INFLUENCE OF INSTITUTIONAL ENVIRONMENT ON INTEGRATION OF INFORMATION COMMUNICATION AND TECHNOLOGY PROJECTS IN TEACHING AND LEARNING IN PUBLIC SECONDARY SCHOOLS: A CASE OF NAKURU COUNTY, KENYA

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A Research Project Report Submitted in Partial Fulfilment of the Requirements for the Award of the Degree of Master of Arts in Project Planning and Management of the University of Nairobi

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DECLARATION

This research project report is my original work and has not been submitted for an award in any other university.

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This research project report has been submitted for examination with my approval as university supervisor.

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DEDICATION

I dedicate this study to my dear parents, Mr. Pascal Maurice Oduol and Mrs. Calasina Auma Oduol for their moral and unwavering support when carrying out this research study.

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LIST OF ABBREVIATIONS

ICT - Information Communication and Technology

PCs - Personal computers

LMS - Learning Management System

MOE - Ministry of Education

NCET - National Commission on Education and Technology

NGOs - Non-Governmental Organizations

ABSTRACT

This study attempts to identify influence of ICT technology environment on the integration of ICT projects in teaching and learning in Kenya public secondary schools particularly Nakuru County. The objectives of the study are to establish the influence of ICT competency of teachers on integration of ICT in teaching and learning in public secondary schools in Nakuru County, to determine the influence of ICT infrastructure facilities on integration of ICT in teaching and learning in public secondary schools in Nakuru County, to establish the influence of technical support on integration of ICT in teaching and learning in public secondary schools in Nakuru County and to ascertain the influence of school administration support on integration of ICT in teaching and learning in public secondary schools in Nakuru County. The study anchored on the Diffusion of innovation theory as well as on Technology acceptance theory. The study adopted a descriptive research design targeting students, teachers, technical staff and administrators in various public secondary schools within Nakuru county. A sample of 155 students, teachers, technical support and administrators was selected from the target population of 260. The study used a questionnaire and the interview guide to collect data which was analyzed using descriptive statistics including mean, frequency distributions, percentages and standard deviations as well as inferential statistical analysis which involved hypothesis testing. The analyzed data was presented using tables and charts. The research findings were that ICT teacher competence, ICT infrastructure, ICT technical support and administrative support are crucial component of integrating ICT in teaching and learning in public secondary schools. These findings could be used by Education stakeholders in training of teachers to acquire more ICT skills and therefore integrate it in the teaching and learning process. Quality of teaching and learning process becomes better with ICT thus creating a positive attitude among teachers and students. With these factors in mind the Ministry of Education in collaboration with that of ICT can easily integrate the projects in public secondary schools.

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

Across Africa, many states have started investing their resources and designing new policies all aimed at making integration of ICT in schools a reality. However, there are many challenges some of which could be attributed to the school heads leadership practices (Arkorful & Abaidoo, 2015). For ICT to be effectively integrated in schools, the administration should be prepared to face challenges that come with it.

1.1.1 Conceptual Background

Integration of Information Communication and Technology (ICT) in schools leads to significant expansion of education and pedagogical outcome which are beneficial to both students and teachers (Macharia & Pelser, 2014). ICT help to strengthen the importance of education to an increasingly networked society. Public secondary schools in Kenya are facing challenges in integration of ICT in the management of institutions. ICT involves all technologies that enable the handling of information and facilitation of different forms of communication among human actors, between human beings and electronic systems, and among electronic systems (Herrington & Kervin, 2017).

When designed and integrated effectively, ICT can improve access for geographically isolated communities; provide support for the teacher and is an effective electronic means for data capture, storage, interpretation and management. In this context, ICT for education refers to any tool that facilitates the communication, processing or transmission of information by electronic means for the purpose of improving students' education (Bukachi & Walsh, 2014).

The role of ICT in education is not widely practiced in Kenya due to various challenges including financial and skilled manpower. Therefore, for effective integration of ICT in teaching and learning in public secondary schools, ICT teacher competency is a very important factor. Then the school administrations need to provide full support for the

projects by improving the ICT infrastructure in public secondary schools and hiring qualified staff. This will enhance integration of ICT in teaching process.

1.1.2 Theoretical Background

In this study two theoretical models have been outlined "The Technology Acceptance Theory" and "The Diffusion of Innovation Theory" The Technology Acceptance Theory explains how users come to accept/adopt and use a technological infrastructure. It suggests that when a user is presented with a new technology, a number of factors influence their decision regarding how and when they will use it. The Diffusion of Innovation Theory states that an innovation (technology) is passed on from its source to end users through a medium of agents and its diffusion to potential users for the most part is dependent on the personal attributes of the individual user.

1.1.3 Contextual Background

In Kenya, the government recognizes the positive effect of ICT in making the country a middle level economy which is envisaged in Kenya Vision 2030. Effort to integrate ICT in schools was first initiated by publishing Sessional Paper No.1 of 2005 where ICT was given prominence. The idea was to equip public secondary schools with ICT infrastructure and integrate it in existing school curriculum in order to meet the challenges of information society. According to Tarus, Gichoya & Mumbo (2015), factors such as ICT teacher competency, infrastructure facilities, technical support and school administration support influence the integration of ICT in public school.

Al-Adwan and Smedley (2013) defined competencies as the set of knowledge, skills, and experience necessary for future, which manifests in activities. Teachers need to improve knowledge and skills to enhance, improve and explore their teaching practices. To be fully prepared to function productively in a technology-oriented society, students must develop not only fundamental computer skills but also proficiency in using a variety of technology tools to solve problems, make informed decisions, and generate new knowledge. According to Abdullah and Ward (2016), the development of these skills in other basic areas of knowledge, is the responsibility of the schools and their instructional staff. Yet

many of our teachers lack the necessary skills themselves to be comfortable in playing a leadership role in the integration of technology into classrooms. Teachers' competencies must be reviewed so that it is redefined depending on the development of the whole life of man and education (Eze, Awa, Okoye, Emecheta & Anazodo, 2013).

According to Mwangi and Kariuki (2015), school administration support of the ICT is very important as the school will be able to get the best of the ICT systems that it installs. The school must be managed effectively. Roles and responsibilities need to be clearly defined; specific people need to be accountable for specific aspects of ICT. (Okiro & Ndung'u 2013) state that unparalleled development of information and communication technology tools within the public schools has given a tremendous boost in supporting new modes of delivery in training, teaching and learning. ICT tools can indeed assist students in acquiring English language competency as well as enhancing the quality of the learning experience.

In Nakuru County, education is an important part of society, since it has enabled ICT into teaching many subjects. Honan (2014) indicated the importance of integrating ICT in education. For example, the author suggested that integrating ICT in education enables students to take a more active role in their learning rather than be a passive observer or listener. In Nakuru county most schools are slowly embracing the idea of ICT not only in curriculum implementation but also in the management of institutions. ICT is also perceived to have many advantages in education including pursuing problem-solving skills, fostering collaborative learning, providing flexible learning opportunities and increasing productivity (Sinclair, 2009). Furthermore, ICT is considered important for improving the effectiveness of teaching and learning in schools (Lim & Khine, 2016). The efforts by the Ministry of Education Nakuru county in ensuring that teachers are trained on ICT skills is highly recommended however more needs to be done. Public secondary schools need to have enough ICT infrastructure and proper staffing. This can be achieved when the ministry injects sufficient funding of the projects

1.2 Statement of the Problem

Integration of Information Communication and Technology (ICT) is of benefit to many sectors. ICT can enable an organization to have a one stop shop of information and records of customers which enhances service delivery. The Kenyan public education sector can also benefit from the use of ICT in managing student data nationwide. The Kenyan government is making significant strides in the integration of ICT strategy in public health care and other departments in ministries. Despite the efforts to adopt the use of ICT in the public schools, most public schools are yet to embrace the idea.

Several studies have been conducted on factors influencing the integration of ICT in various sectors of economy. For instance, Ashioya (2014) investigated the challenges influencing the integration of emerging ICT technologies in health sector. The study revealed that out of the emerging technologies singled out by the researcher, Virtualization was the most implemented technology with 69% of the respondents having implemented it and Artificial Intelligence was the least implemented with only 16% of the respondents having integrated it in their organizations. This study only concentrated on the health sector and did not look at the education sector.

Macharia and Nyakwende (2013) investigated the factors influencing the adoption and diffusion of internet in higher educational institutions. The study indicated that as university administrators continue investing in Information and Communication Technologies (ICTs) such as the internet, Learning Management Systems (LMS) such WebCT, and plagiarism and originality tools like Turnitin to improve quality and to support learning, as well as help in dealing with educational budget cuts and increased enrollment, instructors are increasingly making their teaching materials available on the internet. This study did not cover secondary institutions.

Therefore, these previous studies did not put into consideration the role ICT can play when integrated in the teaching and learning process in public secondary schools, leading to a knowledge gap that the study intends to fill on the factors influencing integration of ICT in public secondary schools with focus on Nakuru County.

1.3 Purpose of the Study

The purpose of the study is to determine the influence of technology environment (Teacher ICT competency, ICT infrastructure facilities, ICT technical support and school administration support) government policy on the ICT integration in teaching and learning process in Kenya public secondary schools in Nakuru County.

1.4 Objectives of the Study

The study will be guided by the following objectives:

i. To establish the influence of ICT teacher competency on ICT integration in teaching and learning in public secondary schools in Nakuru County.
ii. To determine the influence of ICT infrastructure facilities on ICT integration in teaching and learning in public secondary schools in Nakuru County
iii. To examine the influence of technical support on ICT integration in teaching and learning in public secondary schools in Nakuru County
iv. To assess the influence of school administration support on ICT integration in teaching and learning in public secondary schools in Nakuru County

1.5 Research Questions

i. How does ICT teacher competency influence ICT integration in teaching and learning in public secondary schools in Nakuru County?
ii. How does ICT infrastructure facilities influence ICT integration in teaching and learning in public secondary schools in Nakuru County?
iii. How does technical support influence ICT integration in teaching and learning in public secondary schools in Nakuru County?
iv. How does school administration support influence ICT integration in teaching and learning in public secondary schools in Nakuru County?

1.6 Hypothesis of the Study

i. H_o: There is no significant relationship between ICT teacher competency and ICT integration in teaching and learning in public secondary schools in Nakuru County.

ii. H_o: There is no significant relationship between ICT infrastructure facilities and ICT integration in teaching and learning in public secondary schools in Nakuru County.

iii. H_o: There is no significant relationship between technical support and ICT integration in teaching and learning in public secondary schools in Nakuru County.

iv. H_o: There is no significant relationship between school administration support and ICT integration project in teaching and learning in public secondary schools in Nakuru County.

1.7 Significance of the Study

This study is important as it can provide a framework which could assist secondary school administrators in making decisions on how to use ICT in schools. The government can also use the findings of this study as a basis for revising the current ICT curriculum and policy in order to overcome the challenges hindering the use of ICT in public secondary schools in Kenya. Furthermore, findings of the study are expected to open areas for further study by other researchers and academicians, hence benefiting the whole community.

1.8 Assumptions of the Study

The study will be based on the assumption that the respondents for the study will cooperate and give information that will make it easy to achieve the study objectives. The study also assumes that the independent variables (ICT teacher competency, ICT infrastructure, technical support and school administration support) have an influence on the dependent variable (ICT integration project in teaching and learning process in public secondary schools).

1.9 Limitations of the Study

This researcher foresees various limitations that may hinder the achievement of the study objectives. For instance, he may encounter suspicion from the respondents who are hesitant to participate in the study. This will be resolved by showing them the university introduction letter. Some respondents may be unwilling to respond but the researcher will

confirm to them that their responses would be treated with confidentiality and for academic purpose only. The researcher is also likely to encounter situations where respondents give ideal information instead of the facts. To overcome this challenge, the researcher will set some questions in a repeated form to countercheck the respondents' consistence in answering.

1.10 Delimitation of the Study

The researcher will focus this study on ICT teacher competency, ICT infrastructure, ICT technical support as well as school administration support as independent variables that influence integration of ICT in teaching and learning process in Kenya public secondary schools, with focus in Nakuru County as dependent variable. The research study will be conducted in September 2019.

1.11 Definition of Significant Terms Used in the Study

ICT Teachers Competencies: This is set of knowledge, skills, and experience that the teachers should have. It manifests in activities.

ICT infrastructure facilities: These are the ICT tools that assist students in acquiring competency as well as enhance the quality of the learning experience in the school such as computers, projectors and network connectivity.

Technical support: These are plethora of services by which teachers or other technical experts provide assistance to learners as users of technology such as computers, software products and other electronic informatics.

Administration support: This is whereby the school management has to make decisions that support ICT integration project in the school.

Institutional Environment: This refers to a combination of all independent variables including ICT teacher competence, ICT infrastructure facilities, technical support and administration support within an institution as used in the study.

ICT Integration Project: This is where there is use of ICT in running school programs as well as in teaching and learning process within the school environment.

1.12 Organization of the Study

Chapter one consist of introduction where it covers the conceptual, theoretical and contextual background of the study. It has also presented the statement of the problem, purpose of the study, research objectives and questions. The chapter also contains the significance of the study, scope, limitations and delimitations as well as definition of key terms. Chapter two comprises literature review where previous studies, relevant to the study objectives are reviewed. Chapter three presents research methodology which details the methods that were adopted to ensure that valid and reliable data is collected. Chapter four present data analysis, presentation and interpretation while chapter five present summary, conclusions and recommendations.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter reviews the information from other researchers who have carried out their research in the same field of study. It will cover the theoretical and empirical reviews and a conceptual framework for the study. The key variables covered in the review include the influence of ICT teacher competency, ICT infrastructure facilities, technical support and school administration support on the integration of ICT project in teaching and learning in public secondary schools. The study also intends to fill the knowledge gaps from previous studies including other factors that influence ICT project integration in teaching and learning process, teacher and learner attitude toward ICT as well as government policy with focus on Kenya public day secondary schools.

2.2 Empirical Review

Teachers and learners are viewed as the major stakeholders in the integration of ICT in teaching and learning in public secondary schools in Kenya especially Nakuru County. The use of ICT in Kenya has generated a significant amount of interest in recent years, in large part owing to the One Laptop per Child programme (Kozma & Vota,2014) With the rapid development of emerging technologies, the use of ICT in education has increasingly attracted the attention of educational authorities in Kenya (Evoh, (2007). This has resulted to multiple and successive training of teachers by the Ministry of Education.

Dzidou (2010) carried out a study through survey method on ICT teacher skills and competence where he found that many African countries lack well trained teachers and low levels of teachers ICT skills as the major obstacle in implementation of ICT in schools. Even though the study was generalized it should have been conducted in specific countries. Henessy (2010) through survey carried out a study on shortage of skilled and competent teachers where rise in student population, lack of funding for teachers' salaries due to growing poverty and the rising number of teachers affected by HIV/AIDS complicated the

implementation of ICT in schools. However, the study focused on skilled and competent teachers ignoring other variables.

Higgins and Moseley (2011) through survey carried out a study on the role of teachers training institutions in implementing ICT in teaching and learning and found out that many teacher training institutions in Africa continue to teach more about what is ICT rather than teaching how to use it during teaching and learning in class room. However, the study focused more on the role played by teacher training institutions in implementation of ICT in public secondary schools ignoring other factors. Manduku et al (2010) carried out a study through survey on comparison of boarding and day schools in embracing modern ICT and it established that more boarding secondary schools had embraced modern ICT as compared to day schools. The study however does not outline factors that favor boarding schools than day schools in embracing ICT. Jimoyiannis and Komis, (2007) carried out a study through survey on teachers' attitude towards ICT based on gender and found out that male teachers are more positive about ICT while female teachers are neutral or negative however the study did not outline factors that affect female teachers in having negative or neutral perception on ICT. Truong, Paradies and Priest (2014) state that positive attitude of teachers towards ICT was also confirmed in their study. Almost a half of teachers agreed with the statement that they like working with ICT and said that they frequently use it for professional development. About one fifth consider ICT to be a tool like others, for example CD player or video recorder that are also very useful in language learning. Only 6% consider ICT as only external need, without a real benefit for teachers and educational process.

Digital technologies are expected to be widely deployed for teaching and learning in public secondary schools. It seems that education is a central actor to pursue and attain the objectives of the ICT policy; other sectors are expected to benefit indirectly from this approach.

The integration of technology in secondary education is a significant issue especially across the diverse contexts of Kenya, where only 32% of all school-age children attend secondary school (Ministry of Education/Republic of Kenya, (2012).

2.2.1 Integration of ICT Project in Teaching and Learning in Public Secondary Schools

For a long time, Kenya public schools have faced a wide range of challenges including student unrest, arson, destruction of property and so on. Schools therefore are inventing modern ways to curb indiscipline cases including installation of CCTV cameras in almost every part of the school just to monitor the behavior of students in and out of class. These cameras are controlled by computer systems. Apart from acquiring new skills among the learners in school, management of discipline and efficient running of schools has emerged as an important role that ICT integration can play.

Therefore, the four independent variables play an important role in the integration of the ICT project especially in public secondary schools. The government needs to inject more funding in public secondary schools and engage the institutions management in the integration of the projects. This will enhance improved discipline in public secondary schools, increased ICT skills among the learners and efficient running of the institutions (Okiro & Ndungu , 2013).

2.2.2 ICT Teacher Competency and Integration of ICT Project in Teaching and Learning

Competence is defined as a system of prerequisites for successful action in certain domains that can be influenced by practice and learning (Plessis & Van Niekerk, 2014). Application of ICT contributes to the individualization of education, as it allows one to study at his own pace and, on the other hand, it is an effective means of forming communicative culture of the students. In order to integrate ICT successfully teachers should have enough knowledge and skills to work with it and be willing to use it while preparing for the lessons as well as in the class. According to a study conducted by Malinina (2015), teachers have a positive

attitude towards ICT and their belief that use of ICT is valuable for them as well as for their students is one of the key factors of integration of ICT in education.

Kinniburgh, Blaustein, Spinazzola and Van (2017) state that before teachers have developed the ability to achieve complete ICT integration in teaching and learning process, they must have a comfortable level of ICT skills. Unless teachers are functioning at a comfortable level of ICT skills and knowledge, they will be unable to use ICT as a primary tool for teaching and learning across the curriculum. Teachers need to be competent and confident users of hardware and software, to understand how to organize the classroom to structure learning tasks so that ICT resources become a necessary and integral part of learning rather than an add-on technical aid. Teaching becomes a process to initiate, facilitate, and sustain students' self-learning and self-actualization; therefore, a teacher should play the role of a facilitator who supports students' learning (Metzel& Hansen, 2014).

According to Klein, Spector, Grabowski, and Teja (2014), competency is a set of related knowledge, skills, and attitudes that enable an individual to effectively perform the activities of a given occupation or job function to the standards expected in employment. In reviewing the literature, Englander, Cameron, Ballard, Dodge, Bull & Aschenbrener (2013) highlight three possible kinds of technology impact on teaching. The authors state that technology has a positive influence on teaching and learning because students receive faster feedback, students have better collaborative learning experiences, students and faculty can be reached at any time, and learning can take place anywhere at any time.

Technology has had a negative influence on teaching because computers may act as a distractor in class. The use of computer-generated slides does not permit higher levels of learning, and teachers may use technology to distance themselves from students. According to Morris, Webb, Fu and Singhal (2013), technology has no impact on teaching and learning since it is the brain that controls learning not technology. The author further indicated that application of ICT opens up new opportunities in arranging educational environment. The new Web provides resources, tools and technologies that can make

educational process social as they help create collaborative learning atmosphere (Sue, Rasheed & Rasheed, 2015).

2.2.3 ICT Infrastructure and Integration of ICT Project in Teaching and Learning

ICT infrastructure refers to information and communications technologies such as computers and the Internet, as well as fixed-line telecommunications, mobile phones, other wireless communications devices, networks, broadband and various specialized devices ranging from barcode scanners to global positioning systems (Sivakumaren, Geetha & Jeyaprakash, 2013). Teaching modes such as e-learning; distance or virtual classes/laboratories and adoption of electronic content delivery system which are critical in meeting demands for higher education and vocational training can only be implemented in institutions once proper technology infrastructure and policy frame work is in place (Egoeze, Misra, Akman & Colomo-Palacios, 2014).

Ali and Khan (2013) defined ICT infrastructure as the enabling foundation of shared information technology capabilities upon which business depends. They viewed ICT infrastructure as the shared portion of the ICT architecture. Earl (2013) defines ICT infrastructure as the technological foundation of computer, communications, data and basic systems. He views ICT infrastructure as the technology framework that guides the organization in satisfying business and management needs. Duncan (2015) refers to ICT infrastructure as the set of IT resources that make feasible both innovations and the continuous improvement of IT systems. Despite having a rich ideological ICT strategy in education, adoption in Kenya secondary schools has proved to be an uphill task due to gaps in policy and financial constraints (Tiwari & Sahoo, 2013).

Kandasamy and Shah (2013) state that there is need to put more emphasis on provision of support infrastructure, such as, energy and roads; supporting software development; promotion of local manufacture and assembly of ICT equipment and accessories; and availability of incentives for the provision of ICT infrastructure. Demchenko, Grosso, De Laat & Membrey (2013) indicated that telecommunication infrastructure is a major issue that stands as an impediment to access of information. Most people are not able to access

digital information due to lack of the necessary infrastructure (GoK, 2007). This has left a bigger part of the population unable to access the digital information hence discouraging the adoption of ICT thus widening digital divide between developed and developing economies as well as between the haves and the have not, setting classes and levels of learning institutions rather than sink poverty levels and narrow economic gaps (Greenstein, 2013).

Greenstein (2013) state that the structure will include components such as high-speed local networks and fast connections via either fixed narrowband or broadband Internet access, relational databases that support a variety of digital formats, full text search engines to index and provide access to resources, a variety of servers such as Web servers and file transfer protocol (FTP) servers and electronic document management functions that will aid in the overall management of digital resources. Kannappanavar and Vijayakumar (2001) have made a survey on the use of hardware and software facilities in University of Agricultural Science libraries in Karnataka. The results reveal that none of the University libraries at the time of study were having databases and full implementation of IT applications in their libraries. Though the agricultural university libraries are having hardware and software facilities to some extent, the results are not reaching the clientele.

2.2.4 Technical Support and Integration of ICT Project in Teaching and Learning

The term technical support is used in this study to describe the resources and services that are available to schools which assist them in their provision of ICT. These services include those which provide support for schools' ICT equipment, as well as those which assist schools in developing, planning and implementing the ICT curriculum. According to Voogt, Knezek, Cox, and Brummelhuis (2013) technical support covers all aspects of managing the ICT infrastructure. They identified four key areas of technical support which consist of proactive support which involves the prevention of incidents before they occur, reactive support which involves the fixing of incidents once they have occurred, strategic support which makes sure technical support meets the school's needs, and change support which deals with management of ICT changes. Technical support can be provided locally

by individual members of staff in a school or by external bodies that are contracted by the school to provide such service (Albugami & Ahmed, 2015).

Kozma and Vota (2014) indicated that in order to overcome barriers preventing them from using ICT, teachers require good technical support in the classroom. One of the most frequently cited barrier to ICT integration is lack of technical support. According to Mulwa (2015), secondary schools should employ support staff members such as computer laboratory technicians or assistants before embarking on full-scale integration of e-learning in schools within semi-arid districts in Kenya. Technical barriers impeded the smooth delivery of the lessons or natural flow of the classroom activity (Sicilia, 2015). Such technical problems take much of the teacher's time needed to achieve lesson objectives. If there is no technical support available, then it is most likely that technical maintenance of broken or faulty ICT tools will not take place. According to Becta (2014), technical faults discourage teachers from using ICT in teaching/learning because of the fear of ICT tools failure/breakdown during lesson presentation.

Whether provided by in-school staff or external service providers, or both, technical support specialists are essential to the continued viability of ICT use in a given school. Without on-site technical support, much time and money may be lost due to technical breakdowns. In the Philippines, for example, one of the major obstacles to optimizing computer use in high schools has been the lack of timely technical support (Vrasidas, 2015). In some extreme cases involving schools in remote areas, disabled computers take months to be repaired since no technician is available in the immediate vicinity and so the computers have to be sent to the nearest city hundreds of kilometers away (Rodríguez-Miranda, Pozuelos-Estrada & León-Jariego, 2014).

2.2.5 School Administration Support and Integration of ICT Project in Teaching and Learning

For successful integration of ICT in teaching and learning there has to be proper planning at the school level. This is because the school is expected to provide the necessary ICT resources for the teachers and the students to use. An ICT integration plan provides a

detailed blueprint of the steps and methods needed to translate the school ICT vision into reality (Mingaine, 2013). A plan is a guide to action not a substitute for it; the existence of a written ICT plan and strategy does not guarantee the comprehensive use of ICT in schools, nor does the absence of an ICT plan necessarily equate to the lack of ICT integration in a given school (Bryderup and Kowalski 2013).

The support and commitment range from supervision, budgetary allocation, and enhancing access of ICT tools/resources besides motivation of ICT integrating teachers (Make wa Meremo, Role & Role 2013). It has been shown that the most effective way to bring about adoption and acceptance of ICT in classroom instructions as it involve all stakeholders. If all teachers in a school are included in decision making on adoption of technology, then integration becomes easier. The leadership has to be committed to adoption of ICT so that the whole team can integrate it (Fullan, 1992). Where there is backing of the head of the school, with long-term ICT policy to integrate ICT in teaching and learning, there is gradual development on integration (NCET, 1994).

The success of ICT integration in teaching and learning activities is dependent on the support given by the school Principal/head teacher. Teachers need on-site, classroom based technical support from qualified ICT personnel/technician. The support should also include pedagogical advice on how teachers can choose relevant materials from the internet and sample them out for use (Fullan, 2014). Technical support for teachers is limited in most schools. Where such support is available, it is not adequate. The administrator's role in ICT integration in teaching and learning need to be focused on allocation of resources to support management, mentoring performance, empowering staff, improving academic standards and setting clear ICT policy in the school. The leadership plays a role in supporting, recommending and sponsoring teachers for in-service training in order to have them updated (Clark, Cameroon & Schefller 2018).

Albugami and Ahmed (2015) conducted a study to investigate the areas of ICT utilization among teachers and principals of Malaysian schools. Quantitative method was used in this study with a representative sample of 260 school teachers, teachers-supervisors and

principals. The finding of the research demonstrated that 84% of the teachers were not aware of national ICT policy though it exists. Finding shows that most of the schools (80%) do not have ICT policy at the school level though the facilities and equipment of ICT ware available in most Malaysian schools. Almost all the teachers have a high level of skills in using computer and profoundly the basic skills needed for teachers in IT are attained by all the teachers. Likewise, 95% of the schools had photocopy machines and scanners while the multimedia projector is available in 85% of the schools.

Etudor-Eyo, Ante and Emah (2014) carried out a study on the use of ICT and communication effectiveness among secondary school administrators. From the study, it was found that the extent of administrators' use of ICT and the extent of administrators' effectiveness in communication are high. It was further noted that there is a significant positive relationship between administrators' use of ICT and administrators' effectiveness in communication; the effectiveness of secondary school administrators in communication is significantly predicted by the use of ICT. Based on the findings, conclusions were drawn and recommendations made that Government should make ICT tools available in all secondary schools for the administrators; workshops on the use of ICT should be organized from time to time by the governments and NGOs for school administrators who are not yet ICT literate; a constant power supply should be made available to schools so that administrators would be able to make use of ICT for communication; skilled manpower should be employed to teach those administrators who are still illiterate in this regard by NGOs, the government, and individuals.

2.2.6 Government Policy and Integration of ICT Project in Teaching and Learning

The government of Kenya has always been supportive of integration of ICT in teaching and learning process in public schools. This has resulted in collaboration between the ministry of ICT and that of Education.

The Education ministry's policy framework 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 frequent power disruptions. Most public secondary schools have

some computer equipment; however, this could consist of one computer in the office of the school head. Very few secondary schools have sufficient ICT tools for teachers and students. Even in schools that do have computers, the student-computer ratio is 150:1. Most of the schools with ICT infrastructure have acquired it through initiatives supported by parents, the government, NGOs, or other development agencies and the private sector, including the NEPAD e-Schools program. Attempts to set up basic ICT infrastructure in primary schools are almost negligible

2.3 Theoretical Framework

Theories appropriate to the study will be used to explain the variables. The Technology Acceptance Theory and The Diffusion of Innovation Theory will be used in this study as they are relevant to enable the explanation of the literature according to the objectives.

2.3.1 Technology Acceptance Theory

The Technology Acceptance Theory is a theoretical model that explains how users come to accept/adopt and use a technological infrastructure. Original Technology Acceptance Theory was proposed by (Davis 1989). The theory suggests that when a user is presented to a new technology, a number of factors influence their decision regarding how and when they will use it. This includes its perceived usefulness and its perceived ease of use. This theory adopts well established causal chain of beliefs, attitude, intention, actual behavior, which was developed from the theory of reasoned action by social psychologists. In Davis (1989) study, two important constructs are identified; perceived usefulness and perceived ease of use. The perceived usefulness (PU) is defined as the degree to which an individual believes that using a particular system/technology would enhance his/her performance (Davis, Foxall and Pallister, 2002). This means when a student in school understand the importance of using a particular technology then s/he would easily embrace it. This applies to teachers as well.

The perceived ease of use (PU) is defined as the degree to which an individual believes that using a particular system would be free of physical and mental efforts. These perceptions predict attitudes toward the system/technology adoption. Then the attitude

develops the intentions to use which in turn cause actual system usage. Perceived ease of use of an infrastructure has a direct effect on its perceived usefulness and both determine the consumer's attitude toward use, which leads to behavioral intention towards the system and actual use of the system (Davis 2002). The teacher as well as the learner need to find it ease in the use of technology. This will motivate them and therefore embrace it in teaching and learning.

2.3.2 Diffusion of Innovation Theory

Diffusion of Innovation theory was developed by Roger (1995). The author defines diffusion as the process by which an innovation is communicated through certain infrastructure channels over time among members of a social system. An innovation, according to Rogers (1983), is an idea, practice, or object that is perceived as new by an individual or other unit of adoption. The innovation diffusion model states that an innovation (technology) is passed on from its source to end users through a medium of agents and its diffusion in potential users for the most part depends on the personal attributes of the individual user.

The theory assumes that the technology in question is appropriate for use unless hindered by the lack of effective communication (Negatu and Parikh, 1999). According to Rogers (1983), the four major factors that influence diffusion process include; innovation itself, communication, time and nature of the social system into which the technology is being introduced (Rogers, 1983). Van Akkeren and Harker, (2003) argues that media and interpersonal contacts provide information that influences a person’s opinion and judgment. The theory comprises four elements: invention, diffusion through the social networks, time and consequences. Information filters through the networks and depending on the nature of the networks and the roles of its opinion leaders, new innovations are either adopted or rejected.

Rogers further claims that there are five adopter categories that include: innovators, early adopters, early majority, late majority, and laggards. Interestingly, the five categories follow a standard deviation curve where very few innovators adopt at the beginning (2.5%),

early adopters constituting 13.5%, the early majority constituting 34%, the late majority another 34%, finally the laggards at 16%. Rogers (1995) presented four additional adoption/diffusion theories. Potential adopters of a technology progress over time through five stages in the diffusion process. First, they must learn about the innovation (knowledge); second, they must be persuaded of the value of the innovation (persuasion); they then must decide to adopt it (decision); the innovation must then be implemented (implementation); and finally, the decision must be reaffirmed or rejected (confirmation). The focus is on the user or adopter. Individuals who are risk takers or otherwise innovative will adopt an innovation earlier in the continuum of adoption/diffusion. Rate of Adoption theory diffusion takes place over time with innovations going through a slow, gradual growth period, followed by dramatic and rapid growth, and then a gradual stabilization and finally a decline. According to Perceived Attributes Theory, there are five attributes upon which an innovation is judged; that it can be tried out (trialability), that results can be observed (observability), that it has an advantage over other innovations or the present circumstance (relative advantage), that it is not overly complex to learn or use (complexity), that it fits in or is compatible with the circumstances into which it will be adopted (compatibility).

Therefore, for technology to diffuse more effectively from the source to the end user who can either be the learner or the teacher the process should be made easier rather than difficult for the end user. This can motivate even the laggards become early adopters of technology.

2.4 Conceptual Framework

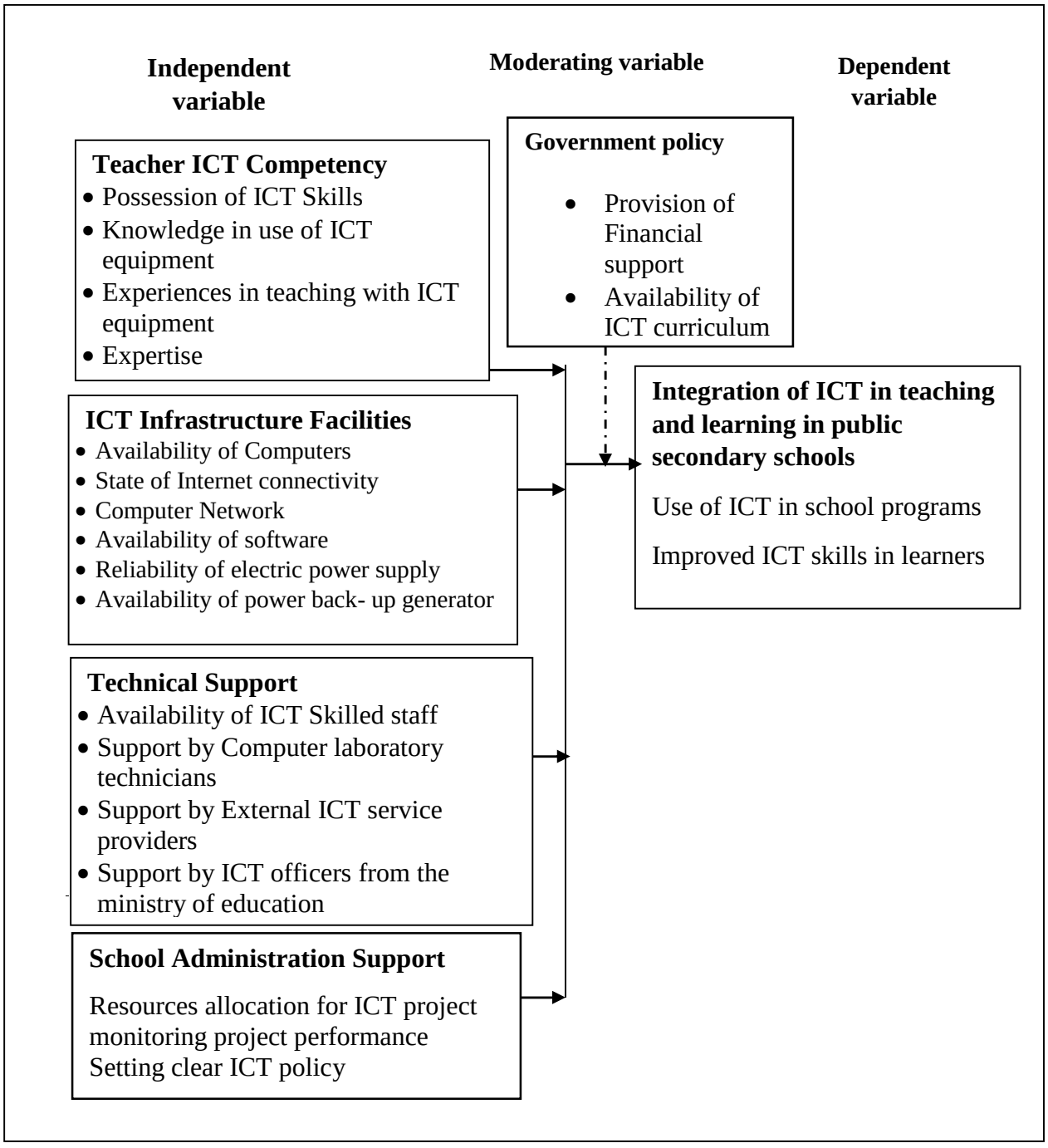

Figure 1: Conceptual Framework Showing the Relationships between Institutional Environment and Integration of ICT Project in Teaching and Learning in Public Secondary Schools

2.5 Summary of the Literature Review

Based on the review of literature from various scholars and past researchers, it can be noted that there are a number of factors that have been cited as having some influence on integration of ICT project in teaching and learning in secondary schools. Mutong'wa, and Farrell (2007) argue that high costs for acquisition and maintenance of ICT infrastructure is a challenge that has continued to hamper adoption and implementation of ICT in schools. Infrastructure is one of the greatest challenges in implementation of ICT in schools.

For the case of skills development in ICT and administrative support, most scholars and past studies suggested that to a large extent these two variables positively affected ICT integration. For example, Farrell, Agaba and Mugisha and Holland (2015) were of the view that possessing ICT skills does not warrant use of computers in teaching. From the review of literature, it is evident that there are a number of studies that have been conducted on infrastructure, teacher training, and administrative support in relation to ICT integration in public secondary schools. However, the context, scope and contribution of the previous studies do not contextually answer the question of factors influencing integration of ICT in public secondary schools in Nakuru County. Therefore, there is need to examine the factors influencing ICT integration project in public secondary schools in Nakuru County.

2.6 Knowledge Gap

Table 2.1: Knowledge Gap

Variable	Author	Findings	Methodology	Knowledge Gaps
ICT teacher skills and competence	Dzidonu, (2010).	Many African countries, lack well trained teachers and low levels of teachers ICT skill and knowledge has been recognized as major obstacle in implementation of ICT in schools	survey	The study was generalized, it should have been conducted in specific countries.
Shortage of skilled and competent teachers	Hennessy, (2010).	Rise in student population, lack of funding for teacher's salaries due to growing poverty and the rising number of teachers affected by HIV/AID has complicated implementation of ICT in schools. Research shows that meeting the severe deficit of skilled, competent and qualified teachers is the most challenging factor affecting most schools in the continent	Survey	The study focused on a specific variable; shortage of skilled competent and qualified ICT teachers
Role of Teachers Training Institutions in implementing ICT in	Higgins & Moseley, (2011)	Many Teachers Training Institutions in Africa continue to teach more about what is ICT rather than teaching how to use it during teaching and learning in classroom.	Survey	The study placed more focus in the role played by teacher training institutions in the implementation of ICT in public

teaching and learning				secondary schools, ignoring other factors
Teachers' ability to implement ICT in teaching and learning	Higgins & Moseley, (2011)	Inability of teachers to understand why they should implement ICT in teaching and how exactly to overcome Challenges in the Implementation of ICT in Public Secondary Schools in Kenya.	Survey	The study focused mainly on Kenya
Comparison of boarding and day schools in embracing modern ICT	Manduku et al (2010)	It established that more boarding secondary schools had embraced modern ICT as compared to day schools.	Survey	The study does not outline factors that favor boarding schools than day schools in embracing ICT.
Teachers attitude towards ICT based on gender	Jimoyiannis and Komis, (2007)	Male teachers are more positive about ICT in school while female teachers are neutral or negative.	Survey	The study does not outline factors that affect female teachers in having negative or neutral perception on ICT.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter deals with various methods and strategies to be used in the study. The main sections covered are paradigm research design, target population, sample size and sampling procedure, methods of data collections, techniques of data analysis.

This study is based on the pragmatism paradigm which is a hybrid between positivism and constructivism. This approach fits in this study because the researcher does not manipulate the variables; they just occur in a natural setting hence the investigator begins with observation of the dependent variable and then studies the independent variable respectively. The design used will allow the researcher to use instruments like interview schedules/guides and questionnaires.

3.2 Research Design

The study will employ descriptive design and correlation to analyse and define factors influencing the integration of Information and Communication Technology (ICT) project in teaching and learning in public secondary Schools. It is a cross-sectional survey design where the researcher collects information for all variables in the study at a given moment in time. Then the information is analysed and the results obtained are generalised for the present time and near future.

This will help establish the meaning and the quantification of causal association between dependent and independent variables in the research study. The instruments will assist in collecting data which will be analysed using statistical methods like tables, graphs and inferential statistical techniques for hypothesis testing to summarize the results.

3.3 Target Population

Population is defined as a collection of people, individuals, events, elements, or group of things that are examined for the purpose of conducting a certain study. The population of

this study will include all public secondary schools in Nakuru County. The study will target 10 secondary Schools with ICT integration projects in their teaching and learning processes. The reason of selecting 10 Schools is to boost the student performance in ICT. The records from the schools indicate lack of ICT facilities in the schools. The study will target public secondary schools in Nakuru County which have integrated ICT in teaching and learning process and they will be selected through random sampling.

Table 3.1: Target Population of Study

Target Groups	Target population	Percentage
School heads	50	19
Teachers	45	17
Technical support staff	10	4
Students	155	60
Total	**260**	**100**

Source: (Ministry of Education, Nakuru County)

3.4 Sample Size and Sampling Procedure

3.4.1 Sample Size

Sample size is a particular representative of a population whose properties are examined to obtain information pertaining the entire group. According to Orodho (2003), sampling is a selection of several subjects from a larger group to represent that group. Any conclusions arrived at from the sample is true for the entire population. Nevertheless, several arguments are greater the sample the lesser the margin of error, (Mugenda and Mugenda, 2013). A required number of subjects or respondents were selected in order to make a sample. The study used a sampling technique called stratified proportionate random sampling to select a sample. A sample of is arrived at by calculating the target population of respondents with a 95% confidence level and an error of 0.05 using the formula adopted by Kothari (2004).

$$n = \frac{z^2.N.\partial_p^2}{(N-1)e^2 + z^2\partial_p^2}$$

441.784

4.4179

n= 155

Where; n = (155) Size of the sample,

N= (265) Size of the population

e = Acceptable error and given as 0.05,

∂p = The standard deviation of the population is given as 0.5 where not known.

Z = Standard variate at a confidence level is given as 1.96 at 95% confidence level.

With a 95% confidence level and an error of 0.05, null hypothesis will be rejected.

Table 3.2: Sample size of respondents

Target groups	**Target population**	**Sample size**	**Percentage**
School heads	50	30	19
Teachers	45	27	17
Technical support staff	10	6	4
Students	155	92	60
Total	**260**	**155**	**100**

3.4.2 Sampling Procedure

This study will adopt a proportionate sampling technique where the category bearing a large population contributes the largest number of respondents to the sample. In each category, the study shall apply simple random sampling because it has the ability of giving every member of the population equal chance of being included in the sample. Structured questionnaires will be used in the collection of data. Respondents will be required to fill in questionnaires appropriately indicating their perception of the factors influencing integration of ICT in teaching and learning in public secondary schools in Nakuru County. The respondents will be asked to rate various aspects on a Likert scale. The respondents will be required to tick where appropriate indicating their opinion. Since there could be a chance that some of the respondents chosen would fail to provide the right information, the researcher will select 100 respondents to ensure that high quality data is collected.

3.5 Data Collection Instruments

The researcher will use two main data collection instruments mainly use of questionnaires and interview method. Students and teachers will fill the questionnaire as guided by the researcher while school administrators will be interviewed so that the researcher can save on time bearing in mind of their busy schedules.

3.5.1 Questionnaires

Questionnaires will be used as instruments of data collection. The selection of questionnaires as data collection instrument in this research study is informed by the fact that the current study is based on descriptive data and is aimed at building a profile on different factors influencing the implementation of ICT integration projects in public secondary schools in Nakuru County. Administering questionnaires is a popular method for data collection in most disciplines because of the relative ease and cost effectiveness with which they are constructed and administered to large samples. The data will be collected through drop and pick method which is a convenient and time saving mode of administering questionnaires. The questionnaire will be dropped at the target respondents' place of work and left there for them to fill.

3.5.2 Interview Schedule

Data will also be collected through interviews to get information about ICT infrastructure in public secondary schools and also administration support of ICT projects in Kenya public secondary schools in Nakuru County. This information will be obtained from school administrators, teachers and students.

3.6 Validity and Reliability of Research Instrument

3.6.1 Validity of the Instrument

Validity as noted by Hillier (2012) is the degree to which result obtained from the analysis of the data actually represents the phenomenon under study. Validity will be ensured by having objective questions in the questionnaire. The validity of research instruments used in the study will be ensured by reviewing and discussing them with the supervisor. The

supervisor will be able to advice on the most appropriate indicators that will measure variables of the study.

3.6.2 Reliability of the Instrument

The accuracy of data to be collected largely depends on the data collection instruments in terms of reliability (Blumberg, Cooper & Schindler, 2014). Reliability is the degree to which a research instrument is consistent in capturing information on a phenomenon. This will be achieved by pre-testing the instrument to be used to identify and change any ambiguous, awkward, or offensive questions and techniques as emphasized by (Kothari, 2004). In this study, reliability will be ensured through pilot testing of the research instruments and using Cronbach's Alpha value to establish whether the research instrument is reliable or not. A Cronbach's Alpha value of 0.7 and above will be used as a reliable research instrument (Cronbach, 1951).

3.6.3 Pilot Testing of the Instrument

The piloting will involve a staff from five public secondary schools. These respondents will not take part in the main study to avoid chances of bias. The purpose of testing the research instrument is to correct errors from the instrument that will be used in the main study.

3.7 Data Collection Procedures

The study will rely on primary data that will be collected by use of structured questionnaires. The researcher will drop the questionnaires to schools which will be filled by school heads, teachers and student before the researcher collect them for analysis. Filling the questionnaire while waiting indicates that the information will be accurate and that the data will not be contaminated.

In this research, the researcher uses triangulation technique. Cohen (2000) stated "Triangulation may be defined as the use of two or more methods of data collection in the study of some aspect of human behavior". Thus, triangulation technique means the researcher uses two or more techniques in collecting the data to get validity. The purpose

of triangulation is to increase the credibility and validity of the findings. Further, (Denzin and Patton, 2009) stated that there are four techniques in triangulation. These are: (1) source triangulation, (2) investigator triangulation, (3) methodological triangulation, (4) theoretical triangulation. In source triangulation, the researcher uses many sources or participants to get the accuracy of data. In Investigator triangulation means technique that uses more than one researcher in collecting and analyzing data. From some researcher's view in interpreting information and collecting the data, the validity of data can be increased. In Methodological triangulation the researcher uses more than one method in the research. Cohen (2000) explained "Methodological triangulation is using the same method on different occasions or different methods on the same object of study". Thus, methodological triangulation is making different method to get validity of data.

Finally, Theoretical triangulation means the researcher compares the data finding with perspective theory that is relevant. Here, the researcher is demanded to have expert judgment to compare the finding of research with the certain theory. From those types of triangulation, the researcher uses methodological triangulation to get validity of data. Besides, the researcher collects the data by using interview guide which is supported by questionnaire and the researcher also uses documentation which can give evidence if the participants are people that is proper to be used as subject of research. In short, the steps in analyzing the data are: the researcher collects the data through interview and questionnaire. Then, the researcher selects, identify, and focuses on the data by referring to formulation of the research problem, after selecting the data, the researcher displays those data into good sentences, after displaying data, the conclusion is drawn. Moreover, to get validity of data, the interview is supported by questionnaire. This questionnaire is analyzed by using descriptive statistics where frequency counts are tabulated and converted to percentages.
The researcher should use different procedures such as questionnaires, interviews and classroom observations to collect data. Also, this information needs to be obtained through different sources such as learners, students, ex- students, language instructors, subject instructors and program staff. Therefore, collecting varied types of information through different sources can enhance the reliability of the data and the results. In this way the replication of the study can be carried out fairly easily.

3.8 Ethical Considerations

Ethics involves making a judgement about the right and wrong behaviour during the research period. The researcher will obtain an introduction letter from the University to confirm to the respondents that the data sought will be used for academic purposes only. Then the researcher will also seek informed consent from the respondents. The respondents will be requested not to indicate any identifying information in the questionnaires that they will fill.

Confidentiality will be upheld throughout the study from data collection to reporting. All information collected from the respondents will be kept confidential in order to avoid any possibilities of victimization. The researcher will take all necessary action to ensure confidentiality of respondent's information, while collecting the data through administering the questionnaire (Kothari, 2007).

The researcher will observe the guiding principles of research such as acknowledgement of sources of published information to avoid plagiarism (Kothari, 2007). The researcher will ensure that all information obtained from various sources used in this study, are appropriately referenced as per the American Psychology Association (APA) referencing style

3.9 Data Analysis Techniques

Data analysis comprises the process of coding, editing, tabulation of the collected data and application of inferential statistical procedures. Organization of data will be done by use of descriptive and inferential statistics including mean and standard deviation. Inferential statistics include correlation and regression analysis to show the influence of technology environment on integration of ICT project in teaching and learning in public secondary schools in Nakuru county. Correlation analysis will be used to measure the influence of independent variable on the dependent variable.

The Multiple Regression Model follows this format:

$Y= \beta 0+ \beta 1X1+\beta 2X2+\beta 3X3 + \beta 4X4 + \varepsilon$

Where Y= ICT integration project in teaching and learning in public secondary schools

B0 = Constant

β1, β2, β3 and β4 are Coefficients of factors influencing integration of ICT in public secondary schools in Nakuru county.

ε = error term

X1= ICT Teacher Competency

X2= ICT Infrastructure Facilities

X3= Technical Support

X4= School Administration Support

F Statistic will be used to determine the validity of the regression model adopted. This statistic will be compared to the F Critical value.

The finding from the analysis will be presented in the form of charts, figures, graphs, tables and narrations.

Thematic analysis is a widely used method of analysis in qualitative research. Braun and Clarke (2006) state that thematic analysis is a foundational method of analysis that needed to be defined and described to solidify its place in qualitative research. Thematic analysis strives to identify patterns of themes in the interview data. One of the advantages of thematic analysis is that it's a flexible method which you can use both for explorative studies, where you don't have a clear idea of what patterns you are searching for, as well as for more deductive studies, where you know exactly what you are interested in. This study can be an explorative one which involves conducting interviews in public secondary schools in order to obtain an understanding of the teachers'/learners 'attitudes towards integration of ICT in teaching and learning, their views on administration support towards ICT projects etc. A more deductive study could be conducting interviews on technical aspect in order to find out how technical support availability influences integration of ICT project in teaching and learning in public secondary schools in Nakuru county.

No matter which type of study you are doing and for what purpose, the most important thing in your analysis is that you respect the data and try to represent your interview as honestly as possible. When you share your results with others, you should be transparent

about everything in your research process, from how you recruited participants to how you performed the analysis. This will make it easier for people to trust in the validity of your results. People who don't agree with your conclusion might be critical of your research results, but if you know that you have done everything possible to represent your participants and your research process honestly, you should have no problem defending your results. Thematic analysis describes an iterative process as to how to go from messy data to a map of the most important themes in the data. The main steps in thematic analysis include Familiarize yourself with your data, assigning preliminary codes to your data in order to describe the content, searching for patterns or themes in your codes across the different interviews. Then review themes. Define and name themes. Finally produce your report. Thematic analysis is simple to use which lends itself to use by researchers who are unfamiliar with more complex types of qualitative analysis. It allows for flexibility in the researcher's choice of theoretical framework. Some other methods of analysis are closely tied to specific theories, but thematic analysis can be used with any theory the researcher chooses. Through this flexibility, thematic analysis allows for rich, detailed and complex description of your data.

3.10 Operational Definition of Variables

Table 3.3: Operationalization of Variables

Objectives	Variable type	Variables	Indicators	Measurement scale	Data collection method	Type of data analysis
To establish the influence of teacher ICT competency on the integration of ICT project in teaching and learning in public secondary schools in Nakuru County, Kenya.	Independent variable	Teacher ICT competency	-Skills -Knowledge -Experiences -Expertise	Ordinal Nominal Interval scales	Questionnaires interviews	Descriptive Regression
To determine the influence of ICT infrastructure on integration of ICT project in teaching and learning in public secondary schools Nakuru County, Kenya	Independent variable	ICT infrastructure	-Computers -Internet connectivity -Network Software - Reliability of electronic power -Availability of power backup generator	Ordinal Nominal Interval scales	Questionnaires interviews	Descriptive Regression
To examine the influence of technical support on the integration of ICT project in teaching and learning in public secondary schools in Nakuru County, Kenya	Independent variable	Technical support	- Skilled staff -Computer laboratory - Technicians -External service providers -ICT officers from ministry of Education	Ordinal Nominal Interval scales	Questionnaires interviews	Descriptive Regression
To assess the influence of school administration support on integration of ICT project in teaching and learning in public secondary schools in Nakuru County, Kenya	Independent variable School administration support	School administration support	- Resource allocation - Mentoring performance -Setting clear ICT policy staff	Ordinal Nominal Interval scales	Questionnaires interviews	Descriptive Regression

CHAPTER FOUR
DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

In this chapter, data analysis, presentation and interpretation are presented.

4.2 Questionnaire Return Rate

A total of 155 questionnaires were administered to the respondents in selected secondary schools a total of 143 questionnaires were filled accurately and were collected by the researcher. This give a return rate of 92%. Mugenda and Mugenda (2003), reported that a 50% return rate is adequate/satisfactory, while 60% and 70% are viewed as good and very good respectively. Likewise, Kothari (2004) stated that a research instrument return rate of above 70% is very good. Hence, from the guides stated by the two scholars, a 92% return rate is viewed to be very good.

Table 4.1 shows the response rate of the respondents.

Table 4.1: Questionnaire Response Return Rate

Response Rate	Frequency	Percentage
Returned	143	92.26
Not returned	12	7.74
Total	**155**	**100.0**

4.3 Demographic Characteristics of the Respondents

In this part, the background information of all those who filled the questionnaires for the study was captured. Here, a step by step procedural analysis of the respondents was done based on gender, age, workplace/employment and their academic attainment. The results obtained were used to make interpretation of the study in the required sub-themes.

4.3.1 Respondent Distribution by Gender

The research was meant to highlight how the gender aspects that exist in Nakuru county in matters relating to integration of ICT projects in public secondary schools. The issues were

very significant at both the county and national perspective. The male gender has been perceived to be more interested compared to female gender in matters of ICT. The findings are tabulated in Table 4.2.

Table 4.2: Respondent Distribution by Gender

Response Rate	Frequency	Percentage
Male	81	56.64
Female	62	43.36
Total	**143**	**100.0**

Table 4.2 shows that, from the 143 respondents involved in the study, 81 people who represented 56.64% were male, while 62 people were women which indicates 43.36% of the sample size. Males are still quite a significant number in many institutions and even in other job sectors of the economy. Most men are still in possession of key ICT skills which are fundamental in the integration of ICT projects in schools.

4.3.2 Distribution of Respondents by Age

The number of years a person has in life is an important determinant on the nature of experience s/he possess and understanding of concepts related to importance of integrating ICT in teaching and learning process. Age at the same time gives an overview of the extent of availability and readiness to participate in projects/program execution and the extent of dexterity required. The results of the study in regard to age are well clarified in Table 4.3.

Table 4.3: Distribution of Respondents based on age

Respondents Age in years	Frequency		Percent	
	Male	**Female**	**Male**	**Female**
Below 18	36	20	25.2	14
19-30	18	16	12.6	11.2
31-50	38	7	26.6	4.8
Above 50	6	2	4.2	1.4
Total	**81**	**62**	**68.6**	**31.4**

Out of the 143 respondents that were interviewed with respect to their age limits.36 (25.2%) males and 20 (14%) females were below 18 years, 18 (12.6%) men and 16 (11.2%) had the ages of 19 to 30 years. 38 (26.6%) men and 7 (4,8%) women had the age limit of 31 to 50 years. Finally,6 (4.2%) men and 2 (1.4%) women of the respondents interviewed had an age limit of above 50 years. Most of the respondents interviewed were of the youthful age. It is in this age bracket, that possess a lot of energy to move from one project undertaking to another, they also are well-trained and passionate in various undertakings hence have adequate technical and human skills that are important in handling, execution of projects and programs. Only 5.6% of the respondents were of the age above 50 years. This is a group that is almost retiring from active professions such as teaching but their experience allows them to hold key administrative positions as well as taking leadership roles in key Departments. They have essential human and conceptual skills that they transfer to their respective junior staffs under them. Those in the ages 31 to 50 years are professionals representing about 31.4 % of the total respondents. It is seen as a group with adequate knowledge of implementing policies and procedures laid by the conceptual experts and financiers of projects and programs. The ideas, skills and experience they possess are used at higher and lower levels of management to see the projects and programs effectively. The young age of 19 to 30 years represented only 23.8% of the respondents. It is a group that is fresh from colleges and universities hence have current information relating to ICT and therefore they can play a very critical role in the integration of ICT projects.

4.3.3 Distribution of Respondents by Education

Academic attainment is a major contributor to a variety of facets of every organization, institutions and entities at all scales of operation. The sole aim of that was to evaluate the attainment of the necessary ICT skills and knowledge that are vital in integrating ICT in teaching and learning, which are then harnessed and converted to tangible aspects of technicality, human and conceptual roles. Education is as well a vital tool in enabling one make some of the informed and precise decisions. It is through academic that is attained at both genders that enhances the type of career choices and the type of roles/ department to work in. The results are presented in Table 4.4.

Table 4.4: Distribution of Respondents based on education attainment

Level of Education	Frequency	Percentage
Certificate	80	55.9
Diploma	19	13.3
Bachelor's degree	38	26.6
Master's degree	6	4.2
Total	**143**	**100.0**

In Table 4.4 There were 80 (55.9%) respondents with certificates level of education, 19 (113.3%) respondents had diploma level, 38 (26.6%) were degree holders, 6 (4.2%) had master level qualifications, in respective fields of operations and involvement. It was observed that, very few respondents are employed in the respective lucrative positions of institutions management without a first university degree. The diploma holders incorporated were done so, depending on the quality of skills they possess which matches those with graduate and post-graduate qualifications. The schools under study are therefore seen to appreciate the learned in society.

Quite a good number were Bachelor's degree holders by 26.6%. This is the group that are given opportunity to join the staff after a successful completion of the course which is provided to top performing graduates each year in respective fields. It is these employees that join the technical team to foresee the goals and objectives of each department they are incorporated to work for. Over a half of the respondents had post-graduate qualifications in academics. It shows how further training and academic achievement is valuable in high ranking in performing schools. Promotions in most public secondary schools are based on academic meritocracy and experience. Having a Master's degree qualification for instance, one is able to make very sound decisions in leadership positions, as well as sharpening their skills in management of projects/programs to meet the triple constraints of time, costs and quality.

Research is an important aspect in the organization under study. It is also a sector that demands a lot of conceptualization of aspects, to create a vast base of human and

conceptual skills required to manage projects in addition to creating confidence in leadership and team work.

4.3.4 Respondent Distribution by Department

The researcher was interested in the department of respondents under study. Five categories did come out clearly based on the information received from the respondents. It is through the information provided that the researcher is much able to deduce the nature of responsibilities each respondent is mandated to undertake. In this category, there was school administrators, technical staff, teachers and students. In the precepts studied; the distribution was given as categorized. The findings are well represented in Table 4.5.

Table 4.5: Distribution of respondents by employment status

Employments status	Frequency	Percent
School administrators	10	7.0
Teachers	52	36.0
Technical staff	11	7.7
Students	70	49.3
Total	**143**	**100.0**

In Table 4.5, 10 (7%) of the respondents were school administrators in the institution, while 52 (36.0%) corresponded to teachers in various subjects, 11 (7.7%) were technical staffs and 70(49.3%) were Students.

School administrators are essential in the ICT integration project since they are mandated to oversee the day to day execution of projects and programs funded by the government over a given period of time, that is why we had a good number of total respondents of 7%. This is attributed to the nature of secondary school under study. Teachers play an important role in the achievement of this project objectives, since with the support of technical support they provide necessary skills needed by the learner. Hence a good number (36%) of them took part in the study.

Technical staff were a few (7.7%). It is a group that is mandated to supervise and coordinate all operations and activities of the organizations and all projects undertaken. In most public secondary schools in Nakuru county ICT teachers also acted as technical staff. Hence, a small number of ICT technicians are justifiable. A good group belonged to the students and learners by 49.3%. It is this cadre of correspondents that are the main beneficiaries of the projects in secondary schools. They need to adequately acquire technical, theoretical and practical skills necessary through education and in future. Despite having other subjects to learn and with their busy schedule while in school, learners need to be motivated.

4.3.5 Distribution of Respondents by their Duration of Employment

It was meant to categorize respondents by the period of time they have been working in the teaching profession. The researcher developed keen interest on the information of the length of time they have been at the position of work, so that some of the important conclusions can be made based on the length of service. Table 4.6 gives the findings of the study.

Table 4.6: Respondent distribution by the duration of engagement

Duration in years	Frequency	Percent
0-2	92	64.3
2-5	24	16.8
6-10	14	9.8
11-20	8	5.6
Over 20 years	5	3.5
Total	**143**	**100.0**

Table 4.6 shows that 92 (64.3%) of the respondents were in the teaching profession for a period not exceeding two years, 24 (16.8%) were those that had been working in the entity at a duration of time of 2 to 5 years, 14(9.8%) were in the profession for 6 to 10 years while 8(5.6%) served in profession within a period of 11 to 20 years. Finally, those that were in the teaching profession for longest were 5 (3.5%).

Those with the shortest duration of service in the organization were starting their careers afresh after completion of various learning programs from institutions of higher learning and majority of them were students who had no experience at all in their careers. Respondents in the category of 2 to 5 years were quite considerable by 16.8% of the total respondents. This group seems to be well established in knowledge, skills and resources to be able to handle any challenge that might be brought up in their areas of work. It is also a representation of a group of work force that is trying to settle down fully in various careers at the organization in line with respective professions. Majority of the respondents had worked for a period of 6 to 10 years by 9.8% of the total respondents, which means that most workers were satisfied with the working conditions provided, which lead to a very low employee turn-over on joining. The probability of workers leaving the teaching profession were not very high as it is one of the competitive and lucrative careers one can ever dream to serve at. Those that had served in it for 11 to 20 years represented 5.6% of respondents. It is a group as well as those that have served for more than 20 years 3.5% that tends to graduate to the level of mentors to new staff, while others had been accorded senior management positions and mandated to lead various departments.

4.4 ICT Teacher Competence and Skills Development and ICT Projects Integration

The first objective of the study was to examine how ICT teacher competence influences skills development and ICT project integration in teaching and learning in public secondary schools. The questionnaire administered required respondents to express their rating level of consent with the asked statement at an interval of 1-5 on a Likert Scale, where: 5=strongly agree. 4=Agree; 3= Neutral;2= Disagree; 1= strongly disagree and the visual analogue scale on a scale of 1 to 10.

The results from the response are represented in Table 4.7.

Table 4.7: Frequency distribution for ICT teacher competence and skills development and ICT project integration

Statement	1	2	3	4	5
1.Adequate ICT knowledge and competence to discharge my duties in my institution	0 (0%)	2 (1.4%)	5 (3.5%)	69 (48.3%)	67 (46.9%)
2.Use of ICT in teaching and learning process	0 (0%)	3 (2.1%)	4 (2.8%)	41 (28.7%)	95 (66.4%)
3.Enhanced ICT skills development among learners and teachers	2 (1%)	3 (2%)	5 (4%)	51 (36%)	83 (58%)
Composite	**0.3%**	**2.2%**	**3.9%**	**34.3%**	**59.4%**

In Table 4.8, 59.4% and 34.3% of the respondents which were the majority, strongly agreed and agreed respectively that aspects related to ICT competence influences integration of ICT in teaching and learning. 3.9% were uncertain/neutral on the matter while 0.3% did not agree at all, while only 2.2% agreed to a very low extent. When asked whether they have adequate ICT competence and skills and their influence in integration of ICT in teaching and learning, saw; none of the respondent disagreeing, 1.4% of the respondents disagreed at a low level, 3.5% were neutral, majority of 48.3% agreed while 46.9% strongly agreed. Concerning the second statement under this objective; 0% disagreed, 2.1% disagreed at a low extent, 2.8% were neutral on the issue, 28.7% agreed while 66.4% strongly agreed that they use ICT in teaching and learning. Finally, when asked whether they enhance ICT skills development and if influences integration of ICT in teaching and learning, 1% did not agree, 2% disagreed at a low extent, 4% were very neutral on the matter, 36% agreed and 58% majority agreed to a greater extent.

Distribution of responses was also determined through the determination of each statement response means and standard deviation and their averages calculated. The results are given in Table 4.8.

Table 4.8: Mean and Standard Deviation for ICT teacher competence

Statement	N	Min	Max	Mean	Standard Deviation
1	143	1	5	4.41	0.5967
2	143	1	5	4.59	0.6807
3	143	1	5	4.49	0.6850
Composite				**4.51**	**0.6778**

Table 4.8 shows how mean and standard deviation was used to examine the distribution of responses concerning ICT teacher competence on integration of ICT in teaching and learning. The average mean of the responses was found to be 4.51 ($3.5<\mu<4.5$) Implying that most respondents were in agreement of all statements relating to ICT teacher competence on influencing ICT integration in teaching and learning. The standard deviations of the responses were moderately distributed around the mean. Averagely it is 0.6778($0.5<\sigma x<1.0$) implying that many respondents were in agreement about the aspects of ICT teacher competence on integration of ICT in teaching and learning.

4.5 ICT Infrastructural Facilities and Integration of ICT in Teaching and Learning

The second objective of the study was to determine how ICT infrastructural facilities influences integration of ICT in teaching and learning. The questionnaire administered required respondents to express their rating level of consent with the asked statement at an interval of 1-5 on a Likert Scale, where; 1= Strongly disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly agree. The results from the response are hereby represented in Table 4.9.

Table 4.9: Opinion on ICT infrastructural facilities and integration of ICT in teaching and learning

Statement	1	2	3	4	5
1.Your school has sufficient number of computers	0 (0%)	2(1.4%)	4(2.8%)	55 (38.5%)	82 (57.3%)
2. The computers in your school are easily accessible by all students.	0 (0%)	3(2.1%)	2 (1.4%)	62 (43.4%)	76 (53.1%)
3.The computers in your school are used for teaching and learning	2 (1.4%)	2 (1.4%)	4 (2.8%)	79 (55.2%)	56 (39.2%)
4. The main source of electricity in your school is national grid.	1 (0.7%)	3 (2.1%)	6 (4.2%)	81 (56.6%)	52 (36.4%)
5.You rely on electricity in your school when using computers	0 (0%)	4 (2.8%)	8 (5.6%)	58 (40.6%)	73 (51%)
Composite percentage	**0.4%**	**2.0%**	**3.4%**	**46.9%**	**47.4%**

Table 4.9 presents a breakdown of the responses in relation to ICT infrastructural facilities in relation to integration of ICT in teaching and learning. Averagely 47.4% were in strong agreement of the opinion statements raised, 46.9% agreed, 3.4% were neutral while 2.0% disagreed, while 0.4% strongly disagreed. This is a strong indication that; ICT infrastructure is an important precept of integration of ICT in teaching and learning.

The responses and frequency from table 4.10 are used to tabulate the measures of dispersion for the study which are the mean and standard deviation, to be able to make a deduction out of the same from the statements 1 to 5. Table 4.10 gives findings of the analysis of the two measures of dispersion.

Table 4.10: Mean and standard deviation of ICT infrastructural facilities

Statements	N	Min	Max	Mean	Standard Deviation
1	143	1	5	4.52	0.6056
2	143	1	5	4.48	0.6026
3	143	1	5	4.29	0.7396
4	143	1	5	4.27	0.6241
5	143	1	5	4.40	0.7121
Composite				**4.39**	**0.6568**

Table 4.10 shows that the mean was 4.39 while the standard deviation was 0.6568, which implies that most of the respondents were moderately distributed around the mean as the standard deviation is less than 1 for responses found. For any responses with standard deviation greater or equals to one ($\sigma x \geq 1$) indicates that there was little or no consensus of the statement in the dependent variable on the independent. Results obtained strongly indicate that there was good consensus of the metrics influence on integration of ICT in teaching and learning. The mean of the statement lies within ($3.5<\mu<4.5$) obtained are an indication that most of the responses were in agreement that ICT infrastructure influences positively integration of ICT in teaching and learning.

4.6 Technical Support and Integration of ICT in Teaching and Learning

The third objective of the study was to examine how technical support influences integration of ICT in teaching and learning. The questionnaire administered required respondents to express their rating level of consent with the asked statement at an interval of 1 to 5 on a Likert Scale, where; 1= Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree and 5=Strongly Agree. The results from the response are hereby represented in Table 4.11.

Table 4.11: Opinions of technical support on integration of ICT in teaching and learning

Statements	1	2	3	4	5
1.Our school has adequate ICT technical support for teaching and learning	2 (1.4%)	5(3.5%)	4 (2.8)	59 (41.3%)	73 (51%)
2.Our school has procured adequate ICT equipment for teaching and learning	1 (0.7%)	3 (2.1%)	5 (3.5%)	71 (49.7%)	63 (44.1%)
3.Our school has installed adequate internet connectivity for teaching and learning	0 (0%)	2 (1.4%)	6 (4.2%)	84 (58.7%)	51 (35.7%)
4.Our school keeps the ICT equipment properly maintained for efficient use for teaching and learning	2 (1.4%)	4 (2.8%)	7 (4.9%)	73 (51%)	57 (39.9%)
5.Our school ensures that internet connectivity is not interrupted for failure to pay the bills	3 (2.1%)	3 (2.1%)	8 (5.6%)	67 (46.9%)	62 (43.4%)
Composite	**1.1%**	**2.4%**	**4.2%**	**49.5%**	**42.8%**

Table 4.11 gives all statements which were answered. An average of 42.8% strongly agreed, 49.5% agreed, 4.2% were neutral, 2.4% disagreed while 1.1% strongly disagreed with the opinion asked in relation to technical support influence on integration of ICT in

teaching and learning. A majority of the respondents representing about 92.3% were in support of the asked aspects while 4.2% were uncertain of the asked aspects. Only 3.5% were either unsure or of a contrary opinion on the matter.

The responses and frequency from Table 4.11 are used to compute the measures of dispersion for the study which are the mean and standard deviation to be able to make a deduction out of the same from the statements 1 to 5. The mean and standard deviation are represented in Table 4.12.

Table 4.12: Mean and standard deviation of technical support

Statements	N	Min	Max	Mean	Standard Deviation
1	143	1	5	4.37	0.8200
2	143	1	5	4.34	0.7267
3	143	1	5	4.29	0.5866
4	143	1	5	4.25	0.7980
5	143	1	5	4.27	0.8433
Composite				**4.30**	**0.7549**

Table 4.12 shows how standard deviation was used to examine the distribution of responses on technical support influence on ICT integration in teaching and learning. Most respondents were in agreement that the metrics had a positive influence on integration of ICT in teaching and learning. The mean was obtained to be 4.30. ($3.5<\mu<4.5$). The standard deviations of the responses were moderately distributed around the mean, implying that majority respondents were in agreement about the aspects of technical support on integration of ICT in teaching and learning. The composite σx was 0.7549 which lies in $0.5<\sigma x<1.0$. Hence, σx is moderately distributed around the mean which is in tandem with the consensus of statements 1 to 5 used for study.

4.7 Administration Support and Integration of ICT in Teaching and Learning

The fourth objective of the study was to examine how administration support influences integration of ICT in teaching and learning. The questionnaire administered required respondents to express their rating level of consent with the asked statement at an interval of 1 to 5 on a Likert Scale, where; 1= Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree and 5=Strongly Agree. The results from the response are hereby represented in Table 4.13.

Table 4.13: Opinions of administration support on integration of ICT in teaching and learning

Statements	**1**	**2**	**3**	**4**	**5**
1.Technical support is offered by the school	0 (0%)	3 (2.1%)	5 (3.5%)	67 (46.9%)	68 (47.6%)
2.I receive adequate technical support during teaching and learning process	2 (1.4%)	2 (1.4%)	6 (4.2%)	71 (49.7%)	62 (43.4%)
3.School administration procures adequate financial support for use of ICT in teaching and learning	1 (0.7%)	3 (2.1%)	4 (2.8%)	58 (40.6%)	77 (53.8%)
4.The school administration motivates teachers and learners to embrace ICT in teaching and learning	0 (0%)	3 (2.1%)	3 (2.1%)	72 (50.3%)	65 (45.6%)
5. My school use ICT in running most of its programs.	2 (1.4%)	3 (2.1%)	5 (3.5%)	63 (44.1%)	70 (53.8%)
Composite	**0.7%**	**1.7%**	**3.2%**	**46.3%**	**48.8%**

Table 4.13 gives the respondents percentage on all statements which were answered. An average of 48.8% strongly agreed, 46.3% agreed, 3.2% were neutral, 2.0% disagreed while 0.7% strongly disagreed with the opinion asked in relation to administration support influence on integration of ICT in teaching and learning. A majority of the respondents 95.1% were in support of the asked aspects while 3.2% were uncertain of the asked aspects. Only 2.4% were of a contrary opinion on the matter.

4.8 Multiple Linear Regression of the Study

This is also a model of statistical analysis that gives or estimates the types of effects a given independent/predictor variable imposes on the dependent variable. In this research the influence of the studied independent variables; ICT teacher Competence, ICT infrastructure, Technical support and Administration support were analyzed and scrutinized. The results are presented in Table 4.14.

Table 4.14: Regression Model Summary

Model	R-Value	R –Square	Adjusted R – Square	Std. The error of the Estimate
1	0.687[a]	0.472	0.459	0.54674

a. Predictors: (Constant) ICT Teacher Competence, ICT infrastructure, Technical support, Administration support (**Source: Researcher 2019**).

The coefficient obtained for multiple regressions was 0.687. This coefficient denotes that there was a moderate positive relationship/correlation between the four independent variables and the dependent variable which was integration of ICT in teaching and learning.

Results obtained gave the coefficient of determination to be 0.472. This implies that; of all integration of ICT in teaching and learning, only 47.2% can be attributed to ICT teacher competence, ICT infrastructure, Technical support and School administration support. An important conclusion drawn here is that there are other aspects which account to 52.80% of integration of ICT in teaching and learning which are not considered in this research.

4.9 Analysis of Variance (ANOVA)

In the study, it was to be determined whether the regression model that was used was reliable or not, hence the need to carry out analysis of variance. The results of the analysis are given in Table 4.15.

Table 4.15: ANOVA Representation

Model		Sum of Squares	df	Mean of Squares	F	Sigma
1	Regression	37.499	2	9.3742	17.25	0.000[b]
	Residual	42.028	140.75	0.205		
	Total	79.527	142.75			

a. Dependent variable: Integration of ICT in teaching and learning (Source: Researcher 2019).

b. Predictors: (Constant) ICT teacher Competence, ICT infrastructural facilities, Technical support and administrative support.

Table 4.15 gives a P-Value from the ANOVA to be 0.000 giving a postulation that the model given is much to be relied upon with much certainty, as it has the least probability of giving a wrong prediction.

4.10 Regression Coefficients[a]

A concomitant analysis was done on the independent variables for the study which were ICT teacher Competence, ICT infrastructural facilities, technical support and administration support. The coefficients are presented in Table 4.16.

Table 4.16: Regression Coefficients

Model		Unstandardized Coeff.		Standardized Coeff.	t	Sig
		B	Std. Error	Beta		
1	(Constant)	0.687	0.4112		1.696	0.091
	ICT teacher competence	0.347	0.0704	0.277	6.145	0.002
	ICT infrastructure	0.339	0.0679	0.387	8.585	0.024
	Technical support	0.449	0.0701	0.412	9.776	0.011
	Administration support	0.406	0.0681	0.404	9.672	0.000

Dependent Variable: Integration of ICT in teaching and learning**.**

Table 4.16 gives us the coefficients which forms the regression model of the study, which can be illustrated by;

Y = 0.347 X 1 + 0.339 X 2+ 0.449 X 3 + 0.406 X 4 + 0.697

Integration of ICT in teaching and learning = 0.347 (ICT teacher competence) + 0.339 (ICT infrastructure) + 0.449 (technical support) + 0.406 (administration support) + 0.687 (Constant)

The model found is indicative of all the indicators have a positive influence on integration of ICT in teaching and learning. Increasing ICT teacher competence by one unit while keeping other factors constant, would lead to increased integration of ICT in teaching and learning by 0.347. Likewise, one unit rise in ICT infrastructure facilities results into a 0.339 increase in integration of ICT in teaching and learning. A single unit rise in technical support automatically leads to a 0.449 increment in integration of ICT in teaching and learning. Finally, a single unit rise in administration support, automatically catapults a rise in integration of ICT in teaching and learning by 0.406 when other factors are held constant.

4.11 Correlation Analysis

There was a need to establish the relationship that existed between the variables. Thus, a correlation analysis was done on the respondents in the study. Table 4.17 presents results obtained in the study.

Table 4.17: Correlation Coefficients

Variables	Type	Integration of ICT in teaching and learning	ICT teacher competence	ICT infrastructure facilities	Technical support	Administration support
Integration of ICT in teaching and learning	Pearson Correlation	1				
	Sig (2-tailed)					
	N	143				
ICT teacher competence	Pearson correlation	0.402**	1			
		0.0094				
	Sig (2-tailed)					
	N	143	143			
ICT infrastructure facilities	Pearson correlation	0.358**	0.106	1		
		0.000	0.164			
	Sig (2-tailed)					
	N	143	143	143	1	
Technical support	Pearson	0.449**	0.126	0.109		
	Correlation	0.000	0.261	0.541		
	Sig (2-tailed)					
	N	143	143	143		1
Administrative support	Pearson	0.432**	0.141	0.43	0.221	0.231
	Correlation	0.0084	0.139	0.521	0.488	0.409
	Sig. (2-tailed)					
	N	143	143	143	143	143

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

Table 4.17 gives the relationship that exists between the predictor and the dependent variables in terms of correlation. A positive correlation was observed between ICT teacher competence and integration of ICT in teaching and learning (correlation coefficient =0.402). Increasing ICT teacher competence automatically leads to a rise in integration of ICT in teaching and learning. A positive correlation was also observed between ICT infrastructural facilities (correlation coefficient=0.358), technical support (correlation coefficient =0.449) and school administration support (correlation coefficient=0.432). This indicates that infrastructural facilities, technical support and administration support are also important aspects for integration of ICT in teaching and learning in public secondary schools. The relationship of the dependent and independent variable was significant at 1% confidence level (0.01)

CHAPTER FIVE
SUMMARY OF FINDINGS, DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter gives a summary of findings, discussion relating to them, conclusions drawn on the findings and recommendations which enhance integration of ICT in teaching and learning in public secondary schools.

5.2 Summary of the Findings

In summary, the questionnaire with a set of questions was administered to 155 respondents who were teachers, school administrators, technical staff in various schools and students. A total of 143 questionnaires were filled and returned this gave a response rate of 92%. The respondents were stratified sampled from entire Nakuru County from teachers, students, technical staffs and school administrators, spread across the area of study. It was revealed that most respondents were men and had university degree level of education and other post-graduate qualifications. Most of the respondents had worked in the teaching profession for more than five years; majority of those had the age limit of between 30 and 49 years. It was drawn from the study that, aspects of ICT teacher competence, ICT infrastructure facilities, technical support and administration support had a positive influence on integration of ICT in teaching and learning in public secondary schools.

5.3 Discussions of the Findings

In this section, the findings of the study are discussed in accordance to the objectives used and their applicability to the literature review and theoretical framework. ICT teacher competence, ICT infrastructure, technical support and administration support had influence on integration of ICT in teaching and learning ($3.5<\mu<4.5$) and ($0.5<\sigma x<1.0$).

5.3.1 ICT Teacher Competence and Integration of ICT in Teaching and Learning

It was deduced that ICT teacher competence is a crucial component to achieving successful integration of ICT in teaching and learning. Here, indicators such as possession of ICT

skills, knowledge on the use of ICT equipment and experiences in teaching with ICT equipment were carefully examined. In analyzing the influence ICT teacher competence on integration of ICT in teaching and learning, a majority of the respondents of 93.7% of all respondents were in agreement that ICT teacher competence has a significant positive influence towards enhancing integration of ICT in teaching and learning.

The means of the respective indicators on ICT teacher competence had a range of $3.5<\mu<4.5$ on average, which strongly supports the notion of ICT teacher competence on integration of ICT in teaching and learning. On average most respondents were in agreement that the metrics laid had a good influence on integration of ICT in public secondary schools.

The standard deviation of possession of ICT skills, knowledge on the use of ICT equipment and experiences on teaching with ICT equipment were moderately distributed around the mean with an average of 0.6778 ($0.5<\sigma x\leq 1.0$) which denotes a good/strong consensus amongst all the respondents that the indicators had a good influence on integration of ICT. The success of educational innovations depends largely on skills and knowledge of teachers. Lack of knowledge and skills is among the inhibiting obstacles to the use of computers in schools. Educators with higher levels of skills, knowledge and tools would exhibit high level of ICT competence in the classroom. Therefore, teachers should develop their competence through training.

5.3.2 ICT Infrastructural Facilities and Integration of ICT in Teaching and Learning

It was deduced from the study that ICT infrastructure is an important facet of successful integration of ICT in teaching and learning in public secondary schools. Here, the metrics studied were availability of computers in schools, the state of network connectivity in schools, availability of software and reliability of electric powers supply or power backup generator. Most of the respondents corresponding to the 94.3% agreed and strongly agreed to the ICT infrastructure facilities metrics influencing positively on integrating ICT in teaching and learning.

The average mean of the indicators under ICT infrastructure was 4.39, which was within the acceptable range of 3.5 to 4.5 for the study to be valid $3.5<\mu<4.5$. Therefore, the indicators under the objective which were availability of computers in schools, the state of network connectivity in schools, availability of software and reliability of electric powers supply or power backup generator had a significant positive influence on successful integration of ICT in teaching and learning. The standard deviations of the indicators were moderately distributed around the mean. The average standard deviation was 0.6568, which is within the good consensus parameter of $0.5<\sigma x\leq 1.0$. Therefore, majority of the respondents were in good agreement that availability of computers in schools, the state of network connectivity in schools, availability of software and reliability of electric powers supply or power backup generator had a significant positive influence on successful integration of ICT in teaching and learning.

From the literature reviewed, the National ICT in education strategy of 2006 shows that about 32% of schools by the end of 2006 in Kenya had some computers but only a small fraction was equipped with basic ICT infrastructure necessary for teaching and learning. The same document estimated that there are about 120-160 students per computer sharing; an abnormal ration as per the World Bank. The situation was further aggravated by the fact that most schools were reported to use less than 40% of the available ICT infrastructure and furthermore, very few schools were using ICT as an alternative method for the delivery of the education curriculum. The parameters to be looked into when accessing the ICT readiness for an institution include: infrastructural availability like electricity, available infrastructure, workforce availability, policy and regulatory framework availability.

5.3.3 Technical Support and Integration of ICT in Teaching and Learning

Technical support is the third objective discussed in this study. Various technical support indicators were determined from the respondents and their relevance to integration of ICT in teaching and learning are highlighted. A majority, (92.3%) of the respondents agreed and strongly agreed on the various indicators of technical support influencing positively on integration of ICT in teaching and learning in public secondary schools.

Average mean of the respondents concerning the influence of technical support on integration of ICT in teaching and learning was 4.30, which is within the limits of $3.5< \mu <4.5$. This is an indication that all aspects relating to technical support; availability of skilled staff, availability of computer laboratory technicians, support from ICT service providers and support by ICT officers from Ministry of Education are important for successful integration of ICT in teaching and learning. The average standard deviation was 0.7549, which is within the good consensus parameter limit of $0.5<\sigma x\leq 1.0$. Therefore, majority of the respondents were in good agreement that; availability of skilled staff, availability of computer laboratory technicians, support from ICT service providers and support by ICT officers from Ministry of Education had a positive and significant influence on integration of ICT in teaching and learning in public secondary schools.

Internet is often prohibitive for most people in developing countries - Kenya included and for those who can afford a PC, routine maintenance, virus protection and servicing, is yet another problem that is not easily manageable by the first generation computer users. Compared to traditional forms of off-campus learning, technology facilitated learning has proven to be quite expensive in all areas of consideration, infrastructure, course development and course delivery.

5.3.4 Administration Support and Integration of ICT in Teaching and Learning

Administration support was the fourth objective of the study. A couple of metrics under administration support were delved at, pertaining integrating ICT in teaching and learning. It is again seen that, majority (95%) of the respondents interviewed agreed and strongly agreed in the strongest terms on the various indicators of administration support having a good positive influence on ICT integration in teaching and learning process.

The mean of the respondents concerning the influence of administration support on ICT integration in teaching and learning was 4.39, which is within the limits of $3.5< \mu <4.5$. This is an indication that all aspects relating to administration support; resource allocation towards ICT projects, monitoring project performance and setting a clear ICT policy form a good backbone toward realizing successful integration of ICT. The average standard

deviation of the five metrics examined was 0.7059.All this measure of dispersion are within the good consensus parameter limit of $0.5<\sigma x\leq 1.0$. Therefore, majority of the respondents were in good agreement that; all these aspects relating to administration support; resource allocation towards ICT projects, monitoring project performance and setting a clear ICT policy had a positive and a good influence on successful integration of ICT in teaching and learning in public secondary schools.

Therefore, for the adoption of ICTs to be effective and sustainable, administrators themselves must be competent in the use of the technology and they must have a broad understanding of the technical, pedagogical, administrative, financial and social dimensions of ICTs in education. For any institution to adapt new innovations there must be a backup from administrators (school heads).

5.4 Conclusion

From a progression of discoveries as achieved by the data gotten from the respondents the researcher presumes that since the Cost of ICT materials like Personal computers, projectors, network connectivity and so on are high in Kenya and this has restricted the rate at which instructors acknowledge and incorporate the ICT innovation in their work. In relationship to the second goal the specialist infers that an organization has not done what's necessary in assigning assets, changing mentality and encouraging ICT mix among the educators in Nakuru County. At long last the researcher infers that ICT framework like power, PCs and so on has not been given adequately, a component that has been ascribed to low motivation of teachers. Support from the school leaders and administrators was therefore crucial to create a conducive ICT-mediated environment. In such an environment, teachers were more likely to plan, develop, and carry out ICT-mediated lessons. Students were also less likely to engage in off task behavior while waiting for the computer to boot up or the program to load. In the case of Singapore schools, the Ministry of Education had equipped the schools well with ICT tools.

Most schools have enough funding from the Masterplan to upgrade their ICT tools every three years. Moreover, many schools also worked with industrial partners on projects that

gave teachers and students access to state-of-the-art ICT tools. For the problem of limited computers (two to three computers) in the classrooms, it was addressed by School during one of the monthly staff sharing sessions on “Innovative practices of computers in the classrooms”. A teacher shared the concept of station-based learning approach during that session where she presented her lesson plan and a short video-clip of the lesson. ICT was employed to facilitate the shift of learning from information receiving towards finding, collating, and synthesizing relevant information, and from learning to apply information to solving problems and communicating ideas effectively. The use of ICT also strengthened the teacher's repertoire of skills and opened up a wider array of learning resources for students to access. This provided a greater degree of independent learning, encouraging more able students to expand their horizons beyond the standard curriculum. The rich, interactive capability of ICT-based learning resources also motivated and engaged weaker students, and allowed them to learn at an appropriate pace. To support the learner autonomy of the students, teachers provided them with worksheets and checklists, and engaged them in dialogues to scaffold the learning processes.

Students were also expected to acquire specific ICT skills at each stage, from primary school upwards. By the time they left secondary school, most of them had acquired minimum competencies in desktop publishing, spreadsheet and database construction, and in sourcing of information from CD-ROMs and on-line resources. There were also initiatives to integrate ICT in both formative and summative assessment. A good example is the Enigma Project that has been undertaken by the ITAL Unit (Interactive Technologies in Assessment and Learning) in UCLES (University of Cambridge Local Examinations Syndicate). The project was a set of trials of online examinations conducted in Singapore in September 1997 and October 1998. The trials were undertaken as part of Singapore’s desire to move towards a more ICT-based assessment system. In the first trial, the papers of a Physics examination were transferred directly into a computer form to consider whether a traditional paper and pen (multiple choice and short questions) could be administered through a computer. For the second trial, there were two components – conceptual and analytical. The conceptual component was similar to the first trial but the analytical component offered questions that were similar in nature to a Science practical

examination where the candidates were expected to carry out a simulation. The two trials showed that ICT-based assessment was feasible but there were many technical, administrative, and Situating ICT in Singapore Schools Within the Education System, Policies and ICT Masterplans 17 educational issues to be addressed. These activities that interacted with the assessment process included the use of ICT for test administration, its use in setting questions, in manual and automated marking, the support for teachers using ICT-related materials in the classroom, and the role and use of provision of electronic content (Harding & Raikes, 2002).

Other initiatives included exploring assessment modes in the ICT based learning environment to measure students' skills in assessing and applying information, thinking, and communicating. While current modes of assessment remain relevant, ICT could facilitate assessment of student competencies across more than one subject area and in several skills. Such modes of assessment included project work, simulation software to assess students' ability to formulate and test hypotheses, and self-assessment software for students to monitor their own learning.

5.5 Recommendations

In view of the discoveries of the study that has originated from the respondents in the field and the case study, the researcher prescribes that:

1) For teachers to have an uplifting state of mind and genuinely grasp the use of ICT in their instructing, ICT competency among the staff is a necessary skill. This can be acquired through continuous training and motivation of teachers to make use of the skill.
2) The second objective is ICT infrastructure facilities. For effective integration of ICT in teaching and learning in public secondary schools the researcher advises that every public institution need to have sufficient facilities. Ease of accessibility to these facilities motivate teaching and learning.
3) The third objective considers technical support as a major factor that contribute successful integration of ICT in teaching and learning. Therefore, the institution

management need to employ qualified technical support who can support effective integration of ICT project in public secondary schools.

4) In connection to the fourth objective, the researcher suggests that the institutions ought to begin by grasping ICT in either administration or observing and assessment. Administration need to provide adequate support necessary for the achievement of this objective. It ought to present motivating forces for better ICT execution in public secondary schools.

5.6 Suggestions for Further Studies

The following further studies are suggested in order to enhance research activities in the area of integrating ICT in teaching and learning in schools.

The researcher suggests that further research should be conducted on the role of government in integrating ICT projects in schools both primary and secondary, day and boarding and how the national in co-ordination with county government can engage other stakeholders in integrating ICT projects in teaching and learning in Kenya public secondary schools. Further research need also to be conducted if ICT has been fully integrated in institutions of higher learning and therefore enhanced research.

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APPENDICES

APPENDIX I: RESEARCH QUESTIONNAIRE

LETTER OF TRANSMITTAL

Bivan oduol

P.O Box 85, Gilgil.

To the Respondents

Dear Respondent

Am a student undertaking Master of Arts Degree in Project Planning and Management at the University of Nairobi. To fulfil the completion of this course, I am carrying out a study on **Influence of Institutional Environment on Integration of Information Communication and Technology Projects in Teaching and Learning in Public Secondary Schools: A Case of Nakuru County, Kenya**

You have randomly been chosen to be part of the study. Since the matter affects the whole community, I am inviting you to participate in this research study by completing the attached questionnaire. If you choose to participate in this research, please answer all questions as honestly as possible. Participation is strictly voluntarily and you may decline to participate at any time. In order to ensure that all the information will remain confidential, you do not have to include your name. The data collected will be for academic purposes only. Thank you in advance.

Yours faithful

Bivan Francisco Oduol

SECTION A: General information (Tick in the appropriate bracket below)

1. Indicate your gender

   Male [ ]

   Female [ ]

2. Indicate your age (in years)

   Below 18 [ ]

   Between 19 – 30 [ ]

   Between 31 – 50 [ ]

   Above 50 [ ]

3. Indicate your level of education

   Certificate [ ]

   Diploma [ ]

   Bachelor's degree [ ]

   Master's degree and above [ ]

4. Indicate your work experience

   Below two years [ ]

   2 – 5 years [ ]

   6 – 10 years [ ]

   11 – 20 years [ ]

   Over 20 years [ ]

SECTION B:ICT teacher competency and skills development and ICT Projects Integration

5. How do you rate ICT skills for teaching and learning in your school? Use a scale where 5=strongly agree. 4=Agree; 3= Neutral;2= Disagree; 1= strongly disagree;

Statement	**5**	**4**	**3**	**2**	**1**
I have adequate ICT knowledge and competence to discharge my duties in my institution					
I use ICT in teaching and learning process					
I enhance ICT skills development among the learners					

6. On a scale of 0-10 (where 0 is poor and 10 is Excellent) please rate your level of ICT competence in teaching/learning process in your institution.

0	1	2	3	4	5	6	7	8	9	10

SECTION C: ICT Infrastructural facilities and ICT project integration in teaching and learning.

7. Does your school have computers?

   Yes [ ]

   No [ ]

8. If yes in 7 above, approximately how many?

   1-9 [ ]

   10-19 [ ]

   20 – 29 [ ]

30 – 39 [ ]

40 and above [ ]

9. How do you rate availability of ICT infrastructure and its use in teaching and learning in your school? Use a scale where 5=strongly agree. 4=Agree; 3= Neutral;2= Disagree; 1= strongly disagree;

Statement	**5**	**4**	**3**	**2**	**1**
Your school has sufficient number of computers					
The computers in your school are used for teaching and learning					
The computers are easily accessible by all students					
The main source of electricity in your school is national grid					
You rely on electricity in your school when using computers					

10. Where are computers used for teaching and learning located in your school?

Computer laboratory [ ]

Office [ ]

Converted classes [ ]

Staffroom [ ]

Other places [ ]

11. On a scale of 0-10 (where 0 is poor and 10 is excel1ent) rate the reliability of power supply in your school?

0	1	2	3	4	5	6	7	8	9	10

SECTION D:Techinical support and integration of ICT project in teaching and learning

12. ICT helps in teaching and learning process. However, shortage of technical support may be a hindrance to computer use. Please rate how costly you find the following aspects of computers using a scale where 5=strongly agree; 4=Agree; 3= Neutral;2= Disagree; 1= strongly disagree;

Statement	**5**	**4**	**3**	**2**	**1**
Our school has adequate ICT technical support for teaching and learning					
Our school has procured adequate ICT equipment for teaching and learning					
Our school has installed adequate internet connectivity for teaching and learning					
Our school keeps the ICT equipment properly maintained for efficient use in teaching and learning					
Our school ensures that internet connectivity is not interrupted for failure to pay the bills.					

13. (On a scale of 0-10 where 0 is least agree and 10 is strongly agree) please rate the extent to which your school has adequate financial resources to provide ICT technical support and equipment for teaching and learning.

0	1	2	3	4	5	6	7	8	9	10

SECTION E: Administrative support and ICT Integration in teaching and learning

14.Please rate the following statements regarding the support the school administration provides for use of ICT in teaching and learning in your school using a scale where 5=strongly agree; 4=Agree; 3= Neutral;2= Disagree; 1= strongly disagree;

Statement	**5**	**4**	**3**	**2**	**1**
Technical support is offered by the school administration whenever I need it.					
I receive adequate technical support during teaching and learning process					
School administration procures adequate financial support for use of ICT in teaching and learning					
The school administration motivates teachers and learners to embrace ICT in teaching and learning					
My school use ICT in running most of its programs					

15. On a scale of 0-10 where 0-least supportive and 10-most supportive rate the extent to which the School administration provides adequate support to the use of ICT in the teaching and learning process in your school.

0	1	2	3	4	5	6	7	8	9	10

SECTION F. Integration of ICT project and teaching and learning in public secondary schools.

16. Please rate the following statements regarding the integration of ICT in teaching and learning in your school using a scale where; 5=strongly agree;4=Agree; 3= Neutral; 2= Disagree;1= strongly disagree

Statement	**5**	**4**	**3**	**2**	**1**
There is general utilization of ICT facilities in teaching and learning process in my school					
There are adequate ICT facilities in my school					
Teachers have a positive attitude towards integration of ICT in teaching and learning process					
Learners have a positive attitude towards integration of ICT in teaching and learning process					

17. On a scale of 0-10 where 0-you strongly disagree and 10-you strongly agree indicate the extent to which your school has integrated ICT in the teaching and learning process.

0	1	2	3	4	5	6	7	8	9	10

APPENDIX II: INTERVIEW GUIDE/SCHEDULE

INTRODUCTION **Request for personal interview**

My name is Bivan Francisco Oduol and I am a student undertaking Master of Arts Degree in Project Planning and Management at the University of Nairobi. To fulfil the completion of this course, I am carrying out a study on **Influence of Institutional Environment on Integration of Information, Communication and Technology in Teaching and Learning in Public Secondary Schools; A case of Nakuru County, Kenya.**

I hereby submit my request for personal interview with you due to the role you play in the administration of public secondary schools in Nakuru County. The data collected will be for academic purposes only. Thank you in advance.

Yours faithful

QUESTIONS **SECTION 1: ICT teacher competency and skills development and ICT Projects Integration**

a) Does your school integrate ICT in teaching and learning?
b) Do you have competent staff that assist other staff members in integrating ICT in teaching and learning process?
c) How do learners' performance relate to integration of ICT in teaching and learning process?

SECTION 2: ICT Infrastructural facilities and ICT project integration in teaching and learning.

a) Does your school has enough ICT facilities for all learners?

b) How are the ICT facilities maintained?

SECTION 3: ICT technical support and ICT project integration in teaching and learning.

a) Does your school has sufficient technical support staff?

b) Are the ICT technical support staff promote ICT integration in teaching and learning in your school?

c)Are the ICT technical support staff motivated to support ICT integration in teaching and learning in your school?

SECTION 4: Administrative support and ICT project Integration in teaching and learning

a) Do you support ICT integration in teaching and learning in your school?

b) Do you provide sufficient funding for the ICT integration in teaching and learning in your school

SECTION 5. Integration of ICT project and teaching and learning in public secondary schools.

a) Does ICT integration in teaching and learning improve the performance of learners in your school?

b) Do teachers and learners in your school receptive to ICT integration in teaching and learning.

CONCLUSION **Thank you for your time.**

APPENDIX III: RESEARCH PERMIT

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

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Date of Issue: **22/November/2019**

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This is to Certify that Mr.. BIVAN ODUOL of University of Nairobi, has been licensed to conduct research in Nakuru on the topic: INFLUENCE OF INSTITUTIONAL ENVIRONMENT ON INTEGRATION OF INFORMATION COMMUNICATION AND TECHNOLOGY PROJECTS IN TEACHING AND LEARNING IN PUBLIC SECONDARY SCHOOLS" A CASE OF NAKURU COUNTY, KENYA. for the period ending : 22/November/2020.

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APPENDIX V: INTRODUCTION LETTER

UNIVERSITY OF NAIROBI
OPEN, DISTANCE AND e-LEARNING CAMPUS
SCHOOL OF OPEN AND DISTANCE LEARNING
DEPARTMENT OF OPEN LEARNING
NAIROBI LEARNING CAMPUS

Your Ref:

Our Ref:

Telephone: 318262 Ext. 120

Main Campus
Gandhi Wing, Ground Floor
P.O. Box 30197
N A I R O B I

REF: UON/ODeL/NLC/30/248

12th November, 2019

TO WHOM IT MAY CONCERN

RE: BIVAN FRANCISCO ODUOL - REG NO: L50/84659/2016

This is to confirm that the above named is a student at the University of Nairobi, Open Distance and e-Learning Campus, School of Open and Distance Learning , Department of Open Learning pursuing Masters of Art in Project Planning and Management.

He is proceeding for research entitled ***"influence of instituitional environment on integration of information communication and technology projects in teaching and learning in public secondary schools" A case of nakuru county, kenya".***

Any assistance given to him will be highly appreciated.

UNIVERSITY OF NAIROBI OPEN ... P.O. BOX ... 12 NOV 2019 NAIROBI NAIROBI LEARNING CENTRE

for **CAREN AWILLY**
CENTRE ORGANIZER
NAIROBI LEARNING CENTRE

APPENDIX V: PLAGIARISM

INFLUENCE OF INSTITUTIONAL ENVIRONMENT ON INTEGRATION OF INFORMATION COMMUNICATION AND TECHNOLOGY PROJECTS IN TEACHING AND LEARNING IN PUBLIC SECONDARY SCHOOLS: A CASE OF NAKURU COUNTY, KENYA

ORIGINALITY REPORT

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