtual schools. They extensively use digital content and virtual schools. They extensively use digital content and resources in addition to open learning resources (US department of education technology, 2016).

European schools are involved in planning education when it comes to technology and the goals that they want to achieve. Participation is key here thus curricula have been designed well and schools are given guidelines to use ICT in teaching and administration (Holmes, 2013). On assessment the guidelines include providing students quality access to ICT matching between education goals and using ICT in schools, considering declarations of UNESCO in view of lifelong learning, and implementing ICT within the educational planning of individual suitable

infrastructure, learning resources, digital content, are addressed in their function to support schools' ICT curriculum (Tairab & Huang, 2017). Education ministries have also established databases for schools and provided a possibility to access and update these databases for better management and running of schools and the education sector as a whole. Schools are provided with interactive white boards, learning platforms and other technology tools to work as tools to facilitate learning and learning processes. Multimedia is used to enrich and optimize the teaching and learning processes and enhance teaching skills (Holmes, 2013). In Asia, China introduced an inclusive plan to improve education technology in education. They developed a national curriculum for grades 1 to 9 and another framework for grades 9 to 12, in addition to formulating national standards for educational technology (Wu, 2014). Schools and educational institutions have even gone further and developed systems that help track students in such a way that facial recognition technology is used by students when they enter or exit at the entrance. The system then sends a short message to the guardian via a mobile application

African countries are embracing ICT in implementing far reaching changes in education and how education is managed. ICT is no longer viewed just as a supporting tool but plays a major role in curricula and teacher development (Mukuna, 2013), countries like Rwanda and Tanzania have achieved progress in use of ICT in education based on current world trends of using digital ICT learning resources. Schools have been equipped with ICT for administration and teaching such as office packages, data processing, students' databases among others in addition to sharing resources and collaborations among schools (Mingaine, 2013). Deployment of the ICTs in education without the right content relevant to the curriculum and one that is readily available and accessible to both learners and teachers is a waste of time and resources. Some communities working with the OLPC have gone a step further and localized language by delivering content in local dialect. Interview data in Haiti revealed a perceived improvement in student reading and writing in Haitian and French (Hirji, 2010). There is need to create content that is relevant to not just for those involved in the education sector but also to the students. This has been achieved in Ethiopia where functionalities are built around existing material with which the students and teachers are familiar. The familiarity and comfort that this brings to the introduction of a computer to the classroom should not be underestimated (Hirji, 2010). Cambodia which is faced with a menace of unexploded ordinance due to many years of war a computer game has been installed on the laptops in order to teach children about the dangers of landmines. It teaches

children how to read warning signs of landmines that dot the Cambodian landscape as they hunt for food for their screen pet dog. (Hirji. 2010). This shows that the digital content and resources available on the laptops can be used to support many forms of learning for the benefit of the community. Digitization of textbooks and learning materials including localized content should be loaded onto the servers and the independent laptops where applicable. This will make the digital resources readily available for both learners and teachers.

2.2.4 Funding and Performance of Education

Funding is the act of providing financial resources, usually in the form of money, or other values such as effort or time, to finance a need, program, and project, usually by an organization or company (Business Dictionary, 2009)

Governments around the world are investing heavily in provision of ICTs in public schools and the education sector as a whole. In financial year 2008/2009, the United Kingdom budgeted 2.5 billion pounds while the USA used 6 billion dollars in the same period for the provision of ICTs in education (Nut, 2010). Funding is a critical component of the implementation and integration of ICTs in education world over for it can positively or negatively affect how ICT influences education. One of the major obstacles noted by UNESCO ICT-CFT is budget restrictions by countries world over. This has made it near impossible and impacted negatively on programmes associated with integration of ICTs in education. Some countries have even repurposed or misappropriated funds meant for this noble course. Where funding has been made available it has either been reduced over time or stopped this has led to temporal shut down or discontinuation of the programmes. In Asia for example issues to do with limited school budgets for internet services have been brought forward by Asian Development Bank (ADB). It is noted that in some cases where internet connectivity was previously available, services have been discontinued due to cuts in funding by external development partners (ADB, 2012). Universal ICT implementation in education is challenging given the lack o resources, national ICT infrastructure and even electricity supply in rural areas (Mutuku, 2014). Funding should be a priority to ensure continuity. Issues to do with technical support and maintenance of ICTs should be prioritised. Warschaur (2009) notes that a balanced funding approach needs to be used with sufficient funding budgeted for curriculum development, professional development, purchase and repair and replacement of laptops. He observes that laptops have been provided to school

children in a rush with disregard to whether schools have funding for curriculum or professional development, technical infrastructure, support or maintenance.

A national survey in Uruguay highlighted the importance of allocating enough funds for the OLPC program. It captured a lot of breakages and disrepair of these laptops only a year after they were distributed. It reported 27.4% of the laptops being unusable in 2010 (Ames, 2016). Ames (2016) notes that logistical problems with a large number of laptops becoming unavailable due to poor maintenance or technical issues. This is being addressed by providing online how-to guides and more funding towards maintenance and for repair facilities.

Kenya has made heavy investments in ICT through the national and the private sector in the ICT industry ranging from the fibre optic sea cable, country wide network infrastructure. This is evidenced by the innovations that keep popping up every day to the fast internet and connectivity that Kenyans enjoy today. The government is investing heavily in ICTs in education evidenced by the government spending billions of shillings year in year out on ICTs in education projects like the economic stimulus plan and the digi-school project whereby through the ministry of education. 24.5 billion shillings were used in 2013/2014 financial year with a further 17.5 billion being spent in the 2014/2015 financial year to carter for improvement of ICT infrastructure, digital content creation and development, capacity building of teachers and procurement of ICT devices Through the economic stimulus project, six secondary schools in each of Kenya's 210 constituencies were provided with 11 computers, I printer, 1 projector, internet connectivity and LAN/WAN (Muriuki, 2017). The private sector has also encouraged schools to integrate ICT in the teaching and learning processes. None governmental organizations like the Computer For Schools- Kenya (CFSK) whose mission is providing Kenyan youth with access to modern technology through donation of computers in Kenya public schools has donated thousands of computers to date (Reddick, 2010). Kenya School Net has also equipped personnel with skills and knowledge to facilitate learning of computers in Kenya through its' a trainer of trainers training program (Mutuku, 2014). Individual schools have also gone a step further and allocated more funds for ICTs. This is evidenced by the investments in school management systems, student management systems among many others. Today student performance in form of reports, continuous assessment tests results are sent to parents and guardians via emails and text messages. In Homa Bay High School for example, they have invested in a student management

system where students clock in and out of school using their biometrics and parents are notified by text message to their phones of their entry or exit immediately

ICT devices generally need regular maintenance, hardware and software upgrades and the approach of just deploying the infrastructure in the education sector such as in schools and leaving them to grapple with technical issues should not be condoned and if so enough funds and resources to carter for this should be allocated.

2.3 Performance of Education

Performance is the success in meeting pre-defined objectives, targets and goals, it is to getting the job done or producing the result that you aim at (Harish, 2010) Performance of education is the achievement of either short term or long term goal by a student, teacher or an institution as a whole. Performance of Education and quality education go hand in hand in a way that they each depend on each other for their achievement. In some cases its more or less the same. At goal number four, inclusive and equitable quality education is key in driving the achievement of the other 16 Sustainable Development Goals(SDGs) (2015). Wastian (2013) indicates that integration of ICT in education has positive effects. Quality of education is enhanced by ICT (Abdullahi, 2013). This supports the notion that ICT if integrated well in education influence the performance of education in one way or another. It is important to note that ICT integration in education on its own without the full support of all those involved in the education sector may not achieve the desired results thus the need to involve all the stakeholders. Frameworks and mechanisms to keep track of performance of education need to be put in place. Issues to do with timelines, cost effectiveness and monitoring and evaluation should be given an upper hand to ensure that institutions can keep track of influence of ICT on performance on education and where necessary make the much needed changes so as to fully enjoy the benefits of integrating ICT in education

2.4 Theoretical Framework

This study was based on Constructionism Leaning Theory that was developed by Papert in 1985 and will be used to explain influence of ICT on performance of Education in Kakamega County. Based on this theory, Information communication Technologies are assumed to have a positive impact on performance of Education

Constructionism Learning Theory was developed by Seymour Papert in the 1985. Papert believes learning is facilitated by constructing actual artefacts or objects-whether theory, a sandcastle or a computer program which can be shared or discussed with others. He emphasizes on social nature of learning such that knowledge is constructed through practical experience and is not something that can simply be transmitted from one person to the next. This theory advocates for learners to construct mental models to better understand the world around them. It's mainly student centred discovery learning where students use information the already know to acquire more knowledge. Constructionist learning involves students drawing their own conclusions through creative experimentation and making social objects.(Parpert and Harel, 1991). It advocates for problem based learning that allows students to learn about a subject by exposing them to multiple problems and asking them to construct their understanding of the subject through hands on experience (Hmelo & Barrows, 2006).

It is this hands on experience that ICT brings to learning by making it possible for students get knowledge through practical experience making ICT have a long-term positive influence on education in the developing world.

This theory supports that students learn from known to unknown thus blending with ICTs as once a concept is introduced to learners they can build on it to learn newer concepts. This helps them build on the already acquired knowledge and learn new ones. It supports the concept of 'I do I remember, I see I remember' since what they learn practically is edged into their long term memory. This makes them confident in the use of ICTs, which eventually translates to improved performance in education

2.5 Conceptual Framework

Miles and Huberman, (1994) describe a conceptual framework as a frame work that lays out the key factors, constructs, or variables, and presumes relationships among them. It is a plan through which different features of research project are organized and their relationships brought out so as to guide a researcher throughout the process and position him in relationship to the research in terms of theoretical and ideological disposition (Holliday, 2007). It is structured from a set of wide ideas and theories that help a researcher to clearly recognize the problem they are looking at, frame their questions and find suitable literature (Smith, 2004). This study was guided by one independent variable; ICT with four components that is; infrastructure, capacity development, management and funding, representing how ICT may influence performance of education in Kakamega County. This research will be guided by the conceptual framework illustrated in figure 2.5.

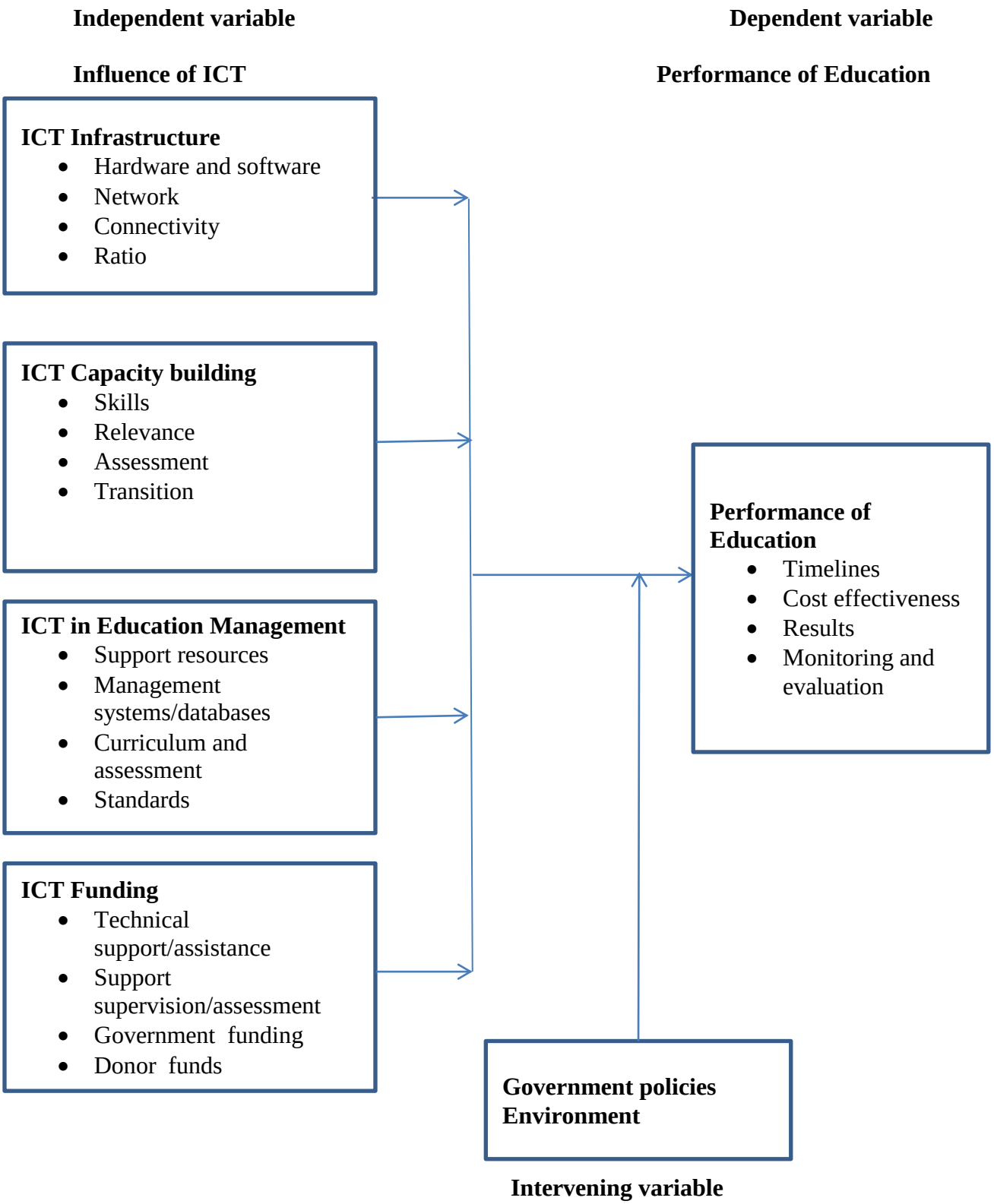

Fig 2.5 Conceptual framework

2.6 Gap in the Literature Review

This study acknowledges previous studies that have been done in relation to ICT in education. The consensus ICT impact towards performance of education remains unclear (Aristovnic, 2012). ICT in general enriches the system of education as well as teaching-learning methods and instructional strategies. In order to achieve scholastic performance, both teachers and students are required to work in coordination and integration with each other. Numerous studies have been undertaken to study the relationship between ICT and student performance, however these studies have not been able to establish precisely the impact of ICT on students' performance or on performance of education as a whole (Basri et al, 2017). These studies have posed two core challenges: first, it is difficult to determine the performance of students since the common approach used by many researchers accredits the curriculum responsible for the performance achievement in terms of grade. However Rose and Kadvakar (2015) criticize these studies blaming them for adopting a narrow approach and suggest alternative approach to consider the influence of ICT on students attitude, competency, and skills in addition to curriculum.

The second challenge lies in technological changes that are rampant in the ICT industry where it is difficult to treat their impact different from their environment. This aspect therefore makes such research attract high contention on the ground that rapid changes in technology would render the used parameters ineffective, therefore no conclusive results can be drawn from such studies. Furthermore many studies conducted on this subject are based on scientific studies of comparison. This studies establish that adoption of ICT in institutions of learning could improve the respective institution. Additionally most studies have focused on cognitive results, a few recent studies have encountered effective results and positive attitude towards ICT development (Basri et al., 2017).

Kuvuuka (2013) concluded and recommended that the government should put in place monitoring and evaluation mechanism for ICT integration in teaching and learning and that further research need to be done to find out the impact ICT integration in teaching and learning has on performance of education. This previous research contexts and scope does not answer the question of influence of ICT on performance of education in Kakamega County. Most researchers have only researched on ICT integration leaving behind how it influences performance of education.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the strategies that were used to carry out this study. It contains; research design, target population, sampling procedure, methods of data collection, description of research instrument, data analysis procedures, instrument validity and reliability and operational definition of variables.

3.2 Research Design

Research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure (Kothari & Garg, 2014). This section describes the general design and execution of the study and rationalizes preferences for particular methods and procedures in data collection and analysis. This study used mixed methods research design. The purpose of selection of this method is to combine both qualitative and quantitative data-collection and analytical methods to understand better the research problem (Creswell, 2012). Mixed methods research design is preferred because quantitative approach or qualitative approach alone will be inadequate to develop multiple perspectives or complete understanding of the research problem. By using the two approaches, the researcher will have the advantage of collecting multiple views, subjectively and objectively in answering research questions (Creswell, 2011).The researcher used structured questionnaires to ask specific questions, and collect quantifiable data from respondents. The data was subjected to statistical tests in an unbiased and objective way to strengthen precision of the conclusions and findings.

3.3. Target Population

Singleton & Strait, (2010) define target population as all the members real or hypothetical set of people, events or objects to which researchers wish to generalize the results of their research. Target population for this study was 72 school Principals, 120 computer studies Teachers and 132 employees from the 12 Sub County education offices in Kakamega County. This was guided by the Kenya government economic stimulus project where six secondary schools in each of Kenya's 210 constituencies were supported to fully integrate ICT in Education. It was also guided by the schools that offer computer studies as a subject

3.4. Sample Size and Sampling Procedure

3.4.1. Sample Size

According to Kothari (2010), a sample is a section of a population that is selected for examination and analysis and it is used to make inferences to the population from which it is obtained. Sampling technique is a process that helps select respondents that constitute a sample (Kothari & Garg, 2014). The target population of the study comprises of the 11 Sub County education officers from each of the 12 sub counties, and 72 Principals and 120 computer studies teachers representing a total of six schools from each of the 12 sub counties in Kakamega County. To obtain a sample from it Krejcie and Morgan's formula will be used as attached in appendix v.

$S=X^2 NP (1-P)/d^2 (n-1)+ P(1-P)$

Where X^2= the table value of chi-square for 1 degree of freedom at the desired confidence level

(1.96x1.96= 3.841)

N= the population size

P= the proportion (assumed to be .50)

D= the degree of accuracy expressed as a proportion (.05)

Substituting the target population into the formula N=324

$$S= \frac{3.841x324x0.5\ (1-0.5)}{0.05^2x(324-1) + 3.841x\ 0.5(1-0.5)}$$

= 175.9981

S = 175

This yielded a sample of 175 respondents out of 324

This study therefore used a sample population of 175 respondents for data collection which represents 54 percent of the target population

3.4.2 Sampling Frame

Sekaran and Bougie (2011) defines sampling frame as a physical representation of all the elements in the population from which the sample is drawn. It provides a list of items from which the sample is to be drawn (Kothari & Garg, 2014). Sampling helps in drawing valid inferences or generalizations on the basis of careful observation of variables with a relatively small percentage of the population.(Best & Khain, 2008).The sampling frame of this study

consisted of 324 respondents that is Principals and Teachers across the 12 Sub Counties. Proportionate sampling was used to arrive at the different sample sizes for each subgroup as illustrated in table 3.1.

Table 3.1 Population Sampling Frame

	TOTAL POPULATION	**SAMPLE SIZE**	**PERCENTAGE**
Principals	72	39	22%
Computer Teachers	120	65	37%
Sub county education officers	132	71	41%
TOTAL	**324**	**175**	100%

3.5 Data Collection Instruments.

Data collection is the collection and measuring information on targeted variables in an defined manner so as to answer relevant questions, test hypotheses, and evaluate outcomes (Sekara & Bougie, 2010). This research aimed to collect both qualitative and quantitative, self-administered questionnaires were administered to the respondents. The questionnaire contained four sections, demographic, infrastructure, capacity building and management and funding.

3.6 Pilot Testing

A pilot study is a small scale preliminary study conducted to find out feasibility, time, cost, adverse events, and effect size in an attempt to predict an appropriate sample size and improve upon the study design prior to performance of a full-scale research project (Hulley, 2007). Pilot testing of instruments was done in schools outside the sample such as schools in the neighboring Vihiga County before the actual data collection was carried out to test for accuracy of the instruments. The instruments were pretested to 2 schools. The pilot testing made it possible for researcher to identify any possible errors in the instruments and to rephrase some questions.

3.6.1 Validity of Instruments

Kothari and Garg, (2014) describe validity as extent to which a test measures what we actually wish to measure..Validity of the instruments was tested using content and face validity. The questionnaire were given to an education expert, research and ICT expert together with consultation between the researcher and the supervisor. Their views and input were considered and all necessary corrections made before the main stage of data collection. An observation checklist was also developed to counter check respondents information

3.6.2 Reliability of Instrument

Reliability is the accuracy and precision of a measurement procedure (Kothari & Garg, 2014). Test and retest method will be employed to test for reliability of the instruments. Questionnaires were administered to respondents in secondary schools that have implemented ICT integration in education in Vihiga County. After two weeks the same questionnaire were administered again to the same school and comparison made to see if it yielded consistent results. Comparison in responses was done using t-test at 95% confidence level. Reliability index was calculated using a Cronchbach's alpha. Mugenda & Mugenda (2003) notes that Cronchbach's alpha coefficient of 0.7 and above is considered high enough to judge the instrument as reliable with a high Cronchbach's alpha coefficient showing that that the items correlate highly among themselves thus consistency among the items being used to measure the concept of interest

3.7 Data Collection Procedure

Sekaran and Bougie (2011) describes data collection as a process of gathering and measuring information on targeted variables in an established systematic fashion that enables one to answer relevant questions, test hypotheses, and evaluate outcomes. Permission to access secondary schools and carry out this study was sought from the Kakamega County education office and the respective sub county education offices. Application of a research permit from the National Council for Science and Technology (NACOSTI) was also done. Prior arrangements were also made with the respective respondents.

3.8 Data Analysis Techniques

Data analysis was conducted based on research questions to ensure that all variables were adequately measured. This was achieved by subjecting data from each research question to analysis. Data collected was analysed both qualitatively and quantitatively by the researcher. The

data was entered into a statistical package for social sciences (SPSS) software for analysis. Descriptive statistics, correlation analysis and regression analysis was done and presented in form of frequencies percentages and tables. The study was tested at 95% confidence level and 5% significance levels

3.9 Ethical Consideration

Permission was sought from the Kakamega County education offices and from the respective sub county education offices, and respondents of each secondary school. A research permit was also obtained from the National Commission for Science, Technology and Innovation (NACOSTI). Informed consent was also obtained from all study respondents to ensure that they participated freely and also an assurance to the respondents that their privacy and confidentiality would be observed. In addition the names for respondents and respective schools were not used for anonymity. The data collection instruments were also destroyed after the data was coded and entered into SPSS package

3.10 Operational Definition of Variables

Table 3.2 Operational Definition of Variables

VARIABLE	TYPE OF VARIABLE	INDICATORS	SCALE OF MEASUREMENT	DATA	TOOL OF ANALYSIS
Performance of Education	Dependent	-Timelines -Cost effectiveness -Results -Monitoring and evaluation	Ordinal	Inferential Descriptive	Mean Standard deviation
Infrastructure as a component of Information communication Technology	Independent	-Uninterrupted power supply -Computer labs -Number of computers	Ordinal Nominal Ratio	Inferential Descriptive	Frequency percentage
Capacity building as a component of Information communication Technology	Independent	Number of teachers trained Number of trainings Computer usage level	Nominal ordinal	Inferential Descriptive	Frequency Percentage Standard deviation
Educational management as a component of Information communication technology	Independent	Digital resources Management systems Policy	Ordinal	Inferential Descriptive	Frequency percentage
Funding as a component of Information Communication Technology	Independent	-Budget -Donations -Technical support -Strong donor collaborations and budget	Ratio	Inferential Descriptive	Frequency Percentage
Government policy		Influence of government policy	Ordinal	Inferential descriptive	Frequency percentage

CHAPTER FOUR

DATA ANALYSIS PRESENTATION AND INTERPRETATION

4.1 Introduction

This chapter contains the findings of the study based on the objectives and research questions The data is presented as it was gathered from the field. In this chapter the researcher analysed interpreted and presented the findings. The findings are mainly reported in frequencies percentages and tables. Correlation and regression analysis were also done

4.2 Response rate

The number of questionnaires that were administered to the respondents was 175. The total number of questionnaires that were collected from the field for analysis were 175 this represented 100% of the return rate. Mugenda (2003) notes that a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good and a rate of 70% and over is excellent. Based on this assertion, the response rate was excellent. Responses from this questionnaires were used to analyse the data and write this report for this research

4.3 Reliability Test Results

For all the five sub scales in the questionnaires the reliability for multi item opinion items were computed separately and the results presented in table 4.6. the Crombach alpha revealed that the tool had adequate reliability to conduct the study

Table 4.1: Cronbach's Alpha Results

Scale	No. Items	Cronbach's alpha	Conclusion
Infrastructure in relation to Performance of Education	7	.849	Reliable
ICT Capacity building and Performance of Education	7	.781	Reliable
ICT Management in relation to Performance of Education	7	.849	Reliable
ICT Funding and Performance of Education	7	.714	Reliable
Performance of Education	7	.863	Reliable

From table 4.1 it was evident that all items correlated with the total scale to a good degree. All the subscales had Crombach alpha of greater than 0.7 which is adequate. These findings show that the questionnaires were generally suitable for data collection because they adequately measured the constructs for which they were intended to measure.

4.4 Demographic information

The question item number one sought to find out the gender of the respondents. The analysis of this data showed that among the respondents that were sampled 71 sub county officials 65 computer teachers and 39 principals. 41 (57.7%(were male sub county officials while 30(42.3%) were female sub county officials. 25(64.1%) were male principals while 14(35.9%) were female principals. 40(61.5%) were male while 25(38.5%) were female. These findings are presented in table 4.2

Table 4.2: Gender of respondents

Category		Frequency	Percentage
Sub county officials	Male	41	57.7
	Female	30	42.3
	Total	71	100.0
Principals	Male	25	64.1
	Female	14	35.9
	Total	39	100.0
Computer teaches	Male	40	61.5
	Female	25	38.5
	Total	65	100.0

Responses were also sought from the respondents to indicate their age and these results were summarized in table 4.3

Table 4.3 Age brackets		Frequency	Percentage
Sub county Officials	20-30 Years	3	4.2
	31-40 Years	21	29.6
	41-50 Years	30	42.3
	Above 50 Years	17	23.9
	Total	71	100.0
Principals	31-40 Years	8	20.5
	41-50 Years	19	48.7
	Above 50 Years	12	30.8
	Total	39	100.0
Computer teachers	20-30 Years	3	4.2
	31-40 Years	30	42.3
	41-50 Years	21	29.6
	Above 50 Years	17	23.9
	Total	71	100.0

As depicted in table 4.3 majority of the sub county officials were within the age bracket 41-50 (42.3%), it was noted that majority of principals were within the age group 41-50(48.7%) and computer teachers 31-40 (42.3%).

Responses were also sought from the respondents to indicate their level of education and these results were summarized in table 4.4

Table 4.4 Level of Education

Category		Frequency	Percentage
Sub county officials	Certificate	6	8.5
	Diploma	14	19.7
	Graduate	28	39.4
	Post graduate	23	32.4
	Total	71	100.0
Principals	Diploma	4	10.3
	Graduate	27	69.2
	Post graduate	8	20.5
	Total	39	100.0
Computer Teachers	Diploma	14	21.5
	Graduate	51	78.5
	Total	65	100.0

Sub county officials were asked to state the current status/position and the results were summarized in table 4.5

Table 4.5 Current status/position

	Frequency	Percent
Director	22	31.0
Chief officer	25	35.2
Programme officer	13	18.3
Officer	11	15.5
Total	71	100.0

From the findings of this study most of the sub county officials were chief officers 25(35.2%) followed by director 22(31.0%), programme officer 13 (18.2%) and officers 11 (15.5%). Respondents were also asked to state the number of years they have served in their current stations. These results were summarised in table 4.6

Table 4.6 Number of years served in current station

		Frequency	Percent
Sub county Officials	Less than 1 Year	23	32.4
	2-5 Years	28	39.4
	Over 5 Years	20	28.2
	Total	71	100.0
Principals	Less than 1 Year	9	23.1
	2-5 Years	22	56.4
	Over 5 Years	8	20.5
	Total	39	100.0
Computer teachers	Less than 1 Year	17	26.2
	2-5 Years	9	13.8
	Over 5 Years	39	60.0
	Total	65	100.0

4.5 Performance of Education

The respondents were asked to rate the extent to which the constructs in table 4.7 conform to performance of education within Kakamega County

4.5.1 Descriptive Statistics for Performance of Education

To assess the performance of education in Kakamega County, a seven construct questions were included in the research pool. A five point rating scale was used to collect the views of respondents to the statement from strongly agree (5) to strongly disagree (1) where 5 indicated very high level relation and 1 indicating very low level. This data was analyzed and presented in form of percentage frequencies of responses. The results are summarized in table The results are summarized in table 4.7

Table 4.7 Performance of Education

STATEMENTS	5	4	3	2	1
Assessment of students is promptly and timely	9.2%	61.5%	21.5%	0%	7.7%
ICT has made it easy to timely appraise and assess teachers	9.2%	69.2%	21.5%	0%	0%
Digitization of teachers records and other related records has made it easy for retrieval and secure storage	9.2%	61.5%	29.2%	0%	0%
Monitoring and evaluation has been enhanced(tracking of students performance, generation of financial reports, inventory tracking and keeping etc)	9.2%	44.6%	38.5%	7.7%	0%
Use o ICTs has enabled teachers to plan their work load and cover the syllabus in time	0%	78.5%	21.5%	0%	0%
Students are satisfied and enjoy classes(increased participation, lively classes)	41.5%	44.6%	13.8%	0%	0%
Overall student enrollment and retention has improved due to use of ICTs in Education	0%	12.3%	63.1%	16.9%	7.7%

Key

5.Strongly agree 4. Agree 3. Neutral 2. Disagree 1. Strongly disagree

From table 4.7 it is evident that ICT has had a positive influence on performance of education. Majority(86.1%) of the respondents support the notion that there is increased participation in class by students. Planning and syllabus coverage has also been enhanced with 78.5% of the respondents supporting this. Appraisal of teachers has also been enhanced with more than half (78.4) of the respondents supporting this. These findings resonate with those of Wastian (2013) who noted that ICT had positive effect on performance of education. Abdullahi (2013) also concluded that quality of education is enhanced by ICT

4.6 ICT Infrastructure in relation of Performance of Education

The first objective of this study was to determine the extent to which ICT infrastructure influence performance of education in Kakamega County. The dependent variable in this study was performance of education. This was analysed through descriptive statistics correlation and regression analysis

The sub county officials, school principals and computer teachers were asked to rate the extent to which the constructs in table 4.8, table 4.16 and 4.23 respectively as indicators of ICT infrastructure in relation to performance of education

4.6.1 Descriptive Statistics for ICT infrastructure at sub county level

Sub county officials were presented with seven constructs as indicators of ICT infrastructure in relation to performance of education. A five point rating scale was used to collect the views of respondents to the statement from strongly agree (5) to strongly disagree (1) where 5 indicated very high level relation and 1 indicating very low level. This data was analyzed and presented in form of percentage frequencies of responses. The results are summarized in table 4.8

Table 4.8 ICT Infrastructure in relation to Performance of Education

STATEMENTS	5	4	3	2	1
I have unlimited access to a computer	18.3%	49.3%	11.3%	12.7%	8.5%
All our departments are have computers	7%	49.3%	29.6%	11.3%	2.8%
All our computers are connected to the same network	1.4%	33.8%	47.9%	14.1%	2.8%
The ICT equipment that we have(both hardware and software is up to date)	5.6%	42.3%	43.7%	8.5%	0%
We are connected to the power grid	87.3%	9.8%	2.8%	0%	0%
We have uninterrupted power supply and we make use of power back up for our computers	12.7%	46.5%	35.2%	5.6%	0%
We makes use of modern ICT technologies like cloud computing, record keeping and in our day to day activities	7.0%	33.8%	53.5%	5.6%	0%

N= 71

Key

5.Strongly agree 4. Agree 3. Neutral 2. Disagree 1. Strongly disagree

From table 4.8 respondents generally agreed that ICT infrastructure had an influence on performance of education for instance respondents were in agreement that ICT infrastructure had effect on performance of education. This was evident by 87.3% of the respondents who stated that connection to the power grid. These findings resonate with those of Muriuki (2017) that through government programmes like rural electrification and the last mile far flung remotely located areas and schools have been connected to the power grid

The respondents were asked to state the extent to which they thought that provision of ICT Infrastructure facilities in schools in their respective sub county had influence the performance of education and the responses to this question were summarized in table 4.9

Table 4.9 Extent of ICT Influence on Performance

	Frequency	Percentage
Large extent	49	69.0
Small extent	13	18.3
No extent	9	12.7
Total	71	100.0

From table 4.9 majority of the sub county officials 69.0% indicated that provision of ICT Infrastructure influenced Performance of Education to a large extent with 18.3% indicating that its influence was only to a small extent. This concurs with Aristovnick (2012) whose findings indicate that ICT has had a major influence on the education sector, on organization and on teaching and learning methods. The respondents were asked to state whether the available ICT infrastructure is sufficient and enough systems in place in their offices and the responses to this question were summarized in table 4.10

Table 4.10 Existence of computer systems

	Frequency	Percent
Yes	40	56.3
No	31	43.7
Total	71	100.0

From table 4.10 it is clear that computer systems are in use by the various sub county offices as 56.3% of the respondents indicated that they have ICT systems in place

The respondents were also asked if there were any challenges and the results were summarized in table 4.11

Table 4.11 Any Challenges

	Frequency	Percent
Yes	37	52.1
No	34	47.9
Total	71	100.0

From table 4.11 52.1% of the respondents noted that there were challenges

Table 4.12 If yes

	Frequency	Percent
Limited Internet access	37	52.1
No Internet	7	9.9
Few computers	14	19.7
Accessing online resources	2	2.8
Old hardware and software	2	2.8
Unreliable internet connectivity	2	2.8
Lack of computers	7	9.8
Total	71	100.0

From table 4.12 it is clear that the leading challenge was limited Internet access at 52.1% followed by few computers at 19.7%

4.6.1.1 Correlation for ICT infrastructure and performance of Education at sub county level

A Pearson product moment correlation coefficient was computed with scores on ICT infrastructure as independent variable and performance of education as the dependent variable. The scores for both variables which were collected in form of frequencies were transformed into ratio scaled data by computing mean responses per respondent where high scale ratings implied high ICT infrastructure and high education performance and vice versa. The SPSS output for the correlation analysis result was summarized in table 4.13

Table 4.13 Correlation For ICT Infrastructure and Performance of Education at sub county level

		Performance Of Education
ICT Infrastructure	Pearson Correlation	.625**
	Sig. (2-tailed)	.000
	N	71

**. Correlation is significant at the 0.01 level (2-tailed)

The findings showed that there was a positive(r=0.625, N=71, P<.0.01) between ICT infrastructure and performance of Education as depicted in table 4.13

4.6.1.2 Regression analysis for ICT Infrastructure and performance of Education at sub county level

To estimate the level of ICT infrastructure in relation to performance of education, a coefficient of determination was computed using regression analysis and the results were presented in table 4.14

Table 4.14 Model summary for ICT infrastructure and performance of Education

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.625[a]	.391	.382	.49673

a. Predictors: (Constant), ICT Infrastructure

From table 4.14 it can be seen that r value is 0.625 for ICT infrastructure and performance of Education suggesting that there is a strong influence infrastructure on performance of education

From the table it can be observed that the coefficient of determination, the R square value is 0.391 which represents 39.1 % variation of performance of Education as a result of ICT infrastructure

To establish whether ICT infrastructure was a significant predictor of Performance of education an analysis of variance (ANOVA) was done and the results presented in Table 4.15

Table 4.15 ANOVA- ICT Infrastructure on Performance of Education

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	10.912	1	10.912	44.224	.000[b]
	Residual	17.025	69	.247		
	Total	27.937	70			

a. Dependent Variable: Performance Of Education

b. Predictors: (Constant), ICT Infrastructure

From table 4.15 it was noted that ICT infrastructure was a significant predictor of performance of education [$F1(1,69) = 44.224$, $P<0.05$)] this means that ICT infrastructure was a significant predictor of performance of education since ICT infrastructure explained a significant amount of the variance in performance of Education

4.6.2. Descriptive Statistics for ICT infrastructure at school level

School Principals were presented with seven constructs as indicators of ICT infrastructure in relation to performance of education. A five point rating scale was used to collect the views of respondents to the statement from strongly agree (5) to strongly disagree (1) where 5 indicated very high level relation and 1 indicating very low level. This data was analyzed and presented in form of percentage frequencies of responses. The results are summarized in table 4.16

Table 4.16 Infrastructure in relation to Performance of Education

STATEMENTS	5	4	3	2	1
The school has a computer lab for use by the students	66.7%	23.1%	10.3%	0%	0%
All our departments have computers	15.4%	38.5%	33.3%	12.8%	0%
All our departments computers are connected to a computer network	10.3%	20.5%	51.3%	17.9%	0%
We have a power back up for our ICT systems in the school	10.3%	56.4%	28.2%	5.1%	0%
The school is connected to the national power grid	94.9%	5.1%	0%	0%	0%
We have a constant power supply	17.9%	82.1%	0%	0%	0%
The school makes use of modern ICT technologies like cloud computing	0%	5.1%	82.1%	5.1%	7.7%

N= 39

Key

5.Strongly agree 4. Agree 3. Neutral 2. Disagree 1. Strongly disagree

Table 4.16 shows that 66.7% and 23.1% strongly agreed and agreed that the school had a dedicated computer lab. 94.9% of the respondents strongly agreed that they were connected to the power grid. This shows that there is existence of the physical infrastructure needed to support use of ICT in education. These findings are supported by the findings of Muriuki (2017) who

notes that the government rural electrification and the last mile programme has ensured that electricity is available in rural areas

The respondents were also asked to what extent provision of ICT infrastructure facilities affected the performance of education. Their responses are summarized in table 4.17

Table 4.17 Extent to which ICT infrastructure influence performance of education

	Frequency	Percent
Large extent	37	94.9
Small extent	2	5.1
Total	39	100.0

Table 4.17 shows that majority of the respondents (94.9%) agreed that provision of ICT infrastructure had an influence on performance of education

The respondents were also asked if they had any computer systems in their school and their responses are summarized in tale 4.18

Table 4.18 Use of Computer systems

	Frequency	Percent
Yes	30	76.9
No	9	23.1
Total	39	100.0

From table 4.18 shows that majority of the respondents (76.9%) agree that they have computer systems in place. it is evident that most schools have embraced use of ICT. The type of systems in use are summarized in table 4.19

Table 4.19 Systems in use

	Frequency	Percent
None	9	23.1
School management	25	64.1
Examination analysis	5	12.8
Total	39	100.0

4.6.2.1 Correlation for ICT Infrastructure and Performance of Education school level

A Pearson product moment correlation coefficient was computed with scores on ICT infrastructure as independent variable and Performance of Education as the dependent variable. The scores for both variables which were collected in form of frequencies were transformed into ratio scaled data by computing mean responses per respondent where high scale ratings implied high ICT infrastructure and high Education Performance and vice versa. The SPSS output for the correlation analysis result was summarized in table 4.20

Table 4.20 Correlation for ICT Infrastructure and Performance of Education at school level

		Performance Of Education
ICT Infrastructure	Pearson Correlation	.680**
	Sig. (2-tailed)	.000
	N	39

**. Correlation is significant at the 0.01 level (2-tailed).

The findings showed that there was a positive(r=0.680, N=39, P<.0.01) relation between ICT infrastructure and Performance of Education as depicted in table 4.20

4.6.2.2 Regression analysis for ICT Infrastructure and Performance of Education at school level

To estimate the level of ICT Infrastructure in relation to Performance of Education, a coefficient of determination was computed using regression analysis and the results were presented in table 4.21

Table 4.21 Model summary for ICT Infrastructure and performance of Education

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.680[a]	.462	.447	.50535

a. Predictors: (Constant), ICT Infrastructure

From table 4.21 it can be seen that r value is 0.680 for ICT infrastructure and Performance of Education suggesting that there is a considerable influence of ICT infrastructure on performance of education

From the table it can be observed that the coefficient of determination, the R square value is 0.462 which represents 46.2% variation of Performance of Education as a result of ICT infrastructure

To establish whether ICT infrastructure was a significant predictor of performance of education an analysis of variance (ANOVA) was done and the results presented in Table 4.22

Table 4.22 ANOVA-ICT infrastructure and performance of education at school level

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.109	1	8.109	31.753	.000[b]
	Residual	9.449	37	.255		
	Total	17.558	38			

a. Dependent Variable: Performance Of Education

b. Predictors: (Constant), ICT Infrastructure

From table 4.22 it was noted that ICT infrastructure was a significant predictor of performance of education [F1(1,37) = 31.753, P<0.05)] this means that ICT infrastructure was a significant predictor of Performance of Education since use of ICT infrastructure explained a significant amount of the variance in Performance of Education

4.6.3. Descriptive Statistics for ICT Infrastructure at school level

Computer teachers were presented with seven constructs as indicators of ICT infrastructure in relation to performance of education. A five point rating scale was used to collect the views of respondents to the statement from strongly agree (5) to strongly disagree (1) where 5 indicated very high level relation and 1 indicating very low level. This data was analyzed and presented in form of percentage frequencies of responses. The results are summarized in table 4.23

Table 4.23 Infrastructure in relation to Performance of Education

STATEMENTS	5	4	3	2	1
The hardware and software that we have is relevant, modern and up to date	0%	73.8%	12.3%	1.5%	12.3%
Each student has access to computers	0%	58.5%	36.9%	0%	4.6%
All computers in our lab are working	0%	50.8%	29.2%	15.4%	4.6%
All the computers are connected to a network	0%	29.2%	33.8%	32.3%	4.6%
The computers are connected to fast internet with minimal downtimes	0%	12.3%	24.6%	33.8%	29.2%
We have a constant and reliable power supply	50.8%	29.2%	20.0%	0%	0%
We make use of modern ICT technologies eg cloud computing	0%	24.6%	53.8%	15.4%	6.2%

N= 65

Key

5.Strongly agree 4. Agree 3. Neutral 2. Disagree 1. Strongly disagree

From table 4.23, majority of the respondents (73.8%) agreed that they had up to date hardware and software. These findings concur with those of Kuvuuka (2013) who noted that through the economic stimulus project six secondary schools in each of Kenya's 210 constituencies had been equipped with computers, internet connectivity and a local area network.

The respondents were also asked to state to whether they had any challenges. Their responses are summarized in table 4.24

Table 4.24 Any Challenges

	Frequency	Percent
Yes	38	58.5
No	27	41.5
Total	65	100.0

From table 4.24 58.5% of the respondents noted that they faced challenges and the challenges they faced are summarized in table 4.25

Table 4.25 Challenges

	Frequency	Percent
Limited internet	31	47.7
No Internet	20	30.8
Few computers	8	12.3
Accessing online resources	5	7.7
Old hardware and software	1	1.5
Total	65	100.0

4.6.3.1 Correlation for ICT Infrastructure and Performance of Education

A Pearson product moment correlation coefficient was computed with scores on ICT infrastructure as independent variable and Performance of Education as the dependent variable. The scores for both variables which were collected in form of frequencies were transformed into ratio scaled data by computing mean responses per respondent where high scale ratings implied high ICT infrastructure and high Education Performance and vice versa. The SPSS output for the correlation analysis result was summarized in table 4.26

Table 4.26 Correlation for ICT Infrastructure and Performance of Education

		ICT Infrastructure
Performance Of Education	Pearson Correlation	.721**
	Sig. (2-tailed)	.000
	N	65

**. Correlation is significant at the 0.01 level (2-tailed).

The findings showed that there was a positive(r=0.721, N=65, P<.0.01) relation between ICT infrastructure and Performance of Education as depicted in table 4.26

4.6.3.2 Regression analysis for ICT Infrastructure and Performance of Education

To estimate the level of ICT Infrastructure in relation to Performance of Education, a coefficient of determination was computed using regression analysis and the results were presented in table 4.27

Table 4.27 Model summary for ICT Infrastructure and performance of Education

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.721[a]	.521	.513	.34370

a. Predictors: (Constant), ICT Infrastructure

From table 4.27 it can be seen that r value is 0.721 for ICT infrastructure and Performance of Education suggesting that there is a considerable influence of ICT infrastructure on performance of education

From the table it can be observed that the coefficient of determination, the R square value is 0.513 which represents 51.3% variation of Performance of Education as a result of ICT infrastructure

To establish whether ICT infrastructure was a significant predictor of performance of education an analysis of variance (ANOVA) was done and the results presented in Table 4.28

Table 4.28 ANOVA-ICT infrastructure and performance of education

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.079	1	8.079	68.395	.000[b]
	Residual	7.442	63	.118		
	Total	15.522	64			

a. Dependent Variable: Performance Of Education

b. Predictors: (Constant), ICT Infrastructure

From table 4.28 it was noted that ICT infrastructure was a significant predictor of performance of education [F1(1,63) = 68.395, P<0.05)] this means that ICT infrastructure was a significant predictor of Performance of Education since use of ICT infrastructure explained a significant amount of the variance in Performance of Education

4.7 Influence of ICT Capacity Building on the Performance of Education

The second objective of this study was to examine the extent to which ICT capacity building influence performance of education in Kakamega County. The dependent variable in this study was performance of education. This was analysed through descriptive statistics correlation and regression analysis

The sub county officials, school principals and computer teachers were asked to rate the extent to which the constructs in table 4.29, table 4.38 and 4.44 respectively as indicators of ICT infrastructure in relation to performance of education

4.7.1 Descriptive Statistics for ICT capacity building at sub county level

Sub county officials were presented with seven constructs as indicators of ICT infrastructure in relation to performance of education. A five point rating scale was used to collect the views of respondents to the statement from strongly agree (5) to strongly disagree (1) where 5 indicated very high level relation and 1 indicating very low level. This data was analyzed and presented in form of percentage frequencies of responses. The results are summarized in table 4.29

Table 4.29 Influence of ICT Capacity Building on the Performance of Education

STATEMENTS	5	4	3	2	1
I have received ICT training	9.9%	7.0%	31.0%	21.1%	31.0%
I undergo ICT re-training/seminars at least once a year	0%	2.8%	26.8%	40.8%	29.6%
I received the re-training at the right time	0%	5.6%	32.4%	35.2%	26.8%
I fund my own ICT training	15.5%	14.1%	52.1%	14.1%	4.2%
I am able to do most of my ICT related tasks on my own	36.6%	31.0%	23.9%	8.5%	0%
We support the ICT programmes in our sub county schools	0%	0%	5.6%	23.9%	70.4%
I don't need to travel for me to access training	0%	15.5%	12.7%	18.3%	53.5%

N= 71

Key

5.Strongly agree 4. Agree 3. Neutral 2. Disagree 1. Strongly disagree

From table 4.29 it is evident that ICT capacity building has an effect on Performance of Education. This is supported by few training opportunities being available leading to a low percentage of the respondents, 36.6%, being able to do most of the ICT related tasks on their own. These findings resonates with those of Adomi and Kpangban (2010) who noted that there

is lack of/limited ICT skills with those tasked with using and integrating ICT into education thus having an effect on performance of education

The respondents were asked to state the extent to which they thought that ICT Capacity Building influenced the Performance of Education in their Sub County and the responses to this question were summarized in table 4.30

Table 4.30 Extent of ICT Capacity Building Influence on Performance of Education

	Frequency	Percent
Large extent	46	64.8
Small extent	11	15.5
No extent	14	19.7
Total	71	100.0

From table 4.30 it is clear that a majority of the respondents 64.8% thought that capacity building had an effect on the performance of Education in their Sub counties

The respondents were also asked if they had received any ICT retraining from the government or from their respective offices and the responses to this question were summarized in table 4.31

Table 4.31 Retraining

	Frequency	Percent
Yes	19	26.8
No	50	70.4
4.00	2	2.8
Total	71	100.0

From table 4.31 a majority of the respondents 70.4% indicated that they had not received any form of retraining from the government or from their office

The respondents were also asked to state if they had received any form of ICT retraining from the government or their office and if yes to state what was the impact of the retraining and the responses to this question are summarized in table 4.32

Table 4.32 Impact of ICT retraining

	Frequency	Percent
None	52	73.2
Training on ICT	2	2.8
Am able to work better	17	23.9
Total	71	100.0

Table 4.32 shows that a majority of the respondents (73.2%) had not received any form of retraining from either the government or their office. Only 2.8% stated that they had received retraining. The respondents were also asked to state if they experienced any challenges and the responses are summarized in table 4.33

Table 4.33 If yes

	Frequency	Percent
Yes	32	45.1
No	39	54.9
Total	71	100.0

From table 4.33 45.1% of the respondents stated that they had challenges and the challenges experienced were summarized in table 4.34

Table 4.34 Summary of Challenges

	Frequency	Percent
No in house ICT capacity building	41	57.7
Limited funds for staff training	7	9.8
Expensive to manage	2	2.8
Insufficient ICT infrastructure	3	4.2
Most staff are not computer literate	3	4.2
no training opportunities	9	12.7
No retraining opportunities	6	8.5
Total	71	100.0

From table 4.34 57.7% of the respondents indicated that there were no opportunities for ICT capacity building and retraining

4.7.1.1 Correlation for ICT Capacity Building and Performance of Education

A Pearson product moment correlation coefficient was computed with scores on ICT Capacity Building as independent variable and Performance of Education as the dependent variable. The scores for both variables which were collected in form of frequencies were transformed into ratio scaled data by computing mean responses per respondent where high scale ratings implied high ICT Capacity Building and high Education Performance and vice versa. The SPSS output for the correlation analysis result was summarized in table 4.35

Table 4.35 Correlation for ICT Capacity Building and Performance of Education

		ICT Capacity Building
Performance Of Education	Pearson Correlation	.607**
	Sig. (2-tailed)	.000
	N	71

**. Correlation is significant at the 0.01 level (2-tailed)

The findings showed that there was a positive(r=0.607, N=71, P<.0.01) between ICT Capacity Building and Performance of Education as depicted in table 4.35

4.7.1.2 Regression analysis for ICT Capacity Building and Performance of Education

To estimate the level of ICT Capacity Building in relation to Performance of Education, a coefficient of determination was computed using regression analysis and the results were presented in table 4.36

Table 4.36 Model summary for ICT Capacity Building and performance of Education

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.607[a]	.368	.359	.50566

a. Predictors: (Constant), ICT Capacity Building

From table 4.36 it can be seen that r value is 0.607 for ICT Capacity Building and Performance of Education suggesting that there is a strong influence infrastructure on performance of education

From the table it can be observed that the coefficient of determination, the R square value is 0.368 which represents 36.8 % variation of Performance of Education as a result of ICT Capacity Building

To establish whether ICT capacity building was a significant predictor of performance of education an analysis of variance (ANOVA) was done and the results presented in Table 4.37

Table 4.37 ANOVA- ICT Capacity Building on Performance of Education

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	10.294	1	10.294	40.260	.000[b]
	Residual	17.643	69	.256		
	Total	27.937	70			

a. Dependent Variable: Performance Of Education

b. Predictors: (Constant), ICT Capacity Building

From table 4.37 it was noted that ICT Capacity Building was a significant predictor of performance of education [$F1(1,69) = 40.260$, $P<0.05$)] this means that ICT Capacity building was a significant predictor of Performance of Education since ICT Capacity Building explained a significant amount of the variance in Performance of Education

4.7.2 Descriptive Statistics for ICT capacity building at school level

School Principals were presented with seven constructs as indicators of ICT capacity building in relation to performance of education. A five point rating scale was used to collect the views of respondents to the statement from strongly agree (5) to strongly disagree (1) where 5 indicated very high level relation and 1 indicating very low level. This data was analyzed and presented in form of percentage frequencies of responses. The results are summarized in table 4.38

Table 4.38 Influence ICT Capacity Building on the Performance of Education

STATEMENTS	5	4	3	2	1
The school facilitates training of our Teachers	0%	10.3%	48.7%	30.8%	10.3%
The Ministry of Education provides updated ICT training materials to the schools	0%	5.1%	30.8%	33.3%	30.8%
Use of ICT helps teachers in delivery of their work	0%	35.9%	59.0%	5.1%	0%
Training of teachers has influenced performance of their performance	0%	35.9%	64.1%	0%	0%
ICT teacher in the school are adequate	0%	43.6%	35,9%	20.5%	0%
Assessment and supervision of our ICT teachers is effective	0%	15.4%	79.5%	5.1%	0%
Teachers fund their own ICT Training/seminar attendance	7.7%	28.2%	53.8%	10.3%	0%

N= 39

Key

5.Strongly agree 4. Agree 3. Neutral 2. Disagree 1. Strongly disagree

Table 4.38 shows that even though training ofteachers had a considerable effect on their performance and delivery of their work (35.9%) schools were not facilitating or supporting their training. This resonates with Kabanda (2012) where he noted that sub-Saharan countries were facing a huge challenge of untrained personnel in schools that attempted to introduce ICT programmes in school

The respondents were also asked to what extent they thought ICT capacity building influenced the performance of education. Their responses are summarized in table 4.39

Table 4.39 Extent of ICT capacity building influence on performance of education

	Frequency	Percent
Large extent	38	97.4
Small extent	1	2.6
Total	39	100.0

A majority (97.4%) of the respondents indicated that ICT capacity building had a huge influence on the performance of education as depicted in table 4.39. The respondents were also asked to state any challenges they faced and this is summarized in table 4.40

Table 4.40 Challenges

	Frequency	Percent
None	16	41.0
Computer illiteracy	3	7.7
Limited funds for staff training	17	43.6
Expensive to manage	3	7.7
Total	39	100.0

Table 4.40 shows that a major problem faced was limited funds for staff training

4.7.2.1 Correlation for Capacity building and Performance of Education

A Pearson product moment correlation coefficient was computed with scores on ICT capacity building as independent variable and Performance of Education as the dependent variable. The scores for both variables which were collected in form of frequencies were transformed into ratio scaled data by computing mean responses per respondent where high scale ratings implied high

ICT capacity building and high Education Performance and vice versa. The SPSS output for the correlation analysis result was summarized in table 4.41

Table 4.41 Correlation for ICT capacity building and performance of education

		Performance Of Education
ICT Capacity Building	Pearson Correlation	.633**
	Sig. (2-tailed)	.000
	N	39

**. Correlation is significant at the 0.01 level (2-tailed).

The findings showed that there was a positive(r=0.633, N=39, P<.0.01) relation between ICT capacity building and Performance of Education as depicted in table 4.41

4.7.2.2 Regression analysis for ICT capacity building and Performance of Education

To estimate the level of ICT capacity building in relation to Performance of Education, a coefficient of determination was computed using regression analysis and the results were presented in table 4.42

Table 4.42 Model summary for ICT capacity building and performance of Education

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.633[a]	.401	.384	.53331

a. Predictors: (Constant), ICT Capacity Building

From table 4.42 it can be seen that r value is 0.633 for ICT capacity building and Performance of Education suggesting that there is a considerable influence of ICT capacity building on performance of education

From the table it can be observed that the coefficient of determination, the R square value is 0.384 which represents 38.4% variation of Performance of Education as a result of ICT capacity building

To establish whether ICT capacity building has a significant predictor of performance of education an analysis of variance (ANOVA) was done and the results presented in Table 4.43

Table 4.43 ANOVA-ICT capacity building and performance of education

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	7.035	1	7.035	24.734	.000[b]
	Residual	10.524	37	.284		
	Total	17.558	38			

a. Dependent Variable: Performance Of Education

b. Predictors: (Constant), ICT Capacity Building

From table 4.43 it was noted that ICT capacity building was a significant predictor of performance of education [F1(1,37) = 31.753, P<0.05)] this means that ICT capacity building was a significant predictor of Performance of Education since use of ICT capacity building explained a significant amount of the variance in Performance of Education

4.7.3 Descriptive Statistics for ICT Capacity building at school level

Computer teachers were presented with seven constructs as indicators of ICT capacity building in relation to performance of education. A five point rating scale was used to collect the views of respondents to the statement from strongly agree (5) to strongly disagree (1) where 5 indicated very high level relation and 1 indicating very low level. This data was analyzed and presented in form of percentage frequencies of responses. The results are summarized in table 4.44

Table 4.43 ICT Capacity Building on the Performance of Education

STATEMENTS	5	4	3	2	1
I am able to do more ICT tasks apart from teaching	56.9%	43.1%	0%	0%	0%
My computer competency skills is assessed annually	0%	4.6%	0%	70.8%	24.6%
I receive ICT materials from the Ministry of Education for teaching	0%	15.4%	67.7%	9.2%	7.7%
I attend at least one training every year	0%	27.7%	58.5%	9.2%	4.6%
I fund my own trainings/seminar attendance	33.8%	20.0%	46.2%	0%	0%
I am affected by the changing ICT technology	63.1%	36.9%	0%	0%	0%
I don't need to travel for me to receive training	20.0%	16.9%	27.7%	35.4%	0%

N= 65

Key

5.Strongly agree 4. Agree 3. Neutral 2. Disagree 1. Strongly disagree

From table 4.44, 63.1% and 36.9% of the respondents strongly agreed and agreed that they are affected with the changing ICT technology. this shows the need of continual teacher training and is supported by the findings of Tairab and Huang (2017) who noted that there should be continual teacher development and update of their skills so as to improve teacher competencies and to prepare teachers in meaningful ways of using technology in the classroom. The respondents were also asked if they had received any kind of ICT retraining. The results are summarized in table 4.45

Table 4.45 ICT Retraining

		Frequency	Percent
	Yes	11	16.9
	No	54	83.1
	Total	65	100.0

From table 4.45 A majority (83.1%) indicated that they had not received any kind of ICT retraining

4.7.3.1 Correlation for ICT capacity building and Performance of Education

A Pearson product moment correlation coefficient was computed with scores on ICT capacity building as independent variable and Performance of Education as the dependent variable. The scores for both variables which were collected in form of frequencies were transformed into ratio scaled data by computing mean responses per respondent where high scale ratings implied high ICT capacity building and high Education Performance and vice versa. The SPSS output for the correlation analysis result was summarized in table 4.46

Table 4.46 Correlation for ICT Capacity building and Performance of Education

		Performance Of Education
ICT Capacity Building	Pearson Correlation	-.302*
	Sig. (2-tailed)	.014
	N	65

*. Correlation is significant at the 0.05 level (2-tailed).

The findings showed that there was a positive(r=0.302, N=65, P<.0.01) relation between ICT capacity building and Performance of Education as depicted in table 4.46

4.7.3.2 Regression analysis for ICT Capacity Building and Performance of Education

To estimate the level of ICT capacity building in relation to Performance of Education, a coefficient of determination was computed using regression analysis and the results were presented in table 4.47

Table 4.47 Model summary for ICT Capacity building and performance of Education

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.302[a]	.091	.077	.47318

a. Predictors: (Constant), ICT Capacity Building

From table 4.47 it can be seen that r value is 0.302 for ICT Capacity building and Performance of Education suggesting that there is a considerable influence of ICT capacity building on performance of education

From the table it can be observed that the coefficient of determination, the R square value is 0.091 which represents 9.1% variation of Performance of Education as a result of ICT capacity building

To establish whether ICT capacity building was a significant predictor of performance of education an analysis of variance (ANOVA) was done and the results presented in Table 4.48

Table 4.48 ANOVA-ICT capacity building and performance of education

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	1.416	1	1.416	6.323	.014[b]
	Residual	14.106	63	.224		
	Total	15.522	64			

a. Dependent Variable: Performance Of Education

b. Predictors: (Constant), ICT Capacity Building

From table 4.48 it was noted that ICT Capacity building was a significant predictor of performance of education [F1(1,63) = 6.323, P<0.05)] this means that ICT capacity building was a significant predictor of Performance of Education since use of ICT capacity building explained a significant amount of the variance in Performance of Education

4.8 Influence of use of ICT in Education Management on the Performance of Education

The third objective of this study was to establish the extent to which use of ICT in education management influence performance of education in Kakamega county. The dependent variable in this study was performance of education. This was analysed through descriptive statistics correlation and regression analysis

The sub county officials, school principals and computer teachers were asked to rate the extent to which the constructs in table 4.49, table 4.57 and 4.62 respectively as indicators of use of ICT in education management in relation to performance of education

4.8.1 Descriptive statistics for use ICT in Management at sub county level

Sub county officials were presented with seven opinion as indicators of ICT capacity building in relation to performance of education. A five point rating Likert scale was used to collect the views of respondents to the statement from strongly agree (5) to strongly disagree (1) where 5 indicated very high level relation and 1 indicating very low level. This data was analyzed and

presented in form of percentage frequencies of responses. The results are summarized in table 4.49

Table 4.49 Use of ICT in Education Management in relation to performance of Education

STATEMENTS	5	4	3	2	1
We use ICTs for communication(emails, work groups) in our office and between our office and schools in our sub county	2.8%	50.7%	42.3%	4.2%	0%
We have ICT systems that store and manage our records and data	0%	59.2%	35.2%	4.2%	1.4%
Our systems are linked with other national government systems (Teachers Service Commission(TSC), County Education office)	0%	7.0%	62.0%	31.0%	0%
We have ICT systems in place that manage our day to day activities in our office	1.4%	38.0%	60.6%	0%	0%
We have ICT policy in place that guides use and access of ICTs	4.2%	19.7%	59.2%	16.9%	0%
Use of ICTs has greatly reduced our paperwork	33.8%	35.2%	31.0%	0%	0%
We use ICT to secure our records and access control	29.6%	38.0%	32.4%	0%	0%

N= 71

Key

5.Strongly agree 4. Agree 3. Neutral 2. Disagree 1. Strongly disagree

From table 4.49 50.7% agreed that they make use of ICT for communication within their office and between their office and the schools in their sub county. 59.2% also agreed that they use ICT systems to store and manage their data. There was a general trend of adoption of technology to manage their activities and education with 38% agreeing that they use ICT systems to manage

their day to day activities, 33.8% and 35.2% strongly agreeing and agreeing that use of ICT had greatly reduced their paperwork. This indicates that there is a considerable effect of use of ICTs in management of the education system on performance of education. This findings resonate with those of Vanderlinder and Aesaert (2014) that ICT use in schools should not only be left for the teachers to use in teaching and learning process alone but throughout the education system as a whole so as to have a positive influence on the performance of the education system.

The respondents were also asked to what extent they thought introduction of ICTs in management of the education system had influenced Performance of Education in schools within their respective Sub counties and their responses were summarized in table 4.50

Table 4.50 Extent of ICT introduction in Education Management influence on Performance of Education

	Frequency	Percent
Large extent	44	62.0
Small extent	25	35.2
No extent	2	2.8
Total	71	100.0

Table 4.50 reveals that 62.0% of the respondents were of the opinion that introduction of ICT in management of education influenced performance of education. The respondents were also asked to state whether they used ICTs in carrying out their day to day activities and their responses are shown in Table 4.51

Table 4.51 Use of ICT

	Frequency	Percent
Yes	52	73.2
No	19	26.8
Total	71	100.0

Table 4.51 shows that a majority of the respondents 73.2% , used ICT to carry out their day to day activities. The respondents were also asked to state whether they faced any challenges and their responses are shown in Table 4.52

Table 4.52 Any Challenge

	Frequency	Percent
Yes	54	76.1
No	17	23.9
Total	71	100.0

Table 4.52 shows that 76.1% of the respondents faced challenges and the challenges are summarized in table 4.53

Table 4.53 Challenges

	Frequency	Percent
Old computers	55	77.5
Few computers	6	8.5
Limited access to ICT use	5	7.0
Lack of computer proficiency	5	7.0
Total	71	100.0

From table 4.53 shows that the main challenge faced by the respondents is an infrastructure in this case 77.5% of the respondents noted that their computers were old

4.8.1.1 Correlation for ICT use in Education Management and Performance of Education

A Pearson product moment correlation coefficient was computed with scores on ICT Management as independent variable and Performance of Education as the dependent variable. The scores for both variables which were collected in form of frequencies were transformed into ratio scaled data by computing mean responses per respondent where high scale ratings implied high use of ICT in Management and high Education Performance and vice versa. The SPSS output for the correlation analysis result was summarized in table 4.54

Table 4.54 Correlation for ICT use in Education Management and Performance of Education

		Performance Of Education
ICT Management	Pearson Correlation	.529**
	Sig. (2-tailed)	.000
	N	71

**. Correlation is significant at the 0.01 level (2-tailed).

The findings showed that there was a positive(r=0.529, N=71, P<.0.01) relation between ICT Management and Performance of Education as depicted in table 4.54

4.8.1.2 Regression analysis for ICT Management and Performance of Education

To estimate the level of use of ICT in Management of education in relation to Performance of Education, a coefficient of determination was computed using regression analysis and the results were presented in table 4.55

Table 4.55 Model summary for ICT Management and performance of Education

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.529[a]	.280	.270	.53995

a. Predictors: (Constant), Management

From table 4.55 it can be seen that r value is 0.529 for use of ICT in Management of education and Performance of Education suggesting that there is an influence use of ICT management has on performance of education. From the table it can be observed that the coefficient of determination, the R square value is 0.28 which represents 28.0% variation of Performance of Education as a result of use of ICT in Management

From table 4.56 it was noted that use of ICT in Management of Education was a significant predictor of performance of education [F1(1,69) = 26.826, P<0.05)] this means that use of ICT in management of education was a significant predictor of Performance of Education since use of ICT in Management of education explained a significant amount of the variance in Performance of Education

4.8.2 Descriptive Statistics for use of ICT in Education Management

School Principals were presented with seven constructs as indicators of use of ICT in

To establish whether use of ICT in Management of education was a significant predictor of performance of education an analysis of variance (ANOVA) was done and the results presented in Table 4.56

Table 4.56 ANOVA- ICT Management and performance of Education

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	7.821	1	7.821	26.826	.000[b]
	Residual	20.116	69	.292		
	Total	27.937	70			

a. Dependent Variable: Performance Of Education

b. Predictors: (Constant), ICT Management

management in relation to performance of education. A five point rating scale was used to collect the views of respondents to the statement from strongly agree (5) to strongly disagree (1) where 5 indicated very high level relation and 1 indicating very low level. This data was analyzed and presented in form of percentage frequencies of responses. The results are summarized in table 4.57

Table 4.57 Use of ICT in Education Management in relation to Performance of Education

STATEMENTS	5	4	3	2	1
The school uses ICTs in teaching	12.8%	35.9%	46.2%	5.1%	0%
The school has ICT systems (Student management systems, stock keeping systems)	20.5%	59.0%	0%	15.4%	5.1%
The parents receive updates and any communication from the school via their emails and phones	7.7%	33.3%	43.6%	15.4%	0%
The school uses ICTs (eg cameras) in offering and managing of exams	7.7%	23.1%	64.1%	5.1%	0%
We make use of ICT in carrying out communication eg emails	7.7%	33.3%	48.7%	10.3%	0%
We make use of ICTs in managing school records and data	33.3%	51.3%	12.8%	2.6%	0%
ICTs has made it possible to undertake timely analysis of information related to the overall management of the school including for example financial reports and students results	38.5%	35.9%	23.1%	2.6%	0%

N= 39

Key

5.Strongly agree 4. Agree 3. Neutral 2. Disagree 1. Strongly disagree

Table 4.57 shows that there is use of ICT systems in place in the schools. This is evident by the 79.5% of respondents who agree to this. These findings agree with those of Mingaine (2013) who noted that schools had been equipped with ICT for administration and teaching such as office packages, data processing, students' databases in addition to sharing resources and collaboration among schools

The respondents were also asked to state any challenges they faced and they are summarized in table 4.58

Table 4.58 Challenges

	Frequency	Percent
High cost of maintenance of the ICT equipment	22	64.4
Some teachers yet to embrace ICT use	3	7.7
Lack of funds for software upgrade	7	17.9
Few computers	4	10.3
Old computers	3	7.7
Total	39	100.0

From table 4.58 it is clear that the major problem face by schools is the high cost of maintenance of ICT equipment with 64.4% of the respondents noting this. These findings resonate with those of Warshaur (2009) who notes that a balanced funding need to be adopted with sufficient funding budgeted for purchase, repair and replacement of computers and technical infrastructure, support and maintenance need to be highly considered for the schools.

4.8.2.1 Correlation for use of ICT in Education Management and Performance of Education

A Pearson product moment correlation coefficient was computed with scores on ICT Management as independent variable and Performance of Education as the dependent variable. The scores for both variables which were collected in form of frequencies were transformed into ratio scaled data by computing mean responses per respondent where high scale ratings implied high use of ICT in Management and high Education Performance and vice versa. The SPSS output for the correlation analysis result was summarized in table 4.59

Table 4.59 Correlation for use ICT in Education Management and Performance of Education

		Performance Of Education
Management	Pearson Correlation	.867**
	Sig. (2-tailed)	.000
	N	39

**. Correlation is significant at the 0.01 level (2-tailed).

The findings showed that there was a positive(r=0.867, N=39, P<.0.01) relation between use od ICT in management and Performance of Education as depicted in table 4.59

4.8.2.2 Regression analysis for use ICT in Education Management and Performance of Education

To estimate the level of use of ICT in Management in relation to Performance of Education, a coefficient of determination was computed using regression analysis and the results were presented in table 4.60

Table 4.60 Model summary for use of ICT in Education Management and performance of Education

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.867[a]	.752	.746	.34277

a. Predictors: (Constant), ICT Management

From table 4.60 it can be seen that r value is 0.867 for ICT management and Performance of Education suggesting that there is an influence of ICT funding on performance of education.

From the table it can be observed that the coefficient of determination, the R square value is 0.752 which represents 75.2% variation of Performance of Education as a result of ICT funding

To establish whether use of ICT in Management was a significant predictor of performance of education an analysis of variance (ANOVA) was done and the results presented in Table 4.61

Table 4.61 ANOVA- Use of ICT in education management and performance of education

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.211	1	13.211	112.442	.000[b]
	Residual	4.347	37	.117		
	Total	17.558	38			

a. Dependent Variable: Performance Of Education

b. Predictors: (Constant), Management

From table 4.61 it was noted that use of ICT in management was a significant predictor of performance of education [F1(1,37) = 31.753, P<0.05)] this means that use of ICT in management was a significant predictor of Performance of Education since use of ICT in management explained a significant amount of the variance in Performance of Education

4.8.3 Descriptive Statistics for use of ICT in Education Management

Computer teachers were presented with seven constructs as indicators of use of ICT in management in relation to performance of education. A five point rating scale was used to collect the views of respondents to the statement from strongly agree (5) to strongly disagree (1) where 5 indicated very high level relation and 1 indicating very low level. This data was analyzed and presented in form of percentage frequencies of responses. The results are summarized in table 4.62

Table 4.62 Use of ICT in Education Management in relation to Performance of Education

STATEMENTS	5	4	3	2	1
We have policies that guide use and access of school ICT resources, and further improvement of this resources	0%	46.2%	49.2%	4.6%	0%
We have an integrated school management system	9.2%	29.2%	7.7%	41.5%	12.3%
We use ICTs in teaching other subjects, preparation of work plans and timetabling	24.6%	55.4%	20.0%	0%	0%
We use ICT to give learning materials eg illustrations and multimedia	12.3%	33.8%	46.2%	7.7%	0%
We communicate with parents(report cards, updates) via their emails and phones	0%	46.2%	46.2%	7.7%	0%
The school uses ICTs in offering and managing of exams	9.2%	47.7%	35.4%	7.7%	0%
We use of ICTs in tracking of student for example electronic clock in and log in	16.9%	0%	16.9%	33.8%	32.3%

N= 65

Key

5.Strongly agree 4. Agree 3. Neutral 2. Disagree 1. Strongly disagree

From table 4.62 it is evident that some schools have an integrated school management system in place. 46.2% of the respondents noted that they use ICT for communication with a majority (80%) noting that they use ICTs in teaching other subjects, preparation of work plans and timetabling. These findings agree with those of Muriuki (2017) who noted that schools were investing more in computer infrastructure in the form of systems ranging from school management systems to students and financial management systems

The respondents were also asked to state the extent they thought that introduction of ICTs in management of their schools influenced the performance of education. The results are summarized in table 4.63

Table 4.63 Extent of influence of ICT introduction in management on performance of education

	Frequency	Percent
Large extent	49	75.4
Small extent	16	24.6
Total	65	100.0

4.8.3.1 Correlation for use of ICT in Education Management and Performance of Education

A Pearson product moment correlation coefficient was computed with scores on use of ICT in management as independent variable and Performance of Education as the dependent variable. The scores for both variables which were collected in form of frequencies were transformed into ratio scaled data by computing mean responses per respondent where high scale ratings implied high use of ICT in management and high Education Performance and vice versa. The SPSS output for the correlation analysis result was summarized in table 4.64

Table 4.64 Correlation for use of ICT in Education Management and Performance of Education

		Performance Of Education
Management	Pearson Correlation	.781**
	Sig. (2-tailed)	.000
	N	65

**. Correlation is significant at the 0.01 level (2-tailed).

The findings showed that there was a positive(r=0.781, N=65, P<.0.01) relation between ICT infrastructure and Performance of Education as depicted in table 4.64

4.8.3.2 Regression analysis for ICT Management and Performance of Education

To estimate the level of use of ICT in management in relation to Performance of Education, a coefficient of determination was computed using regression analysis and the results were presented in table 4.65

Table 4.65 Model summary for use of ICT in education management and performance of Education

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.781[a]	.610	.604	.30993

a. Predictors: (Constant), ICT Management

From table 4.65 it can be seen that r value is 0.821 for use of ICT in education management and Performance of Education suggesting that there is a considerable influence of use of ICT in management on performance of education. From the table it can be observed that the coefficient of determination, the R square value is 0.610 which represents 61.0% variation of Performance of Education as a result of use of ICT in education management

To establish whether use of ICT in education management was a significant predictor of performance of education an analysis of variance (ANOVA) was done and the results presented in Table 4.66

Table 4.66 ANOVA- Use of ICT in education management and performance of education

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	9.470	1	9.470	98.591	.000[b]
	Residual	6.051	63	.096		
	Total	15.522	64			

a. Dependent Variable: Performance Of Education

b. Predictors: (Constant),ICT Management

From table 4.66 it was noted that use of ICT in education management was a significant predictor of performance of education [F1(1,63) = 98.591, P<0.05)] this means that use of ICT in education management was a significant predictor of Performance of Education since use of ICT in management explained a significant amount of the variance in Performance of Education

4.9 Influence of ICT Funding on the performance of Education

The forth objective of this study was to determine how ICT funding influences the performance of education in Kakamega County. The dependent variable in this study was performance of education. This was analysed through descriptive statistics correlation and regression analysis.

The sub county officials, school principals and computer teachers were asked to rate the extent to which the constructs in table 4.67, table 4.74 and 4.79 respectively as indicators of use of ICT funding in relation to performance of education

4.9.1 Descriptive statistics for ICT Funding

Based on seven opinion statements the respondents rated the items using a Likert scale of 1 to 5 where 5 strongly agree, 4 agree, 3 neutral, 2 disagree and 1 strongly disagree. The results were as shown in table 4.67

Table 4.67 Influence of ICT Funding on the performance of Education

STATEMENTS	5	4	3	2	1
The Government allocates us funds to overhaul, invest and modernize our ICT equipment	0%	5.6%	52.1%	22.5%	19.7%
We have a permanent ICT support staff	0%	0%	4.2%	35.2%	60.6%
We outsource ICT services on a need basis	25.4%	22.5%	29.6%	9.9%	12.7%
We fund ICT teachers retraining through various seminars and programmes	0%	9.9%	21.1%	39.4%	29.6%
We have an ICT department that services other departments	0%	0%	0%	39.4%	60.6%
Ministry supplies us with computers	15.5%	19.7%	18.3%	19.7%	26.8%
Computer software are updated by the Ministry	5.6%	31.0%	53.5%	2.8%	7.0%

N= 71

Key

5.Strongly agree 4. Agree 3. Neutral 2. Disagree 1. Strongly disagree

Table 4.67 reveals that ICT funding had a considerable effect on performance of education. Its evident that even though there is little direct government support, the sub county offices have gone out of their way to use some of the funds allocated to them to outsource ICT services on a need basis. This is shown by the 44.9% who agree to this. These findings concur with those of Ames (2016) who notes that governments around the world need to allocate more resources for ICT in education to fully reap the benefits of ICT integration into education

The respondents were also asked to what extent they thought ICT funding influenced Performance of Education in schools within their Sub counties. Their responses were summarized in table 4.68

Table 4.68 Extent of ICT funding influence on performance of education

	Frequency	Percentage
Large extent	46	64.8
Small extent	21	29.6
No extent	4	5.6
Total	71	100.0

It is evident from table 4.68 that ICT funding has an influence on the performance of education

The respondents were also asked if they had any other source of funding other than the national government. The results shown in table 4.69

Table 4.69 Any other Source of funding

	Frequency	Percent
Yes	6	8.5
No	65	91.5
Total	71	100.0

Table 4.69 shows that most of the respondents 91.5% indicated that they do not have any other source of funding apart from the national government with only 8.5% indicating that they had other form/source of funding such as partnership with other agencies as captured in Table 4.70

Table 4.70 Other sources of funding

	Frequency	Percent
None	65	91.5
Partnership with other agencies	6	8.5
Total	71	100.0

4.9.1.1 Correlation for ICT funding and Performance of Education

A Pearson product moment correlation coefficient was computed with scores on ICT Funding as independent variable and Performance of Education as the dependent variable. The scores for both variables which were collected in form of frequencies were transformed into ratio scaled data by computing mean responses per respondent where high scale ratings implied high ICT funding and high Education Performance and vice versa. The SPSS output for the correlation analysis result was summarized in table 4.71

Table 4.71 Correlation for ICT funding and Performance of Education

		Performance Of Education
Influence Of Funding	Pearson Correlation	.467**
	Sig. (2-tailed)	.000
	N	71

**. Correlation is significant at the 0.01 level (2-tailed).

The findings showed that there was a positive(r=0.467, N=71, P<.0.01) relation between ICT funding and Performance of Education as depicted in table 4.71

4.9.1.2 Regression analysis for ICT Funding and Performance of Education

To estimate the level of ICT funding in relation to Performance of Education, a coefficient of determination was computed using regression analysis and the results were presented in table 4.72

Table 4.72 Model summary for ICT funding and performance of Education

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.467[a]	.219	.207	.56250

a. Predictors: (Constant), Influence Of Funding

From table 4.72 it can be seen that r value is 0.467 for ICT funding and Performance of Education suggesting that there is a considerable influence of ICT funding on performance of education. From the table it can be observed that the coefficient of determination, the R square value is 0.219 which represents 21.9% variation of Performance of Education as a result of ICT funding

To establish whether use of ICT funding was a significant predictor of performance of education an analysis of variance (ANOVA) was done and the results presented in Table 4.73

Table 4.73 ANOVA-ICT funding and performance of education

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.105	1	6.105	19.296	.000[b]
	Residual	21.832	69	.316		
	Total	27.937	70			

a. Dependent Variable: Performance Of Education

b. Predictors: (Constant), Influence Of Funding

From table 4.73 it was noted that ICT funding was a significant predictor of performance of education [F1(1,69) = 19.296, P<0.05)] this means that ICT funding was a significant predictor of Performance of Education since use of ICT funding explained a significant amount of the variance in Performance of Education

4.9.2 Descriptive Statistics for ICT Funding at the school level

School Principals were presented with seven constructs as indicators of use of ICT funding in relation to performance of education. A five point rating scale was used to collect the views of respondents to the statement from strongly agree (5) to strongly disagree (1) where 5 indicated very high level relation and 1 indicating very low level. This data was analyzed and presented in form of percentage frequencies of responses. The results are summarized in table 4.74

Table 4.74 Influence of ICT Funding on the performance of Education

STATEMENTS	5	4	3	2	1
We have a lab technician employed by the school	10.3%	28.2%	10.3%	20.5%	30.8%
The Ministry of Education allocates funds for ICT equipment maintenance every financial year	0%	0%	10.3%	33.3%	56.4%
The Government periodically sends quality assurance officers and IT experts to support our programme	0%	0%	5.1%	41.0%	53.8%
The Ministry of Education funds students projects and assessment	20.5%	48.7%	30.8%	0%	0%
The government funds renewal and replacement of our ICT equipment	0%	0%	10.3%	25.6%	64.1%
Computer software are updated by the government	0%	0%	10.3%	20.5%	69.2%
The government funds teacher ICT training	0%	0%	5.1%	25.6%	69.2%

N= 39

Key

5.Strongly agree 4. Agree 3. Neutral 2. Disagree 1. Strongly disagree

From table 4.74 69.2% of the respondents agree that the Ministry of education funds students projects in one way or another. These findings resonate with those of Mutuku (2014) who noted that for continuity of any ICT Programme, funding should be given a high priority not just for the program itself but for all those involved in the Programme

The respondents were asked to state to what extent they thought ICT funding influenced the performance of education as a whole in their school. Their responses are summarized in table 4.75

Table 4.75 Extent of ICT funding influence on performance of education

	Frequency	Percent
Large extent	38	97.4
Small extent	1	2.6
Total	39	100.0

From table 4.75 A majority (97.4%) of the respondents were of the notion of the idea that ICT funding was key for ICT integration into education to have any influence on performance of education. These findings agree with those of Mutuku (2014) who emphasized on funding being given priority to ensure continuity

4.9.2.1 Correlation for ICT funding and Performance of Education

A Pearson product moment correlation coefficient was computed with scores on ICT funding as independent variable and Performance of Education as the dependent variable. The scores for both variables which were collected in form of frequencies were transformed into ratio scaled data by computing mean responses per respondent where high scale ratings implied high ICT funding and high Education Performance and vice versa. The SPSS output for the correlation analysis result was summarized in table 4.76

Table 4.76 Correlation for ICT Funding and Performance of Education

		Performance Of Education
ICT Funding	Pearson Correlation	.610**
	Sig. (2-tailed)	.000
	N	39

**. Correlation is significant at the 0.01 level (2-tailed).

The findings showed that there was a positive(r=0.610, N=39, P<.0.01) relation between ICT funding and Performance of Education as depicted in table 4.76

4.9.2.2 Regression analysis for ICT funding and Performance of Education

To estimate the level of ICT funding in relation to Performance of Education, a coefficient of determination was computed using regression analysis and the results were presented in table 4.77

Table 4.77 Model summary for ICT funding and performance of Education

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.610[a]	.372	.355	.54592

a. Predictors: (Constant), ICT Funding

From table 4.77 it can be seen that r value is 0.610 for ICT funding and Performance of Education suggesting that there is a considerable influence of ICT funding on performance of education. From the table it can be observed that the coefficient of determination, the R square value is 0.372 which represents 37.2% variation of Performance of Education as a result of ICT funding

To establish whether ICT funding was a significant predictor of performance of education an analysis of variance (ANOVA) was done and the results presented in Table 4.78

Table 4.78 ANOVA-ICT funding and performance of education

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	6.531	1	6.531	21.914	.000[b]
	Residual	11.027	37	.298		
	Total	17.558	38			

a. Dependent Variable: Performance Of Education

b. Predictors: (Constant), ICT Funding

From table 4.78 it was noted that ICT infrastructure was a significant predictor of performance of education [F1(1,37) = 21.914, P<0.05)] this means that ICT funding was a significant predictor of Performance of Education since use of ICT funding explained a significant amount of the variance in Performance of Education

4.9.3 Descriptive Statistics for ICT Funding in schools

Computer teachers were presented with seven constructs as indicators of use of ICT funding in relation to performance of education. A five point rating scale was used to collect the views of respondents to the statement from strongly agree (5) to strongly disagree (1) where 5 indicated very high level relation and 1 indicating very low level. This data was analyzed and presented in form of percentage frequencies of responses. The results are summarized in table 4.79

Table 4.79 ICT Funding and performance of Education

STATEMENTS	5	4	3	2	1
We have a lab technician employed by the school	0%	16.9%	9.2%	41.5%	32.3%
I do all the ICT maintenance myself	47.7%	13.8%	26.2%	12.3%	0%
The Government periodically sends quality assurance officers and IT experts to support our programme	0%	12.3%	0%	66.2%	21.5%
The school outsource IT support experts when need arises	20.0%	0%	20.0%	38.5%	21.5%
We have received ICT equipment and resources from individuals and non-governmental organization	0%	12.3%	41.5%	32.3%	13.8%
The school invests periodically in Information Communication Technologies	12.3%	15.4%	47.7%	12.3%	12.3%
The school replaces and updates the available ICT equipment	0%	29.2%	33.8%	12.3%	24.6%

N= 65

Key

5.Strongly agree 4. Agree 3. Neutral 2. Disagree 1. Strongly disagree

From table 4.79 more than half (61.5%) of the respondents noted that they do all the ICT maintenance by themselves with only 20% noting that the school outsources ICT experts when need arises. These findings resonate with those of Adomi and Kpangban (2010) who noted that schools faced a myriad of challenges which included inadequate or no technical support being availed to them with no funding being made available where there was technical support.

4.9.3.1 Correlation for ICT funding and Performance of Education

A Pearson product moment correlation coefficient was computed with scores on ICT funding as independent variable and Performance of Education as the dependent variable. The scores for both variables which were collected in form of frequencies were transformed into ratio scaled data by computing mean responses per respondent where high scale ratings implied high ICT funding and high Education Performance and vice versa. The SPSS output for the correlation analysis result was summarized in table 4.80

Table 4.80 Correlation for ICT Funding and Performance of Education

		Performance Of Education
ICT Funding	Pearson Correlation	.605**
	Sig. (2-tailed)	.000
	N	65

**. Correlation is significant at the 0.01 level (2-tailed).

The findings showed that there was a positive(r=0.605, N=65, P<.0.01) relation between ICT funding and Performance of Education as depicted in table 4.80

4.9.3.2 Regression analysis for ICT Management and Performance of Education

To estimate the level of ICT funding in relation to Performance of Education, a coefficient of determination was computed using regression analysis and the results were presented in table 4.81

Table 4.81 Model summary for ICT funding and performance of Education

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.605[a]	.366	.356	.39510

a. Predictors: (Constant), ICT Funding

From table 4.81 it can be seen that r value is 0.605 for ICT funding and Performance of Education suggesting that there is a considerable influence of ICT funding on performance of education. From the table it can be observed that the coefficient of determination, the R square value is 0.356 which represents 35.6% variation of Performance of Education as a result of ICT funding

To establish whether ICT funding was a significant predictor of performance of education an analysis of variance (ANOVA) was done and the results presented in Table 4.82

Table 4.82 ANOVA-ICT funding and performance of education

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	5.687	1	5.687	36.431	.000[b]
	Residual	9.834	63	.156		
	Total	15.522	64			

a. Dependent Variable: Performance Of Education

b. Predictors: (Constant), ICT Funding

From table 4.81 it was noted that ICT funding was a significant predictor of performance of education [F1(1,63) = 36.431, P<0.05)] this means that ICT funding was a significant predictor of Performance of Education since use of ICT funding explained a significant amount of the variance in Performance of Education

CHAPTER FIVE

DICSUSSIONS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes this study based the research objectives and questions. Primary data obtained from respondents was analyzed to give the findings as presented in chapter 4, which forms the basis of this summary. Theoretical and empirical literature in chapter two was used to relate to the findings of this study and the conclusions made. It also contains recommendations and suggests areas for further research.

5.2 Summary of the findings

This study sought to investigate how information communication technologies influenced performance of education in Kakamega County. The study had four objectives which were: to determine the extent to which ICT infrastructure influence performance of education in Kakamega County, to examine the extent to which ICT capacity building influence performance of education in Kakamega County, to examine the extent to which use of ICT in management of education influence performance of education in Kakamega County and to determine how ICT funding influence the performance of education in Kakamega County. Data from all the 175 respondents was successfully collected. Majority of the respondents were male 60.57%. the study found a positive and significant effect between Information communication technologies and performance of education in Kakamega County. This was in line with **c**onstructionism leaning theory that was developed by Papert in 1985 that supports the notion that Information communication Technologies are assumed to have a positive impact on performance of education

5.2.1 ICT Infrastructure in relation to performance of education in Kakamega county.

The results on influence of ICT infrastructure on performance of education in Kakamega County both at the sub county level and school level showed how ICT infrastructure was a major enabler for ICTs influence on performance of education. Descriptive statistics showed that ICT infrastructure had an influence on performance of education in Kakamega County. Pearson correlation analysis showed there was a strong positive correlation between ICT infrastructure and performance of educations. A standard multiple regression analysis both at the sub county and school level revealed that ICT infrastructure contributed significantly to the explanation of

performance of education. This significant relationship between infrastructure and performance of education supported the conclusion that ICT infrastructure had a significant effect on performance of education. This therefore implies that more investments aimed at improving or upgrading the available ICT infrastructure will significantly enhance performance of education.

It was noted that infrastructure such as connection and availability of electricity was high with 87% and 9.8% strongly agreeing and agreeing that they were connected to power. More than half (56.3%) of the respondents noted the presence of computer systems with 66.7% and 23.1% strongly agreeing and agreeing that they had a computer lab in place. There was however issues to with internet connectivity with only 12.2% agreeing that they had a fast internet connectivity with only 29.2 agreeing that all computers are connected to the same network

5.2.2 ICT capacity building influence on performance of education in Kakamega County.

The second objective was to examine the extent which ICT capacity building influenced performance of education in Kakamega County. Descriptive statistics showed that ICT capacity building had a considerable effect on performance of education. According to Pearson correlation analysis, there was a positive correlation between ICT capacity building and performance of educations. Regression analysis showed that ICT capacity building contributed significantly to the explanation of performance education. The regression results demonstrated the existence of significant relationship between ICT capacity building and performance of education, this informed the conclusion that ICT capacity building had a significant effect on performance of education in Kakamega County. This led to conclusion that an increase in ICT capacity building will lead to a positive effect on the performance of education.

Effects of lack of training opportunities were noted with only 36.6% of the respondents at the sub county level indicating that they were able to do most of the ICT related tasks. A majority (70.4) of the respondents indicated they had not received any kind of ICT retraining. Only 10% of the schools indicated at some time with 53.8% indicating they sponsored their own. This is despite 63.1% and 36.9% of the respondents strongly agreeing and agreeing that they were affected by the changing technology. Overall 83.1% indicated they had not received any kind of ICT retraining

5.2.3 The extent to which use of ICT in education management of education influence the performance of education Kakamega County.

Study findings on use of ICT in management of education showed that it had a strong influence on the performance of education. Descriptive statistics showed that use of ICT in management of education had a strong effect on performance of education. Pearson correlation analysis revealed a strong positive correlation between use of ICT in management and performance of education. Regression analysis showed that use of ICT management had an effect to the explanation of performance of education. This significant relationship between use of ICT in education management both at the sub county and school level and performance of education sector informed the conclusion that use of ICT in management of education strongly influenced performance of education. This therefore implies that an increase in use of ICT in management of education enhances performance of water supply projects.

From the analyzed data it was clear that computer systems are in place to assist in educational management in areas to do with managing data, communication and analysis of general data eg financial reports

5.2.4 ICT funding and performance of education.

The forth objective of this study was to determine how ICT funding influences the performance of education in Kakamega County. Descriptive statistics revealed ICT funding had a considerable effect on performance of education. Pearson correlation analysis was done and showed that there was a moderate positive correlation between ICT funding and performance education. A standard multiple regression analysis also showed that ICT funding contributed significantly to the explanation of performance of education. This existence of significant relationship between ICT funding and performance of education, this led to the conclusion that ICT funding had a significant effect on performance of education implying that an increase in ICT funding positively enhances performance of education.

Limited funding for technical was noted with respondents noting that they do not ICT support staff in place, respondents noted that they funded their own training with only 27% of computer teachers noting that schools invested periodically in ICTs

5.3 Conclusions

5.3.1 ICT infrastructure

The findings revealed that there was a strong relationship between ICT infrastructure and performance of education. It was, therefore, concluded that ICT infrastructure had an influence on performance of education, with more investments in infrastructure resulting in enhanced performance of education.

5.3.2 ICT capacity building

The findings of the study showed that there was a moderate positive correlation between ICT capacity building and performance of education. Thus informing the conclusion that there was significant relationship between ICT capacity building and performance education, such that increased ICT capacity building would have a positive effect on performance of education

5.3.3 Use of ICT in education Management

The findings of the study revealed that there was a strong positive relationship between use of ICT in management of education on performance of educations. It was, therefore, concluded that there was indeed statistical significant relationship between use of ICT in education and performance of education, with increase in use of ICT in education enhancing performance of education.

5.3.4 ICT funding

According to the findings of the study, there was a moderate correlation between ICT funding and performance of education. This informed the conclusion that is significant relationship between ICT funding and performance of education. An increase in funding will positively enhance performance of education.

5.4 Recommendations

Based on the findings and the conclusions that have been drawn from this study, the following recommendations are made:

1. The findings of this study revealed that infrastructure is key and is the backbone for the implementation of ICT in education. This shows that for ICT to have any influence on performance of education, ICT infrastructure whether physical such as the hardware and software involved or enabling such as electricity should be given priority. The government needs

to come up with policies to ensure that this ICT infrastructure is sustained and revamped occasionally due to the technology that keeps changing.

2. This study also concluded that ICT capacity building was a significant predictor in the performance of education. The Kenyan government through the Ministry of Education and its relevant agencies needs to come up with ways either by organizing seminars and trainings to ensure that teachers ICT skills refreshed and updated or making sure that ICT is incorporated into teacher training so as to fully prepare them for the ICT that is in the schools that they are expected to one day tutor in.

3. The findings of this study revealed that there was relationship between use of ICT in management of education and performance of education. It is therefore recommended that schools be encouraged to put systems in place. This can be done through a matter of policy by the Kenyan government through the Ministry of Education

4. From the results it was concluded that there is statistical significant relationship between ICT funding and performance of education. It is thus recommended the government of Kenya which is a major stakeholder should include ICT capitation as they allocate funds to schools so that schools can fully integrate ICT into education. It should also come up with ways of supporting the ICT programmes and not just implementing them and leaving the schools to grapple with sustaining the programmes

5.5 Suggestion for Further Research

This study mainly focused on information communication technologies influenced performance of education in Kakamega County. It mainly focused on schools that had adopted ICT in learning and management of the schools and the education sector in Kakamega County. Future research should therefore be conducted in a different social setting to establish whether similar results would be obtained and how this ICT initiatives can be made sustainable and efficient

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APPENDICES

APPENDIX I: INTRODUCTION LETTER FOR DATA COLLECTION

July, 2019

Dear Sir/Madam,

RE: DATA COLLECTION

I am a post-graduate student at the University of Nairobi currently undertaking the a Masters of Arts degree in Project Planning and Management. I am required to carry out a research project as a requirement for fulfilment of my course. I intend to carry out a research on the influence of Information Technology on Performance of Education in Kakamega County, Kenya. This study is designed for research purposes only. Your responses will be totally anonymous and confidential therefore you are kindly requested not to write your name or signature on the questionnaire. Kindly complete all sections of the questionnaire

Your honest responses will be highly appreciated.

Thank you.

Malungu Enock Kwarula

APPENDIX II: QUESTIONNAIRE

Questionnaire for school Principal

I am Malungu, Enock Kwarula, a master's student from University of Nairobi carrying out an academic research on the Influence of Information Communication Technologies on Performance of Education in Kakamega County. **This study is purely for academic research purposes and not any other purpose.** You are kindly requested to participate in the study by filling in the blank spaces or tick (√) the appropriate response.

Section I: Demographic Information

1. Gender

   Male [ ] Female [ ]

2. Age category in years

   25 – 30 yrs. [ ] 31 – 40 yrs. [ ] 41 – 50 yrs. [ ] Above 50yrs [ ]

3. Highest professional qualification

   Diploma [ ] Graduate [ ] Post graduate [ ] any other (Specify) ……

4. How long have you been in this school

   2 yrs. and below [ ] 2 – 5 yrs. [ ] Above 5 yrs. [ ]

Section B: Data collection based on objectives

Using a scale of 1-5, kindly tick (√) appropriately as:

5.Strongly agree 4. Agree 3. Neutral 2. Disagree 1. Strongly disagree

I: Infrastructure in relation to Performance of Education

		5 (SA)	**4 (A)**	**3 (N)**	**2 (D)**	**1 (SD)**
1	The school has a computer lab for use by the students					
2	All our departments have computers					
3	All our departments computers are connected to a computer network					
4	We have a power back up for our ICT systems in the school					
5	The school is connected to the national power grid					
6	We have a constant power supply					
7	The school makes use of modern ICT technologies like cloud computing					

8 To what extent does provision of infrastructure facilities by government affect the performance of education?

20 Large extent [ ] Small Extent [ ] No Extent [ ]

9 Apart from the infrastructure facilities (Computers, ICT devices, labs) does your school make use of computer systems?

Yes [ ] No [ ]

If yes (name and specify) ……

10. Are there any challenges?

Yes [ ] No [ ]

If yes (explain the challenges)

……

……

II: Influence of ICT Capacity Building on the Performance of Education

		5 (SA)	**4 (A)**	**3 (N)**	**2 (D)**	**1 (SD)**
1	The school facilitates training of our Teachers					
2	The Ministry of Education provides updated ICT training materials to the schools					
3	Use of ICT helps teachers in delivery of their work					
4	Training of teachers has influenced performance of their performance					
5	ICT teacher in the school are adequate					
6	Assessment and supervision of our ICT teachers is effective					
7	Teachers fund their own ICT Training/seminar attendance					

8 To what extent do you think ICT Capacity Building Influence the Performance of Education in your school?

Large extent [ ] Small Extent [ ] No Extent [ ]

9 Does your school organize and facilitate any Capacity Building initiatives for the staff within the school?

Yes [ ] No [ ]

10 Are there any challenges?

Yes [ ] No [ ]

If yes (explain the challenges)

……

……

III: ICT Management in relation to Performance of Education

		5 (SA)	**4 (A)**	**3 (N)**	**2 (D)**	**1 (SD)**
1	The school uses ICTs in teaching					
2	The school has ICT systems (Student management systems, stock keeping systems)					
3	The parents receive updates and any communication from the school via their emails and phones					
4	The school uses ICTs (eg cameras) in offering and managing of exams					
5	We make use of ICT in carrying out communication eg emails					
6	We make use of ICTs in managing school records and data					
7	ICTs has made it possible to undertake timely analysis of information related to the overall management of the school including for example financial reports and students results					

8. To what extent do you think your use of ICTs in management of the education system has influenced performance of the Education in schools in your sub county?

Large extent [ ] Small Extent [ ] No Extent [ ]

9. Do you use ICTs in to manage the school day to day activities?

Yes [ ] No [ ]

10. Are there any challenges?

Yes [ ] No [ ]

If yes (explain the challenges)

……

……

IV: Influence of ICT Funding on the performance of Education

		5 (SA)	**4 (A)**	**3 (N)**	**2 (D)**	**1 (SD)**
1	We have a lab technician employed by the school					
2	The Ministry of Education allocates funds for ICT equipment maintenance every financial year					
3	The Government periodically sends quality assurance officers and IT experts to support our programme					
4	The Ministry of Education funds students projects and assessment					
5	The government funds renewal and replacement of our ICT equipment					
6	Computer software are updated by the government					
7	The government funds teacher ICT training					

8 To what extent do you think ICT funding Influences the Performance of Education in your school?

21 Large extent [ ] Small Extent [ ] No Extent [ ]

9 Other than the national government do you have any other form/source of ICT funding?

Yes [ ] No [ ]

If yes (name and specify) ……

10 Are there any challenges?

Yes [ ] No [ ]

22 If yes (explain the challenges)

……

……

V: Performance of Education

		5 (SA)	**4 (A)**	**3 (N)**	**2 (D)**	**1 (SD)**
1	Assessment of students is promptly and timely					
2	ICT has made it easy to timely appraise and assess teachers					
3	Digitization of teachers records and other related records has made it easy for retrieval and secure storage					
4	Monitoring and evaluation has been enhanced(tracking of students performance, generation of financial reports, inventory tracking and keeping etc)					
5	Use o ICTs has enabled teachers to plan their work load and cover the syllabus in time					
6	Students are satisfied and enjoy classes(increased participation, lively classes)					
7	Overall student enrollment and retention has improved due to use of ICTs in Education					

8 To what extent do you think availability and use of ICTs in teaching and delivery of learning materials Influences the overall Performance of Education in your school?

23 Large extent [ ] Small Extent [ ] No Extent [ ]

9 Has the use of ICTs in teaching and learning influenced students' enrollment and retention in your school?

Yes [ ] No [ ]

10 Are there any challenges?

Yes [ ] No [ ]

If yes (explain the challenges)

……

……

We have come to the end of this interview. Thank you for your time and cooperation

Questionnaire for Computer Teacher

I am Malungu, Enock Kwarula, a master's student from The University of Nairobi carrying out an academic research on the Influence of Information Communication Technologies on Performance of Education in Kakamega County. **This study is purely for academic research purposes and not any other purpose.** You are kindly requested to participate in the study by filling in the blank spaces or tick (√) the appropriate response.

Section A: Demographic Information

1. Gender

Male [ ] Female [ ]

2. Age category in years

24 – 30 yrs. [ ] 31 – 40 yrs. [ ] 41 – 50 yrs. [ ] Above 50yrs [ ]

3. Highest professional qualification

Certificate [ ] Diploma [ ] Graduate [ ]

Post graduate [ ] any other (Specify) ……

4. How long have you been a Computer Teacher?

Less than 1 year [ ] 2 – 5years [ ] over 5years [ ]

Section B: Data collection based on objectives

Using a scale of 1-5, kindly tick (√) appropriately as:

5.Strongly agree 4. Agree 3. Neutral 2. Disagree 1. Strongly disagree

I: Infrastructure in relation to performance of education

		5 (SA)	4 (A)	3 (N)	2 (D)	1 (SD)
1	The hardware and software that we have is relevant, modern and up to date					
2	Each student has access to computers					
3	All computers in our lab are working					
4	All the computers are connected to a network					
5	The computers are connected to fast internet with minimal downtimes					
6	We have a constant and reliable power supply					
7	We make use of modern ICT technologies eg cloud computing					

8 To what extent does provision of ICT infrastructure facilities influence the performance of education?

Large extent [ ] Small Extent [ ] No Extent [ ]

9 Does your school have any computer systems in place?

Yes [ ] No [ ]

If yes (name and specify) ……

10. Are there any challenges?

Yes [ ] No [ ]

If yes (explain the challenges)

……

……

……

II: Influence of ICT Capacity Building on the Performance of Education

		5 (SA)	4 (A)	3 (N)	2 (D)	1 (SD)
1	I am able to do more ICT tasks apart from teaching					
2	My computer competency skills is assessed annually					
3	I receive ICT materials from the Ministry of Education for teaching					
4	I attend at least one training every year					
5	I fund my own trainings/seminar attendance					
6	I am affected by the changing ICT technology					
7	I don't need to travel for me to receive training					

8 To what extent do you think Capacity Building influences the performance of education in your school?

Large extent [ ] Small Extent [ ] No Extent [ ]

9 Have you received any form of retraining from the government or the school?

Yes [ ] No [ ]

If yes, what has been the impact of the re-trainings on your performance

……

……

10. Are there any challenges?

Yes [ ] No [ ]

If yes (explain the challenges)

……

……

III: Management in relation to performance of Education

		5 (SA)	4 (A)	3 (N)	2 (D)	1 (SD)
1	We have policies that guide use and access of school ICT resources, and further improvement of this resources					
2	We have an integrated school management system					
3	We use ICTs in teaching other subjects, preparation of work plans and timetabling					
4	We use ICT to give learning materials eg illustrations and multimedia					
5	We communicate with parents(report cards, updates) via their emails and phones					
6	The school uses ICTs in offering and managing of exams					
7	We use of ICTs in tracking of student for example electronic clock in and log in					

8. To what extent do you think introduction of ICTs in the management of school has influenced performance of the education the school?

   Large extent [ ] Small Extent [ ] No Extent [ ]

9. Do you use ICTs in to manage the school day to day activities?

   Yes [ ] No [ ]

10. Are there any challenges?

Yes [ ] No [ ]

If yes (explain the challenges)

……

……

IV: Influence of Funding on the performance of Education

		5 (SA)	4 (A)	3 (N)	2 (D)	1 (SD)
1	We have a lab technician employed by the school					
2	I do all the ICT maintenance myself					
3	The Government periodically sends quality assurance officers and IT experts to support our programme					
4	The school outsource IT support experts when need arises					
5	We have received ICT equipment and resources from individuals and non-governmental organization					
6	The school invests periodically in Information Communication Technologies					
7	The school replaces and updates the available ICT equipment					

8 To what extent do you think ICT funding has influenced the Performance of Education in your school?

Large extent [ ] Small Extent [ ] No Extent [ ]

9. Other than the national government do you think the school has any other form/source of ICT funding?

Yes [ ] No [ ]

If yes (name and specify) ……

10. Are there any challenges?

Yes [ ] No [ ]

If yes (explain the challenges)

……

……

V: Performance of Education

		5 (SA)	4 (A)	3 (N)	2 (D)	1 (SD)
1	Assessment of students is promptly and timely					
2	ICT has made it easy to timely appraise and assess teachers					
3	Digitization of teachers records and other related records has made it easy for retrieval and secure storage					
4	Monitoring and evaluation has been enhanced(tracking of students performance, generation of financial reports, inventory tracking and keeping etc)					
5	Use o ICTs has enabled teachers to plan their work load and cover the syllabus in time					
6	Students are satisfied and enjoy classes(increased participation, lively classes)					
7	Overall student enrollment and retention has improved due to use of ICTs in Education					

8. To what extent do you think introduction of ICTs in your school as a whole has influenced performance of the Education?

   Large extent [ ] Small Extent [ ] No Extent [ ]

9. Has the use of ICTs in teaching and learning influenced students' enrollment and retention in your school?

   Yes [ ] No [ ]

10. Are there any challenges?

    Yes [ ] No [ ]

If yes (explain the challenges)

……

……

We have come to the end of this interview. Thank you for your time and cooperation

Questionnaire for Sub County Education Officials

I am Malungu, Enock Kwarula, a master's student from University of Nairobi carrying out an academic research on the Influence of Information Communication Technologies on Performance of Education in Kakamega County. **This study is purely for academic research purposes and not any other purpose.** You are kindly requested to participate in the study by filling in the blank spaces or tick (√) the appropriate response.

Section A: Demographic Information

1. Gender

Male [ ] Female [ ]

2. Age category in years

25 – 30 yrs. ( ) 31 – 40 yrs. ( ) 41 – 50 yrs. ( ) Above 50yrs ( )

3. Highest professional qualification

Certificate ( ) Diploma ( ) Graduate ( )

Post graduate ( ) Others-specify……

4. Your current Status/Position

Director ( ) Chief Officer ( ) Programme Officer ( ) Officer ( )

5. How long have you been serving in your current position?

Less than 1 year ( ) 2 – 5years ( ) over 5years ( )

Section B: Data collection based on objectives

Using a scale of 1-5, kindly tick (√) appropriately as:

5.Strongly agree 4. Agree 3. Neutral 2. Disagree 1. Strongly disagree

I: Infrastructure in relation to Performance of Education

		5 (SA)	**4 (A)**	**3 (N)**	**2 (D)**	**1 (SD)**
1	I have unlimited access to a computer					
2	All our departments are have computers					
3	All our computers are connected to the same network					
4	The ICT equipment that we have(both hardware and software is up to date)					
5	We are connected to the power grid					
6	We have uninterrupted power supply and we make use of power back up for our computers					
7	We makes use of modern ICT technologies like cloud computing, record keeping and in our day to day activities					

8 To what extent do you think the provision of infrastructure facilities in schools in the sub county has influenced the performance of education?

Large extent [ ] Small Extent [ ] No Extent [ ]

9 Do you think the available ICT infrastructure is sufficient and enough?

Yes [ ] No [ ]

10 Are there any challenges?

Yes [ ] No [ ]

If yes (explain the challenges)

……

……

II: Influence of ICT Capacity Building on the Performance of Education

		5 (SA)	4 (A)	3 (N)	2 (D)	1 (SD)
1	I have received ICT training					
2	I undergo ICT re-training/seminars at least once a year					
3	I received the re-training at the right time					
4	I fund my own ICT training					
5	I am able to do most of my ICT related tasks on my own					
6	We support the ICT programmes in our sub county schools					
7	I don't need to travel for me to access training					

8 To what extent do you think Capacity Building has influenced the performance of your office and the performance of the education sector in your sub county?

Large extent [ ] Small Extent [ ] No Extent [ ]

9 Have you received any form of retraining from the government or from your office?

Yes [ ] No [ ]

If yes, what has been the impact of the re-trainings on your performance

……

……

10 Are there any challenges?

Yes [ ] No [ ]

If yes (explain the challenges)

……

……

III: Management in relation to performance of Education

		5 (SA)	4 (A)	3 (N)	2 (D)	1 (SD)
1	We use ICTs for communication(emails, work groups) in our office and between our office and schools in our sub county					
2	We have ICT systems that store and manage our records and data					
3	Our systems are linked with other national government systems (Teachers Service Commission(TSC), County Education office)					
4	We have ICT systems in place that manage our day to day activities in our office					
5	We have ICT policy in place that guides use and access of ICTs					
6	Use of ICTs has greatly reduced our paperwork					
7	We use ICT to secure our records and access control					

8. To what extent do you think your use of ICTs in management of the education system has influenced performance of the Education in schools in your sub county?

   Large extent [ ] Small Extent [ ] No Extent [ ]

9. Do you use ICTs in carrying out your day to day activities?

   Yes [ ] No [ ]

10. Are there any challenges?

    Yes [ ] No [ ]

If yes (explain the challenges)

……

……

IV: Influence of Funding on the performance of Education

		5 (SA)	4 (A)	3 (N)	2 (D)	1 (SD)
1	The Government allocates us funds to overhaul, invest and modernize our ICT equipment					
2	We have a permanent ICT support staff					
3	We outsource ICT services on a need basis					
	We are facilitated for ICT training and re-training at least once bi annually(2 years)					
4	We fund ICT teachers retraining through various seminars and programmes					
5	We have an ICT department that services other departments					
6	Ministry supplies us with computers					
7	Computer software are updated by the Ministry					

8 To what extent do you think ICT funding Influences the Performance of Education in the sub county?

Large extent [ ] Small Extent [ ] No Extent [ ]

8. Other than the national government, do you have any other form/source for ICT funding?

Yes [ ] No [ ]

If yes specify……..

9 Are there any challenges?

Yes [ ] No [ ]

If yes (explain the challenges)

……

……

V: Performance of Education

		5 (SA)	**4 (A)**	**3 (N)**	**2 (D)**	**1 (SD)**
1	Assessment of students is promptly and timely					
2	ICT has made it easy to timely appraise and assess teachers					
3	Digitization of teachers records and other related records has made it easy for retrieval and secure storage					
4	Monitoring and evaluation has been enhanced(tracking of students performance, generation of financial reports, inventory tracking and keeping etc)					
5	Use o ICTs has enabled teachers to plan their work load and cover the syllabus in time					
6	Students are satisfied and enjoy classes(increased participation, lively classes)					
7	Overall student enrollment and retention has improved due to use of ICTs in Education					

8.To what extent do you think availability and use of ICTs in teaching and delivery of learning materials has Influenced the education sector and the overall Performance of Education in your sub county?

Large extent [ ] Small Extent [ ] No Extent [ ]

8 Do you think the use of ICTs in education in your sub county has impacted on the performance of education in your sub county?

Yes [ ] No [ ]

9 Are there any challenges?

Yes [ ] No [ ]

If yes (explain the challenges)

……
……

We have come to the end of this interview. Thank you for your time and cooperation

APPENDIX V: KREJCIE AND MORGAN TABLE

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size.
S is sample size.

NACOSTI RESEARCH PERMIT VI

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **720402**

Date of Issue: **14/August/2019**

RESEARCH LICENSE

This is to Certify that Mr.. ENOCK MALUNGU of University of Nairobi, has been licensed to conduct research in Kakamega on the topic: INFLUENCE OF INFORMATION COMMUNICATION TECHNOLOGIES ON PERFORMANCE OF EDUCATION IN KAKAMEGA COUNTY, KENYA. for the period ending : 14/August/2020.

License No: **NACOSTI/P/19/170**

720402

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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APPENDIX VII COUNTY REASEARCH AUTHORIZATION

MINISTRY OF EDUCATION
STATE DEPARTMENT OF EARLY LEARNING AND BASIC EDUCATION

Telephone: 056 – 30411
Fax : 056 – 31307
E-mail : wespropde@yahoo.com
When replying please quote

COUNTY DIRECTOR OF EDUCATION
KAKAMEGA COUNTY
P. O. BOX 137 - 50100
KAKAMEGA

REF: KAK/C/GA/29/17 V/53

2nd September, 2019

Enock Kwarula Malungu
University of Nairobi
Open, Distance & E-Learning Campus
School of Open and Distance Learning
P. O. Box 422
KAKAMEGA, Kenya

RE: RESEARCH AUTHORIZATION

The above has been granted permission by National Commission for Science, Technology and Innovation vide their letter Ref: NACOSTI/P/19/170/720402 dated 14th August, 2019, to carry out research on "**Influence of Information Communication Technologies on performance of Education in, Kakamega County, Kenya**", for a period ending **14th August, 2020.**

Please accord him any necessary assistance he may require.

DICKSON O. OGONYA
COUNTY DIRECTOR OF EDUCATION
KAKAMEGA COUNTY

COUNTY DIRECTOR OF EDUCATION
KAKAMEGA COUNTY
Date.....