CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Education is one of the main corner-stones for economic development and improvement of human welfare. As global economic competition grows stiffer, education becomes an important source of competitive advantage as it is linked to economic growth and ways for countries to attract investment and hence jobs (Srivatsava 2002). Education further appears to be one of the major determinants of sustainable life-long earnings. Countries, therefore, frequently raise educational attainment as a way of tackling poverty and deprivation (UNESCO 2005). A well -educated and skilled workforce is one of the core pillars of the knowledge-based economies (UNESCO 2005). This realization makes the reforms in education and development to remain a central pre-occupation for many countries and for international development. In every country at any given level of economic development, there is a great demand for education reform in order to be able to face the prevailing political, social and cultural changes as well as scientific and technological transformations (UNESCO Educational policy and Reforms 2008)

Since 1990, many governments have been promoting the use of Information Communication Technologies (ICT) in education, particularly to expand access to and improve the quality of education. At the same time, globalization and shift to a knowledge-based economy requires that education institutions develop

individual ability to apply knowledge in dynamic contexts. ICTs have been identified as a means to attain these objectives (School Net Africa 2003).

Although ICT is now at the center of education reform efforts, not all countries are currently able to benefit from this development and advances that technology can offer. Significant barriers often referred to as digital divide limit the ability of some countries to take advantage of technological development (Kozma and Anderson 2002). The developing countries are faced with challenges related to access, pedagogy or assessment when using ICTs to improve and reinforce education (Kozma et al 2002). It is important to note that the concept, methods and application of the term ICTs are constantly evolving rapidly; starting from the popularity of the issue of computers in education in the 1980s, when relatively cheap micro-computers became available for the consumer market, later, near the end of 1980s the term was replaced by IT (Information Technology); signifying a shift of focus from computing technology to the capacity to store, analyze and retrieve information. This was followed by the introduction of the term ICTs (Information Communication Technologies) around 1992 when email and World Wide Web (Internet) became available to the general public (Pelgrum and Law 2003).

Though initially educators saw the use of ICTs in the classroom mainly as a way of teaching computer literacy, it has a broader role: that of delivering many kinds of learning at a lower cost and with high quality than the traditional methods of

teaching allow. In addition schools and universities increasingly use ICTs as do other large organizations, to reduce cost, improve efficiency and administration (Blurton 2002).

There has however been a wide disparity between the levels of investments in developed countries vis-a-vis the developing countries, Kenya included. Scrivatsava (2002), nonetheless states that this disparity is not necessarily a bad thing as developing countries can learn from developed countries on ICT integration.

The government of Kenya recognizes the benefits of ICT Integration in Education at all levels of education in the country. The Kenya Economic Recovery Strategy for Wealth and Employment (2003-2007), stresses that ICT is crucial for realization of the required improvement in the Curriculum. The vision of Ministry of Education Science and Technology (MoEST) is to facilitate ICT as a universal tool for education and training. In order to achieve this vision, in every educational institution, teachers, learners and the respective community should be equipped with appropriate ICT infrastructure, competencies and policies for usage and progress (Kenya National ICT Strategy GoK 2006)

A critical aspect to the successful implementation of ICT integration-related objectives is the planning aspect. Pelgrum and law (2003), indicate that policy makers and educational planners play a central role and indicate that there are policy and planning implications in each step of implementation.

Research done by Brassford, Brown and Cocking (1994),showed that ICT can enhance critical thinking, information handling skills, the level of conceptualization and problem solving capacity among learners. However, according to GoK (2006) there is considerable technology lag in the Kenyan education institutions. Most of the institutions still use nearly obsolete systems and consequently are unable to exploit educational potentials of the emerging technologies. The document also notes that most schools use less than 40% of the available infrastructure and there is; therefore, a need to ensure optimum use of ICT resources by students, teachers and administrators in order to exploit educational potential of the technology. It is, therefore, against the background of the foregoing, that the researcher sought to investigate the extent of ICT integration in enhancing teaching and learning activities in public secondary schools in Kenya.

1.2 Statement of the problem

The successful integration of ICT into the classroom warrants careful planning and depends largely on how well policy makers understand and appreciate the dynamics of such integration (Jhurree 2005). Ministry of Education has placed considerable emphasis on the importance of ICT integration in education as evidenced by the promulgation of National ICT strategy in 2006 following the approval of sessional paper number one of 2005. The vision of Ministry of Education is to facilitate ICT as a universal tool for education and training and in

particular stimulate ICT integration in education in various regions in the country. However, while other countries have reported up to 41% of ICT integration in teaching and learning the proportion remains substantially low in Africa Kenya included.   Kasharda and Waema (2007) and Irura (2008) referring to the implementation of ICT integration policy asserts that , there has not been well spelt out procedure to address uniformity in the pace of ICT integration and it's adoption approach due to the various needs and disparities in secondary school in Kenya. A recent report by Wikipedia Kenya in 2012 in Nyeri South District indicated that some secondary schools had very few computers and that for most of the schools that had reasonable number of computers, the main use was in teaching Computer Studies. Nyeri South is a relatively new district that was gazette in 2009. A study was therefore essential to determine the extent of ICT integration in education in Nyeri South district with particular focus on exactly how technology is being used in the teaching and learning process.

1.3 Purpose of the study

The purpose of this study was to assess the extent of ICT integration in teaching and learning process in secondary schools in Kenya.

1.4 Objectives of the study

i.   To determine the extent of accessibility of computers to teachers and students in secondary schools in Nyeri South District.

ii. To determine the level of teachers' and students' expertise in ICT integration in teaching and learning process in Nyeri South District.

iii. To determine the ways in which ICT is integrated in teaching and learning process by teachers and students.

iv. To determine the extent of implementation of the Ministry of Education policy on ICT integration in secondary schools in Nyeri South District.

1.5 Research Questions

i. What is the extent of accessibility of computers and related peripheral to teachers and students to support e-learning?

ii. What is the level of teachers and student expertise on ICT integration in the teaching and learning process?

iii. In which ways do teachers and students integrate ICTs in the teaching and learning process?

iv. To what extent has the Ministry of Education ICT integration policy objectives been implemented by schools in Nyeri South District?

1.6 Significance of the study

The Study findings may be used to facilitate the integration of ICT in the teaching and learning process by both teachers and students. This information may also be useful to administrators, policy makers and other stakeholders in education in determining the preparedness of secondary schools in Nyeri South District in terms of availability of appropriate ICT infrastructure for e-learning. Also, the

findings may be used as a baseline data for laying strategies on increasing the level of ICT integration in the district. The study may further indicate the capacity building gaps which may be useful in formulating framework to empower ICT users in integrating ICT in the secondary school curriculum.

1.7 Limitations of the study

Some questions of innovation and teaching practices relied on the level of ICT knowledge of the respondents and some respondents had limited knowledge owing to their level of ICT awareness. This was solved by use of contingency question items such that one only responded to items that applied to him or her. An observation checklist was also be used to confirm, where it was possible, the veracity of responses in the questionnaire items. Again, owing to the nature of technology explosion and rapid changes taking place in education institutions, the ICT integration situation in secondary schools in the district may change rapidly within a short span of time, rendering the study to be obsolete. However, the findings may still be useful as a baseline for future study to assess the extent of such change.

1.8   Delimitation of the study

Delimitation of the study is the boundary limitation Best and Kahn (2005). This study focused exclusively on utilization of ICTs in teaching and learning activities but did not focus on ICTs utilization on other aspects in education like administrative processes. Although Nyeri South District is located in an

agriculturally productive area, it is typically a rural area; hence, the findings of this research may be generalized to other regions with caution since some conditions in the district may be unique and different from other areas especially those in urban set-ups.

1.9   Assumptions of the Study

i).   Secondary school teachers and students are computer literate and are conversant with various computer usages in teaching and learning in Secondary Schools.

ii).   The study assumes that secondary schools in Nyeri South District utilize ICT in the teaching and learning process.

1.10   Definition of significant terms

Access opportunity or right to make use of something.ICT access is usually determined by the number of ICT equipment available visavis the number of learners.

Broadband internet of speed greater than or equal to 256 kilobits per second (Kbps) in one or both direction

Computer training the process of enlightening an individual on how to use the computers

Computer Virus a computer programme designed to affect the normal functioning of computer. It can damage stored information or fill the computer storage devices. These include Trojan, autorun, bomb.

Digital Content Refers to information that is published and distributed in electronic form such as softwares.

Digital Divide It is the gap between those people with access to information and Communication Technologies (ICTs) and those who do not have.

Hardware Refers to physical or tangible components of a computer including computer motherboard and its accessories.

Information Communication Technology any product that will store, retrieve, manipulate, transmit and analyze information electronically in digital form including the internet, broadcasting technologies and mobile phones. For purpose of this research the term ICT will be operationalised to imply only computers and related peripheral devices for instance projectors, printers and scanners.

Information Communication Technology Integration use of any product that will store, retrieve, manipulate, transmit and analyze information electronically to introduce, reinforce, supplement and extend learning or acquisition of skills.

Multimedia It's a combination of various digital means of communication in computers. (images, sound, video and text).

Pedagogy A term generally used to refer to strategies of instruction or style of instruction.

Peripheral any auxiliary or external device connected to a host computer and it expands the computer capability for instance printers, scanners, LCD projectors. In this study the term ICT tool has been used generally to include the computer themselves, their peripherals or any other related facility.

Software program that instructs a computer to process data. Software's can be categorized into open source and proprietary.

World Wide Web It is information superhighway; it comprises networks that are joined globally.

1.11 Organization of the study

The study is organized into five chapters: Chapter one highlights the background and statement of the problem, purpose, objectives, significance, limitations, delimitations, basic assumptions and the definition of significant terms of the study. Chapter two focuses on literature review which is organized into the following themes:- the concept of the ICT integration in education, internet connectivity and ICT equipments in the school, teachers professional development in ICT, digital curriculum and content of the schools and ICT integration policy implementation in education. Chapter three covers research methodology that was employed. These included research design, the target

population, the study sample size and sampling procedure, research instruments, validity for the instruments, reliability of the instruments, data collection and data analysis technique. Chapter four consists of data presentation analysis and discussions of the findings while Chapter five comprises of summary, conclusions, recommendations and suggestions for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section reviews literature related to the study on ICT integration in the teaching and learning process in secondary school education. The review is divided into the following: the concept of ICT integration in education; internet connectivity and ICT equipment in schools; teacher professional development in ICT; digital curriculum and content for schools and policy framework for ICT integration in education. The section ends with the discussion on theoretical framework and conceptual framework upon which the study was based.

2.2 Concept of ICT Integration in Education

Information Communication Technology (ICT) is basically a tool; it can be a hardware, a software or both. Jackson (2002) advises that teachers should not replace what they teach, but see ICT as a tool just like a calculator, a pen or chalkboard that help them to teach and students to learn. Hodgkison (2006) and Duplessis (2010) note three types of ICT integration present in schools; the first being, learning about computers without any link to classroom practice. The second is full integration with traditional goals whereby computer is just used as a transmitter of knowledge resulting to just learning "from" the computer and the third is full integration with constructivist learning space and context, implying that computers are taken as mediational or transformational tools resulting to

learning "with" or "through" using computers. An analysis of South African Institute of Distance Education (SAIDE) (2003) suggests that the generative mode integration is not the norm in most Sub-Saharan African schools.

Muchiri (2008) (citing Poole 1998) indicate that educators in United States of America (USA) are able to put computers to good use in preparing teaching and learning materials. They are able to produce syllabi, schedules and classroom materials professionally and more efficiently using computers. By use of productivity tools such as word processors, database management software, communication systems and graphic tools educators are able to duplicate excellence in managing the process of teaching and learning. Generally, educators have found ICT to be a crucial tool for supporting drills and practice in previously taught skills and concepts in class. Also opportunities for networking and collaborative learning indicate that several principles and theories which promote learner centered constructivist learning can be more easily integrated in teaching. Furthermore, the internet connectivity makes it possible for educational resources to be accessed and exchanged with relative ease.

Kenyan experience on ICT integration has been low despite the government and Ministry of Education's efforts to support ICT integration initiatives. Ndiku, (2003) conducted a research on the experience of managers and computer teachers in eight schools in Uasin Gishu with a focus on problem encountered in implementing ICT projects. The research identified the following as the most

significant factors: insufficient number of computers and peripheral devices, teacher lack of adequacy in ICT knowledge; inadequate software for instruction and inadequate technical assistance .The research by Ndiku focused on problems encountered in ICT implementation but did not capture the extent of ICT usage in teaching and learning activities.

2.3   Internet Connectivity and ICT Equipments in schools.

Electronic learning in education is the wholesome integration of modern telecommunication equipment and ICT resources in the teaching and learning process and it can be online (synchronous) or offline (asynchronous) (Garrison , Anderson 2003 and Allen 2003)

An important aspect of e- learning therefore is the utilization of the internet in education .Tracy (1995) defines the internet as the international network of communication in which computers in wide area network (WAN) communicate with each other. Most of the available options for effective use of ICT in support of education are much more powerful when the activity is linked in a communication network that permits access to email ,web browsing ,file transfers through downloading and uploading as well as other communications .Brassford, Brown and cocking (1999) indicate that High School students in the United States of America(USA) use the internet to enhance their educational experience in a variety of ways .These include opportunity for collaborative learning environment where students actively construct their knowledge with online peers

and teachers through message boards, chat rooms and emails creating an arena where different discourse and leaning styles can comfortably co-exist. Students also benefit from lectures and presentations in form of video conferencing and web cast from dispersed teachers and experts .Such learning opportunities can only be possible if there is efficient internet connectivity in schools. Government of Kenya (2006) quoting Educational Management Information Systems (EMIS) survey (2003/2004) indicates that 70% of secondary schools and much larger population of primary schools require functional internet connectivity. The study also establishes that about 90% of secondary schools need to establish Local Area Network to improve sharing of learning resources. Aydin and Tasci (2005) indicate that secondary schools ought to ensure internet connectivity is in place as it forms an important indicator of e-readiness for ICT integration.

 The other major ICT infrastructure include multimedia computers and related peripherals .The Kenya National ICT strategy for education and training, (2006) indicate that with respect to great concern about digital divide, access to ICT facilities is one major challenge in Africa and Kenya is not an exception. While ratios of less than 15 students to 1 computer are the norm in most developed countries, the ratio in Africa stands at 150 students to 1 computer. This ratio is even wider in disadvantaged regions and areas. Cuban (2001) indicate that the number of student per computer ratio is a common and important metric to judge public school response to massive technological change of the last quarter

century. The lower the student to computer ratio, the better as a computer is an individual device most useful for one person at a time.

2.4   Teacher Professional Development in ICT

The growth of the ICT sector has challenged teacher training institutions to prepare a new generation of teachers to effectively use the new teaching and learning tools in their profession UNESCO (2002). Pascopella (2001) notes that globally most educators are not competent to integrate application software meaningfully into the learning content of a learning area and this may be the reason that schools do not appear to be exploiting the opportunities offered by ICT.

A study by Russel (2000) aimed at establishing baseline information regarding Australian teachers' experiences and skills in ICT. The investigation revealed that the teachers saw themselves as competent with basic computer skills but were less confident with activity requiring advanced use of computers. Muriithi, (2005) in her study on a framework of integrating ICTs in secondary schools argued that in Kenya, ICT usage is limited to computer literacy training. She contends that the present ICT curriculum for teacher-trainees merely deals with training about computer and not how computers can be used to improve the teaching and learning in schools. Both Muriithis' (2005) and Russels' (2000) studies indicate that computer studies knowledge possessed by teachers has not yet helped in transforming the teaching process through ICT integration and thus a review on

teacher training and capacity building is still required. The current study aims at establishing the extent of expertise in ICT usage by secondary school teachers with particular emphasis on ICT integration skills.

2.5 Digital Curriculum and Content for Schools.

Computers themselves do not come pre-packaged with relevant teaching content and although the internet provides a vast number of resources, most are in English and may need to be modified in order to be relevant for the Kenyan student and curriculum needs (Kenya national ICT strategy (2006). In this light, investment in custom-made digital material with high relevant content for Kenyan classroom in rural and urban contexts is important if MoEST wants to tap into the real potential of ICT for learning. According to Wims and Lawler (2007), a research done in Rift Valley assessing impacts of investments in educational institutions, found that most of institutions do not have specialized and simulated academic programme software installed on their PC (Personal Computers) for use by students. Despite the many designs of school software by Kenya Institute of Education (KIE) and MoEST, there has not been great improvement in terms of software available and used in schools to facilitate easier pedagogical activities in classroom.

 Hash, (2008) asserts that Timetabling and Results analysis software have special niche in schools such that tasks that used to take even a week or more manually now take only an a hour when working with Access Database timetabling or

results analysis software. This is a clear evidence that the use of ICTs in school can go along way in improving education delivery (Specialist School and Academies Trust, 2006).

2.6 Policy Framework for ICT integration In Education

Kenya promulgated a National ICT policy in January 2006 that aims to improve the livelihood of Kenyans by ensuring the availability of accessible efficient and affordable ICT services The mission statement of the policy is "To integrate ICT in education and training for improved access, learning and administration" .The policy has several sections but it is the section on Information Technology that sets out the objectives and strategies pertaining to ICT in education. In June 2006, the ministry of Education introduced the National ICT Strategy for Education and Training, a sector wide stakeholder driven five year strategy document .The document was developed in line with National ICT policy ,Kenya Education Sector Support Programmme (KESSP), E-Government Strategy and the Millenium Development Goals (MDGs). Some policy objectives outlined in the strategy include : To establish functional networked computer laboratories in education institutions; to equip educational institutions with digital equipment and internet connectivity; to stimulate integration of ICT in education in various regions, to develop education software to meet local education requirement in teaching and learning; to build basic capacity in ICT skills for all players in education sector; to stipulate minimum hardware specifications adequate for educational use and to promote public and private sector investment in ICT in the

education subsector Despite the policy strategy being comprehensive and a vehicle through which policy objectives in Kenyan Education can be achieved. Kashorda , Weema (2007), and Irura (2008) asserts that one of the weaknesses of the Kenya National ICT Policy and Strategy is the lack of explicit implementation strategy and adoption approach addressing the various needs and disparities in secondary schools in Kenya. The current study seeks to determine the extent of ICT integration in the teaching and learning process with particular focus on the level of implementation of some ICT policy objectives in secondary schools in Nyeri South District.

2.7 Summary of Literature Review

Reviewed literature indicates that a lot of work has been done to initiate comprehensive ICT use in schools, beginning with the developed countries like USA, Australia and Britain in the last two decades and more recently the developing countries as well. However, there is still a big gap between advocacy and real practice especially with regard to extent of ICT integration and actual classroom pedagogical practice. In Kenya for instance there has not been uniformity in ICT implementation as this has been carried out largely by individual schools with occasional support from the private sector. KESSP (2005 – 2010) for instance estimate that only 3 % of Kenyan schools have ICT infrastructure albeit limited, which is not even put to optimal use.

2.8 Theoretical Framework

The research is based on the modern human capital theory developed in the 1960s by Theodore W. Schultz together with other economists including Gary S. Becker, Jacob Mincer and Samuel Bowles. Human capital theory is based on the belief that individuals and societies at large derive economic gains by investing in people. It is argued that such investments aimed at exploiting the utmost potential of people should target areas like education, Health and nutritional improvement Schultz (1971). The theory rests on the assumptions that formal education is highly instrumental and even necessary to improve the productive capacity of population that in turn fuels economic growth.

For countries to meet their labour or industrial requirements as well as gain the necessary competitive edge in the global information and knowledge based economy, they need a work force that is skilled in use of technology. Information Communication Technology integration in education forms a critical entry point Furthermore, equipping institutions and keeping them up to date with ICT equipment is very expensive operation not only due to the necessary hardware and software purchases but also because of the recurrent cost associated with maintenance and support Pelgrum and Law (2003). According to Fagerlind and Saha (1997) human capital theory provides a basic justification for such large public expenditure towards providing and improving education.

2.9 Conceptual Framework

According to Ogula, (1998) conceptual frame work is a description of the main independent and dependent variables of the study and relationship among them. The study was conceptualized on the variables used in the objectives.

Figure 2.1 Relationship between variable in the teaching and learning process and ICT integration
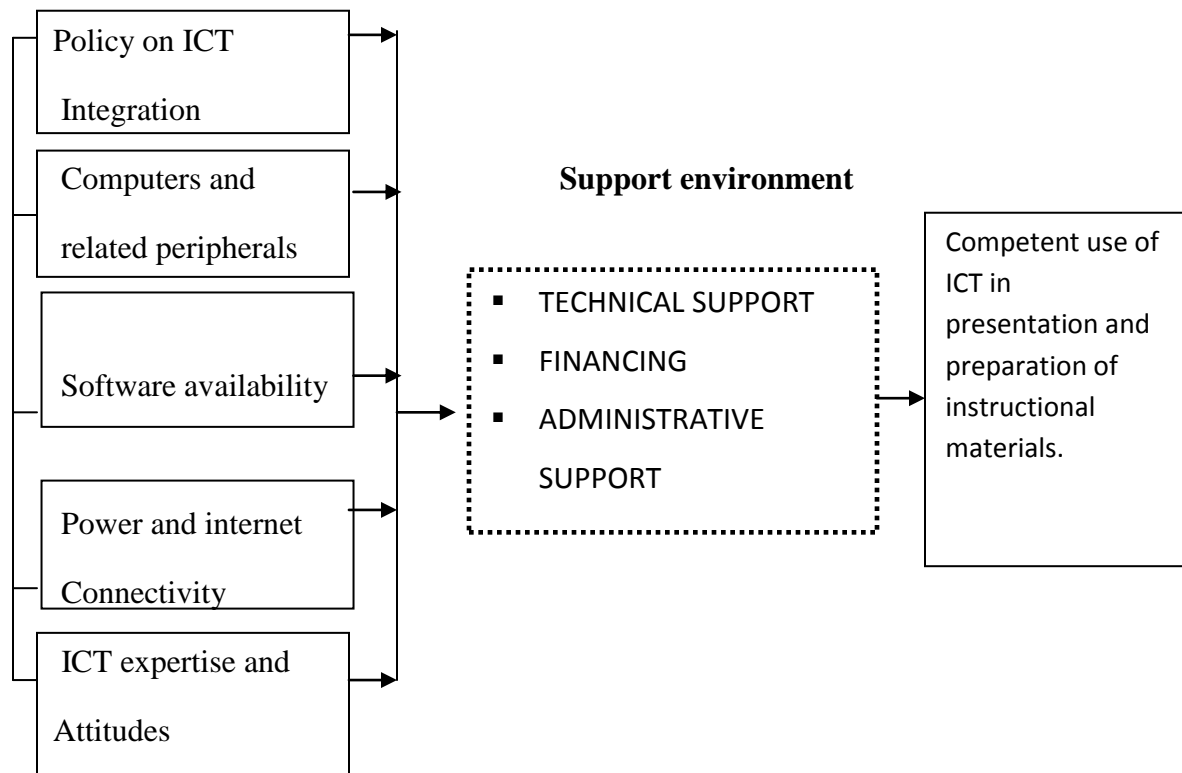
In figure 2.1 realization of the ICT integration vision in Education dependents on availability of various variables in schools including among others:- Computers, education software, ICT skills and internet connectivity. These variables are taken to affect ICT usage in education delivery. Plans policies and

implementation strategies guide the whole processes. Support environment is required in terms of finances, administration and technical assistance to teachers. Some indicators of ICT integration include; competent use of internet, ICT use in presentation and preparation of instructional material, assessment and result analysis among others.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The section covers research methodology used in this study. It is organized under the following sub-headings: research design, target population, sample size and sampling procedure, research instrument, instrument validity, instrument reliability, data collection procedure and data analysis

3.2 Research Design

A research design is the structure of research. It holds all the elements in a research project together. It shows how all the major parts of the research project work together to try to address the central research question Kombo and Tromp, (2006). The study adopted a descriptive survey design. Kombo, (2006) defines descriptive survey as a method of collecting information by administering a questionnaire to a sample of individuals in order to secure evidence concerning all existing situations, and comparing the present conditions for the next cause of action. Descriptive survey was suitable since this study sought to determine the extent of ICT access and usage in the various teaching and learning activities in secondary school.

3.3   Target population

Nyeri South district has 34 secondary schools and all are public. The schools are categorized as 8 counties and 26 district schools .The target population is 34 principals, 4760 students and 680 teachers from all the 34 schools in the district. (School statistics return DEO's office Nyeri South District July 2012)

3.4 Sample Size and Sampling Procedure

A sample size is a small group obtained from the accessible population while sampling is a research technique used for selecting a given number of subjects from a target population as a representative of that population Borg and Gall (1989). Mugenda and Mugenda (2003) argue that if the population is less than 10,000 and that there is no estimate available of the proportion in the population assumed to have the characteristic of interest then 50 % can be used with a corresponding statistics of 1.96 and precision value of plus or minus 5%. A sample size to be adjusted of 384 can be consequently used. This is arrived at using the following relation

$n_o = z^2 \, pq/e^2 \Rightarrow (1.96)^2 \, (0.5) \, (0.5)/(0.05)^2 = 384$

Where :

❖ n_o = sample size to be adjusted

❖   z= is a value at the area under normal curve of confidence level of 95%

❖ p= is a sample population of successes within which is 0.5 and q is (1-p) that is (1-0.5) = 0.5

❖ e= is precision value or the sample error. Here, it's taken to lie within plus or minus 5%.

The population of the teachers and students for this study is each less than 10,000 hence the study adopted the formula for determining the sample size as follows:

$n_f = n_o/(1+(n_o/N))$

Where

n_f = is the desired sample (when population is less than 10,000)

n_o= sample size to be adjusted size i.e. 384 (Treated as a constant)

N= estimates of population size

Sample size of student from target population of 4760

Sample size $(n_f) = 384/(1 + 384/4760) = 355$

Sample size of teachers from target population of 680

Sample size $(n_f) = 384/(1+ 384/680) = 245$

Data was collected from all the 34 schools and all the 34 Principals were purposively included as they were key informants to the study. The rest of the sample was selected using simple random sampling technique where each member was given an equal chance to participate.

3.5 Research Instruments

The study sought for empirical and qualitative data collection approaches. Data was collected from the secondary schools using three sets of questionnaires. An observation checklist was used to confirm some facts on the questionnaires. The questionnaires were divided into two sections covering demographic information, access and usage of ICT as well as attitudes and challenges on ICT use. Both open and close ended questions were used. Close ended questions restricted the respondents to yes or no responses. Matrix questions, contingency questions and behavioral questions were also included. The open ended questions allowed the respondents to give an in depth response to the subject of study.

3.5.1 Validity of the Instruments

The validity of the research instruments represents the degree to which a test measures what it is supposed to measure, (Kombo and Tromp 2006). Mutai (2000) further indicate that for a research instrument to be considered valid, the content selected and included in the questionnaire must be relevant to the variable being investigated. To enhance the validity of the research instruments, the researcher had the research instruments appraised by the two supervisors who were the authorities in the area .The content of the questionnaire were then corrected appropriately according to the supervisors guidance. All the questionnaires were structured in a simple language to facilitate easy understanding

3.5.2 Instrument Reliability

According to Mugenda and Mugenda (1999), the reliability of instruments is the measure of the degree to which research instruments yield consistent results or data after repeated trial. In this study test-retest method was used to test reliability of the instrument. The same questionnaires were administrated to the same subject in the same conditions twice within a week . The two sets of scores from each group were then correlated using pearson's products moments correlation coefficient (r).

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

Where x =score of the first test for each respondent $y =$ score of the second test for each respondent:

r = correlation coefficient of the scores in the two sets

n = number of respondents

According to Mugenda and Mugenda, (2003) if (r) is closer to one the research tools are regarded as accurate .The coefficient of correlation were found to be 0.93, 0.96 and 0.82 for the principal questionnaire teachers and students questionnaire respectively, hence the reliability of the three questionnaires was considered to be high enough to give consistent result.

3.6   Data Collection Procedure

Permission to carry out research was obtained from: The ministry of Higher education through the National Council of Science and technology, Nyeri south District Education Office (DEO) and from Nyeri South District Commissioner's Office (DC) Three sets of questionnaires were administered as follows: one set to the school heads, another set to the subject teachers and a third set to the students. The researcher also filled an observation schedule in some of the school that were visited.

3.7   Data Analysis Techniques

Data analysis techniques are statistical methods which were used to analyze data so that it could be interpreted. The data collected from the respondent was both quantitative and qualitative in nature. Quantitative data was coded tallied and analyzed using descriptive statistics such as mean, frequency and percentages. The result of data analysis was reported in summary form using frequency tables, bar graphs and pie charts. Qualitative data analysis for the open ended questions was done using content analysis where ideas were grouped into themes. The frequencies of different descriptions were generated by categorizing and coding pieces of data into themes. Frequency distribution and percentages were obtained using Statistical Package for Social Sciences (SPSS)

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSIONS

4.1 Introduction

This chapter presents the results of data collected from the field. The findings have been presented with respect to each of the specific research questions that guided the study.

4.2 Questionnaire return rate

A total of 634 questionnaires were administered to 355 students in form 3 and form 4, 245 teachers and 34 principals. Table 4.1 summarizes the questionnaire return rate.

Table 4.1 Questionnaire return rate

Respondents	Sample size administered	Actual response	Percent
Student	355	317	89.3
Teacher	245	210	85.7
Principal	34	31	91.1
Total	634	558	88.0

Table 4.1 indicates that the average response rate was 88%. According to Edward, Roberts, Clarke, Diguiseppi, Pratep, Wentz and Kwan (2000) a questionnaire return rate of 80% and above is absolutely satisfactory while 60-80% is quite satisfactory .A rate below 60% is barely acceptable. This response rate obtained here was considered sufficient to provide reliable response.

4.3 Demographic data for respondents

The data presented in this part was obtained from responses by the teachers, principals and students in respective questionnaires

4.3.1 Distribution of principals by gender

Figure 4.1 Distributions of principals by gender
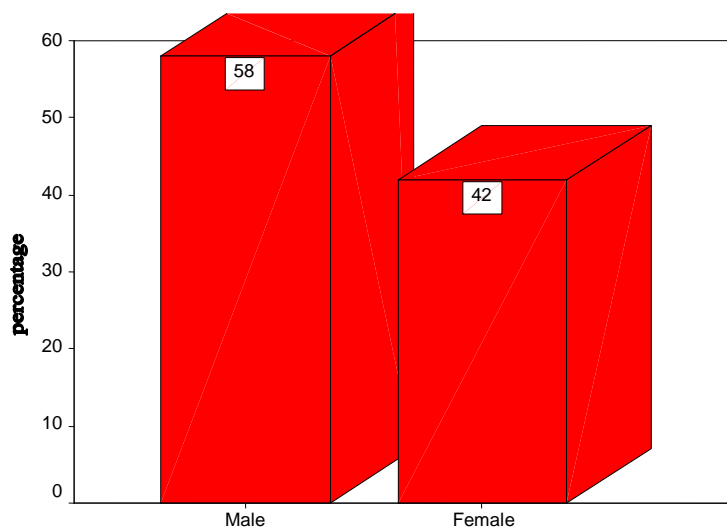
Figure 4.1 shows that out of 31 principals who responded most 18 (58.1%) were male. This data indicates that principalship in secondary schools in Nyeri South District is male dominated.

4.3.2 Distribution of principals by years of experience as principal

The study further sought to establish the distribution of the principals by their years of experience as school heads. Table 4.2 summarizes the data obtained.

Table 4.2   Distribution of principals by years of experience

Experience in years	Frequency	Percent	Cumulative percent
1 -5	4	12.9	12.9
6 – 10	9	29.0	41.9
11 – 15	5	16.1	58.1
16 – 20	11	35.5	93.5
Over 20	2	6.5	100
Total	31	100.0	100.0

Table 4.2 indicate that a majority of the principals are very experienced as 58.1% had experience of 10 years and beyond. Experience as principal is significant as it influence how individuals respond to innovation and change presented by use of ICT in teaching and learning

4.3.3 Distribution of teachers by gender

The majority of respondents were male 114 (54.3%) while the minority were female 46 (45.7%). The data corroborated with the statistics provided by principals by their data which indicated that there were a total of 618 teachers in all the 31 schools out of which 324 (52.4%) were male and 294 (47.6%) were female.

4.3.4 Distribution of teachers by age

Table 4.3 Distribution of teachers by age

	Frequency	Percent	Cumulative percent
Below 25yrs	56	26.7	26.7
25 -30yrs	50	23.8	50.5
31-40yrs	62	29.5	80.0
41-50yrs	42	20.0	100.0
Total	210	100.0	

Pertaining the age of the teachers as shown on table 4.3 the findings indicate that cumulatively most teachers are 30yrs and below, 106 (50.5%) and only a small proportion of teachers 42 (20%) was above 40yrs. According to Muchiri (2008) younger teachers are more open to use of ICT than most but not all older teachers.

4.3.5 Distribution of teachers by teaching subject

Teachers were asked to indicate their main teaching subjects. Analysis of their responses are summarized by table 4.4

Table 4.4 Distribution of teachers by their teaching subject

	Frequency	Percent	Cumulative percent
Languages	15	7.1	7.1
Mathematics	40	19.0	26.2
Applied	20	9.5	35.7
Sciences	123	58.6	94.3
Humanities	12	5.7	100.0
Total	210	100	100

Table 4.4 shows that the majority of teachers 123 (58.6%) were science oriented while minority 12.(5.7%) were humanities oriented. This indicated that there was unequal distribution of teachers teaching various disciplines. For the purpose of this study, it is reassuring to note that all the departments in secondary school curriculum were represented.

4.3.6   Distribution of students by gender

Figure 4.2 Distribution of students by gender.
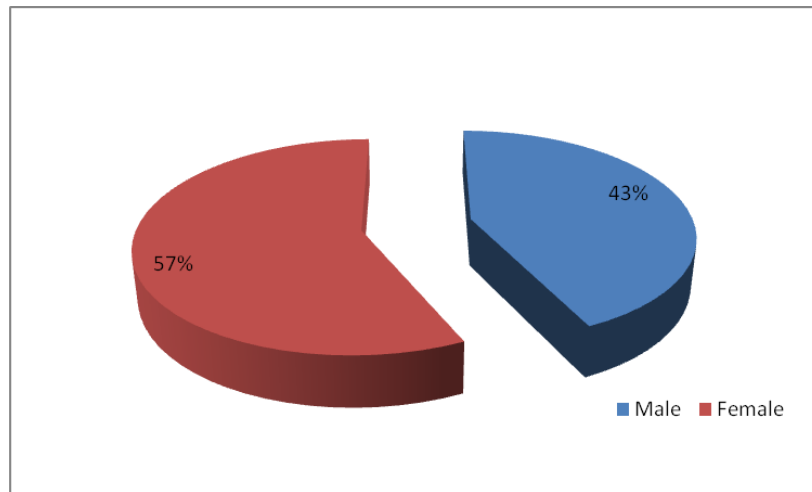
Figure 4.2 shows that the majority of students are female, 181 (57%).This indicates that schools in Nyeri South District are female students dominated; probably there being low boy child participation rate in education.

4.3.7 Distribution of students by class

Of the Students who were sampled the majority were in form 3 198 (62.5%) while the rest 119 (34.5%) were in form 4

4.3.8 Distribution of students by age

When asked to indicate their age at the time of study, students' responses were as summarized in table 4.5

Table 4.5 Distribution of students by their age

Age (Years)	Frequency	Percent	Cumulative percent
14 – 16	70	22.1	22.1
17 – 20	247	77.9	100.0
Total	317	100.0	

Table 4.5 shows that the majority of the students were within the school going age bracket of 17- 20 yrs at 77.9%

4.4 Responses pertinent to extent of ICT integration in teaching and learning process

The study was guided by five research objectives and the findings from the field are reported as per questions 4.4.1, 4.4.2, 4.4.3 and 4.4.4

4.4.1 Research question 1: What is the extent of accessibility of computer and related peripheral to support e-learning?

Principals, teachers and students were asked several questions on various aspects to determine the extent of access to computer and the related peripherals and their response were as described:-

Regarding the presence of electricity connection all the 31 (100%) secondary schools in Nyeri South District were reported to have electricity. Electricity connectivity is a major enabling factor for ICT integration in teaching and learning.

When asked to rate power outage (blackouts) in their schools on a likert scale of always, often, and never, all the 31 (100%) principals ranked power outages as sometimes there were blackouts . In connection to power outages 14 (45.2%) schools reported to have installed standby power back-up generators while 17 (54.8%) reported to have no power back-up installed. This indicates that the barrier of power supply reliability in most schools still exist and can hamper effective ICT integration whenever there is power failures. Principals from 8 (25.8%) of the schools indicated they did not have computer labs although the majority of schools 23 (74.2%) had a computer lab. There was no school that had more than one computer lab.

Pertaining distribution of desktop computers in the schools, the principals were asked to give the number of desktop computers in their schools their responses were as summarized in Table 4.6

Table 4.6 Distribution of desktop computers in the schools.

The principals were asked to give the number of desktop computers in their school and their responses were as summarized in table 4.6

Number of computers	Frequency	Percent	Cumulative frequency
(0-5)	8	25.8	25.8
(11-15)	6	19.4	45.2
More than 20	17	54.8	100
Total	31	100	100.0

Table 4.6   shows that a majority of the schools 54.8% in Nyeri South District have more than 20 computers with two schools having the highest number of computers which was 60 , 8 (25.8%) of the school had 0-5 computers suggesting that in such schools computers were probably used for administrative functions other than for teaching and learning. Further, the study found that the average number of computers per school was 20.03 computers with a standard deviation of 16.91. the high standard deviation which is a measure of dispersion indicate that there was a wide disparity between the number of desktop computers owned from one school to another.

Student computer ratio (SCR)

The principals were asked to give the number of computers accessible to students and the total number of students in their schools so as to enable the computation of number of students per computer. Table 4.7 summarizes the distribution of computers.

Table 4.7 Number of computers dedicated to students use

Computers	Frequency	Total
0	8	0
10	2	20
11	2	22
12	2	24
20	2	40
25	3	75
26	3	78
30	3	90
31	2	62
45	2	90
60	2	120
Total	31	621

Data obtained from table 4.7 was used in computation of student to computer ratio (CSR) which is an index useful in determining and comparing access of computers to students in schools.

Student computer ratio (SCR)

Total Number of students

Computer accessible to students

$$= \underline{13, 345}$$

$$621$$

$$= 21.4895$$

≈ 22 students for every computer

The computation from the school data that was collected indicated that the students to computer ratio (SCR) was 21.4895 translating to about 22 students per computer (22:1) Although this ratio was significantly lower than the government estimate GOK (2006) of (150:1) there is still a great disparity between the findings and the situation in developed countries. A recent survey on technology access and use by European School Net (2012) which sampled 31 countries (EU27, Croatia, Iceland Norway and Turkey) found that there was about 3 to7 student per computer in the European Union (EU). This comparison clearly indicates that a SCR of 22:1 is still high as the lower the ratio the better the access of computers to students in schools.

Connectivity of computers to the internet

Principals were asked to indicate the type of internet connectivity in their schools the summary of the findings are in Figure 4.3

Figure 4.3 Types of internet connectivity used by secondary schools
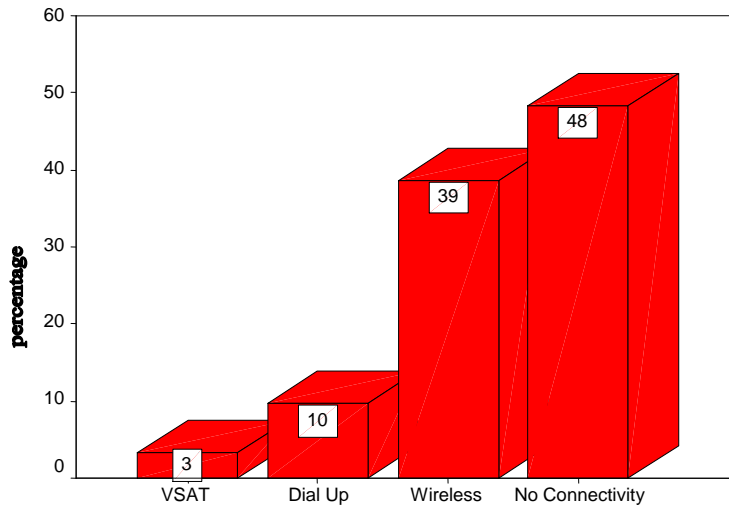
The findings indicated that 51.6% of schools had internet connectivity while 48.4% did not have. Most of the schools connected to the internet had wireless access while only one school (3%) had fixed connectivity using Very Small Aperture Terminal (VSAT). The principal from the school that had installed VSAT connection indicated that it was very reliable as it utilizes satellite transmissions and therefore very appropriate for a remote locations. Most schools

connected to the internet had more than 10 computers connected indicating that they were probably for teaching and learning purpose.

Cost of internet connectivity per month

Principals were asked to give the cost of internet connectivity in their schools, the summary of the findings are in table 4.8

Table 4.8 Cost of internet connectivity per month

Cost of connectivity per month (Kshs)	Frequency	Percent	Cumulative percent
0 (No internet)	15	48.4	48.4
1000	2	6.5	54.8
3000	2	6.5	61.3
4000	3	9.7	71
4500	2	6.5	77.4
5000	5	16.1	93.5
6000	2	6.5	100
Total	31	100	100

Table 4.8 shows that school in Nyeri South District are spending a substantial amount of their budgets on internet connectivity with most schools spending about Kshs 5,000 per month

Availability of ICT tools in schools

Table 4.9 Availability of ICT tools in schools

ICT Tool	Yes	%	No	%	Total	%
LCD projector	25	80.6	6	12.9	31	100
Printer	31	100			31	100
Modems	27	87.1	4	72.9	31	100

According to table 4.9 basic ICT tools were available but the number of items per school was low as most schools had only one of each item indicating that the tools were available but not adequate. It was only printers that were reported to be more than one in some schools.

Personal ownership of ICT tools by teachers

Teachers were asked to indicate whether they owned some ICT tool used in ICT integration. The responses are as summarized in table 4.10

Table 4.10 Personal ownership of basic ICT Tools by teachers.

Item	Yes	%	No	%	Total	%
Desktop Computer	70	33.3	140	67.7	210	100
Laptops/Ipads	41	19.5	169	80.5	210	100
Printer	0	0	210	100	210	100
Scanner	42	20	168	80	210	100
Flash disk	153	72.9	57	27.1	210	100
Modem	110	52.4	100	47.6	210	100

Table 4.10 shows that teachers have in their possession varied ICT tools as technology continues to permeate in the teaching and learning activities. The distribution of personal ownership of basic ICT tools is varied but seems to be influenced by cost whereby most items that are cheap are more prevalent for instance flash disks72.9%, modems52.4% than those which are relatively expensive laptops/Ipads19.5%, printers 0%.

4.4.2 Research Question 2:- What is the level of teachers and students expertise in ICT Integration in teaching and learning process?

Principals, teachers and students were asked several questions on their expertise. The questions and their responses were as follows

Principals level of ICT training

Principals were asked to indicate their level of ICT training and their responses were as shown in table 4.11

Table 4.11 Principals level of ICT training

Level of training	Frequency	Percentage
No training	12	38.9
Proficiency	16	51.6
Diploma	3	9.7
Total	31	100

Table 4.11 shows that the majority of the principals 16 (51.6%) had proficiency level of training (workshop, seminar, apprenticeship) only 3(9.7%) had higher level training on ICT being holders of Diplomas in ICT. Twelve principals (38.9%) have not received any form of training. Proper training on ICT is essential for all principals as being leaders, they form key change agents. They also influence individual school ICT policy and financing.

Teachers level of ICT Training

Teachers were asked to indicate their level of ICT training, their response is as summarized in figure. 4.4.

Figure 4.4 Teachers level of ICT training
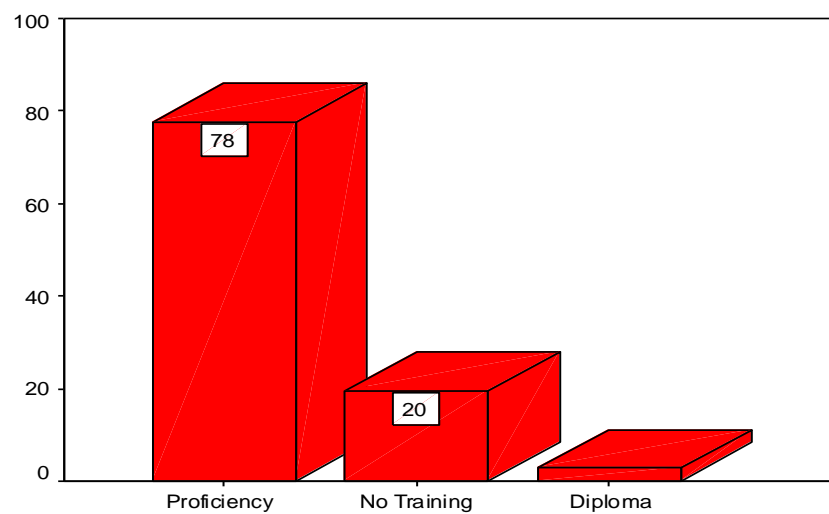
Figure 4.4 show that the majority of teachers 80.5% reported to have had some ICT training. Most of them indicating that they had received proficiency training of between 1 – 2 weeks

Table 4.12 Training of computers in TTC or University

	Frequency	Percent
Yes	90	42.9
No	120	57.1
Total	210	100

Teachers were further asked whether they had received any training on ICT in Teacher's Training College (TTC) or University as shown in tables 4.12. Majority of the teachers 120 (57.1%) indicated they had not received such training.

Table 4.13 Integration of ICT during training in TTC or University

	Frequency	Percent
Yes	39	43.3
No	51	56.6
Neutral	120 (Excluded)	-
Total	210	100

Out of those who had received ICT training in the TTC/University they attended, only 39 (43.3%) as shown in table 4.13 had received ICT integration related training

Table 4.14 Relevance of training to teaching tasks

	Frequency	%
Relevant	10	25.6
Slightly relevant	29	74.4
Neutral	171(Excluded)	-
Total	210	100

When those who reported to have trained on ICT integration in the TTC/Universities were further asked to rate their ICT integration training in terms of equipping them with skills in their subjects like lesson planning, lesson delivery and lesson presentation as shown in table 4.14. Most of the respondents 74.4% indicated it was slightly relevant while 25.6% indicated it was just relevant. The findings of the study echoed those obtained by Kiptalam and Rodrigues (2010) who found that majority of teachers did not receive any prior ICT training during the formative years at the Teacher's Training College or university before joining the teaching profession. About 55% of teachers stated that they did not receive any ICT training at all in TTC or University they attended whereby 51% of this teachers had taken self-initiative to undergo ICT training over the past three years they had been employed in the teaching profession.

Table 4.15 Level of teacher ICT competency

Item		V. Good	%	Good	%	Average	%	Weak	%	Poor	%	Total	%
i.	Connecting computer cables to electricity and switching on and off a computer	180	85.7	15	7.1	15	7.1					210	100
ii.	Operating with Word processor	82	39.0	101	48.1	14	6.7					210	100
iii.	File management e.g. opening, renaming or saving	11	5.2	33	15.7	87	41.4					210	100
iv.	Information browsing and downloading	111	52.9	57	27.1	29	13.8	13	6.2			210	100
v.	Email communication	82	39	72	34.3	30	14.0	13	6.2	13	6.2	210	100
vi.	Networking/communicating with others e.g twitter/Facebook	56	26.7	72	34.3	29	13.8	27	12.9	26	12.4	210	100
vii.	Attaching files to email	97	46.2	44	21.0	28	13.3	15	7.1	26	12.4	210	100
viii.	Printing hardcopy document	111	52.9	57	27.1	29	13.8	13	6.2			210	100
ix.	Use of presentation application	69	32.9	58	27.6	40	19.0	30	14.3	13	6.2	210	100
x.	Technology management eg. Troubleshooting	56	26.7	14	6.7	84	40	43	20.5	13	6.2	210	100
xi.	Operating using access and excel	84	40	14	6.7	99	47.1	13	6.2			210	100

Teachers level of ICT competency

To establish the level of teachers competency or confidence on some skills relating to ICT integration in teaching ,teachers were asked to rate themselves on a likert scale of very good ,good, average, and weak. Skills that were tested included teacher's ability to connect cables to a computer and switch the computer on or off, operating with Word application which included typing skills and composing document, file management which is a skill on maintaining digital files so as to organize information to be stored, operating with internet including skills on attaching files to emails, operating with access and excel application. Excel application are useful in spreadsheet where statistical computation can be done. This may be useful to a teacher during student examination analysis while access application are useful in production of database and can be used to store student details. Troubleshooting comprise skills on systematic search for source of a problem so that it can be solved

The level of teacher's ICT competency as shown in table 4.15 was analyzed in terms of level of confidence expressed by teachers whereby those who rated themselves as either good or very good in a given skill were regarded to have high confidence or competency in that skills, while those rating themselves from average to poor were regarded as having low confidence with their skills. Most teachers expressed low confidence on file management 20.2%, troubleshooting 33.4% using excel and access47.1% while they had high competency or

confidence on skills to do with switching ON and OFF a computer 92.8% and in using word application87.1% as well as browsing for internet80%.

Teachers ability to choose appropriate software applications

The teachers were give three questions to fill in whereby each required them to choose a suitable computer application to perform the task.

Table 4.16 Teachers ability to choose appropriate software

Task	Able	%	Not able	%	Total	%
Ability to use graphical presentation	36	17.1	174	82.1	210	100
Ability to type exams	120	57.1	90	42.9	210	100
Ability to analyze results	23	11	187	89.0	210	100

Table 4.17 illustrates that greatest ability by teachers was demonstrated in typing exams 120 (57.1%) This probably indicate that teachers could have had experience on typing exams for their students but did not seen to have had much experience for the other two abilities tested.

Table 4.17 Attitude of teachers towards ICT integration

Item	SA	%	A	%	U	%	D	%	SD	%	TOTAL	%
Negatively stated												
i. Computers are difficult to understand	15	7.1	43	20.5	58	27.6	28	13.3	66	31.4	210	100
ii. Anything a computer can do I can just do as well	44	21	28	13.3	15	7.1	97	46.2	26	12.4	210	100
iii. Challenge of solving problem using computer dose not appeal to me	96	45.7	15	7.1	43	20.5	43	20.5	13	6.2	210	100
iv. ICT integration is best for some subjects	44	21	58	27.6	69	32.9	69	32.9	39	18.6	210	100
v. Computers are for younger generation	29	13.8	28	13.3	28	13.3	86	41.0	39	18.6	210	100
positively stated												
vi. Computer can help to learn thing easily	152	72.4	43	20.5	15	7.1					210	100
vii. Policy of ICT integration should be encouraged	140	66.7	42	20			28	13.3			210	100
viii. All students/teachers should have an opportunity to learn ICT at schools	97	46.2	14	6.7	71	33.8	15	7.1	13	6.2	210	100
ix. ICT integration will improve education standards	140	66.7	70	33.3							210	100
x. Computers will relieve teachers routine duties	42	20	26	12.4	100	47.6	29	13.8	13	6.2	210	100

Attitude of teachers towards ICT integration

To determine the attitude of teachers towards ICT integration teachers were asked to rate some statements provided in a likert scale of Strongly agree (SA) agree (A) undecided (U) disagree (D) and strongly disagree (SD) from table 4.17 for the positively stated statements, majority of teachers responded as either strongly Agree (SA) or Agree (A) while for those negatively stated statements they responded as either Disagree (D) or Strongly Disagree (SD).

The opinion of the teachers was further sought regarding value of ICT integration whereby teachers were asked to indicated in an open ended question the importance computers have had in their class teaching. Most teachers indicated that they found ICT to be useful as they had made revision easy through accessing questions in digital format and that setting exams has been improved using computer application together with the fact that internet research has improved their lesson notes, language teachers also indicated benefit from computer dictionary. In general, most teachers expressed positive attitudes and interests towards ICT integration

Students level of ICT training

Students were asked if they had received any training in computers, their responses was as shown in figure 4.5

Fig 4.5 Students level of ICT training

No
41.6%

Yes
58.4%
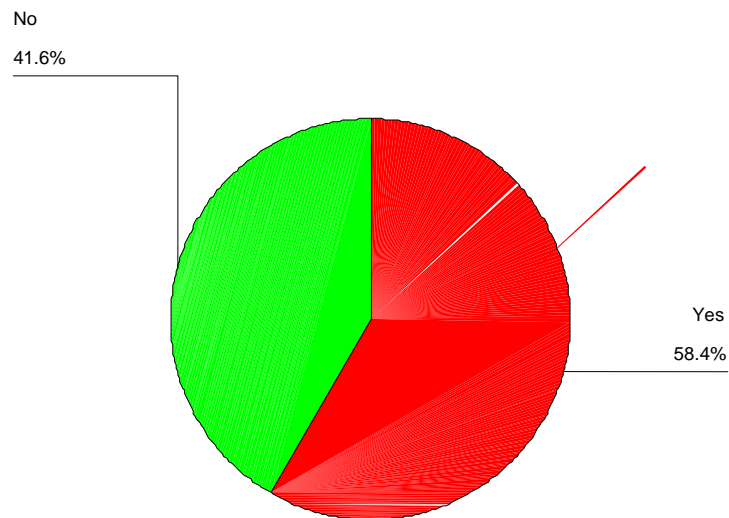
Figure 4.5 shows that the majority of the students had received ICT training 185 (58.4%). most students indicated that they had been taught computers in their school by their computer teachers. This findings indicate that while some schools had embraced technology, a significant number of schools 41.6% were yet to prioritize training of their students on digital literacy.

Table 4.18 Level of student`s competency in some ICT

tasks relating to learning

Item		V. Good	%	Good	%	Average	%	Weak	%	Poor	%	Total	%
i.	Connecting computer cables to electricity and switching on and off a computer	215	67.8	37	11.7	49	15.5	16	5.0			317	100
ii.	Operating with Word processor	116	36.6	16	5.0	66	20.8	70		49	15.5	317	100
iii.	Information browsing and downloading	101	31.9	17	5.4	120	37.9	32	22.1	47	14.8	317	100
iv.	Email communication	46	14.5	72	22.7	87	27.4	33	10.1	79	24.9	317	100
v.	Attaching files to email	37	11.7	81	25.6	55	17.4	48	10.4	96	30.3	317	100
vi.	Use of spreadsheet to plot graphs	69	21.8			64	20.2	103	15.1	81	25.6	317	100
vii.	Operating using access and excel	85	26.8			48	15.1	87	32.5	97	30.6	317	100
viii.	Use of presentation application	101	31.9			65	20.5	87	27.4	64	20.2	317	100
ix.	Networking/communicating with others e.g twitter/Facebook	118	37.2	54	17.0	97	30.6	16	27.4 5.0	32	10.1	317	100

Level of students competency in some ICT tasks relating to learning

To determine the competency or confidence of the learners on some ICT skills students were asked to rate themselves on a likert scale of very good, good, average, weak and poor. Skills tested included, skill on connecting cables to a computer and switching the computer on or off, operating with word, skills on internet use including browsing and downloading information, use of spreadsheets and presentation application like PowerPoint demonstration as well as students skills in networking or communicating with their colleague on facebook and twitter

The level of student competency as shown on table 4.18 was analyzed in terms of level of confidence expressed by students whereby those students who rated themselves as either good or very good in a given skill were regarded to have high confidence in that skill while those rating themselves as from average to poor were regarded to have low competence hence low confidence in the performance of such tasks.

Majority of the students demonstrated greater confidence on two operations connecting computer cable to the electricity and switching ON and OFF a computer 79.5% and networking e.g. Facebook and twitter 54.3%. In all the other skills tested, Majority of students demonstrated low level of confidence or competency whereby a majority of them rated themselves on a level between average and poor.

This indicates that more need to be done in terms of improving the skills of the student hence enhancing their confidence in application of the skills in their learning activities.

Attitude of students towards ICT integration

Table 4.19 Attitude of students towards ICT Integration

Item	SA	%	A	%	U	%	D	%	SD	%	TOTAL	%
NEGATIVELY STATED												
i. Computers are difficult to understand	32	10.1	62	19.6			141	44.5	82	25.9	317	100
ii. Computer usage would promote immorality	49	15.5	138	43.5	16	5.0	81	25.6	33	10.4	317	100
iii. Boys are better in computers than girls	53	16.7			32	10.1	78	24.6	154	48.6	317	100
POSITIVELY STATED												
iv. Computer can help to learn thing easily	251	79.2	34	10.7			32	10.1			317	100
v. Computers and ICT should be used in all subjects	146	46.1	135	42.5	36	11.4					317	100
vi. All students should have an opportunity to learn computers	198	62.5	102	32.2	17	5.4					317	100
vii. The internet is as resourceful as books	153	48.3	100	31.5	32	10.1	16	5	16	5	317	100
viii. ICT makes learning enjoyable	201	63.4	116	36.6							317	100
ix. ICT would assist in assisting in understanding of abstract concepts	184	58	85	26.8	32	10.1	16	5			317	100

Attitude of students towards ICT integration

To determine the attitude of students towards ICT Integration, students were provided with statements to rate them on likert scale of strongly agree (SA) agree (A), undecided (U), disagree (D) and strongly disagree (SD) as shown in figure 4.19, whereby just like in the case of teachers, for the positively stated statements, majority of students responded as either strongly agree (SA) or Agree (A) while for those negatively stated statements they responded as either Disagree (D) or Strongly disagree (SD). Student's opinion was further sought regarding value of ICT integration in their learning whereby students in an open ended questions were asked to indicate how computers have influenced the way they learn and what they learn. Most students indicated that use of computers and related technology had made their learning enjoyable and that they were able to learn for more hours without getting bored, they also indicated that computers and especially the internet has enabled them get access to a lot of information. Others indicated that they were able to access past papers for revision through web based platforms. Generally, these indicate that students had high interest on ICT integration.

4.4.3 Research Question 3: In which ways do teachers and students integrate ICTs in teaching and learning process?

Principals, teachers and students were asked several questions on ways in which ICT was being integrated in teaching and learning process and their responses were as follows:

Possession of some ICT facilities by schools

Principals were asked to indicate if their schools possessed some listed basic ICT facilities that support ICT integration and their responses were as summarized in table 4.20

Table 4.20 possession of some ICT facilities by schools

Facility	Yes	%	No	%	Total	%
Timetabling software	14	45.2	17	54.8	31	100
Result analysis software	21	67.7	10	32.3	31	100
Availability of software on specific subjects	7	22.6	24	77.4	31	100
Availability of digital curriculum from KIE	8	25.8	23	74.6	31	100
School email	22	71	9	29	31	100
LAN	11	35.5	20	64.5	31	100
School website	7	22.6	24	77.4	31	100

The Findings as summarized by Table 4.20 indicated that only result analysis software and external email address are possessed by a majority of the schools.

All the other facilities despite being essential are owned by a minority of the schools

Availability of computer teachers in schools

Principals were asked to give the number of computer teachers in the school, their response indicated that 19 (61.3%) school had each one computer teacher in their school. Twelve school (38.7%) had no computer teacher. All principals in the schools that reported to have a computer teacher indicated that the computer teachers offered technical assistance to the other teachers on ICT integration. However, when teachers were asked to rate technical assistance as a potential challenge the majority 64.3% rated it as a major challenge suggesting that something still need to be done to ensure that teachers are assured of technical assistant as they endeavor to integrate ICT in their work.

Level of ICT usage in the schools

Principal were asked to generally rate on a likert scale of very high, fair, low and very low their school's level of ICT usage (e-learning) in teaching and learning process by both teachers and students as opposed to the traditional methods of talk, chalk, blackboard, text book and hand written notes. Table 4.21 shows the summary of their responses

Table 4.21 Principal's rating of ICT usage in their schools

Level of ICT usage	Frequency	Percent	Cumulative percent
Very high	2	6.5	6.5
Fair	6	19.4	25.8
Low	13	41.9	67.7
Very low	10	32.3	100.0
Total	31	100	100.0

Table 4.21 show that cumulatively 23 (74.5%) of the principals rated their school's level of ICT usage as between low and very low, further when both principals and students in an open ended question were asked to indicate in which groups of subjects ICT were being utilized in their schools, most indicated that ICT were being generally utilized in all subject in examination analysis but classroom application of ICT was more frequent in the teaching of sciences and mathematics subjects than in any other subject.

Use of the internet by teachers in preparing learning materials

Figure 4.6 Teachers use of the internet in preparing learning materials.

Yes
40.0%

No
60.0%
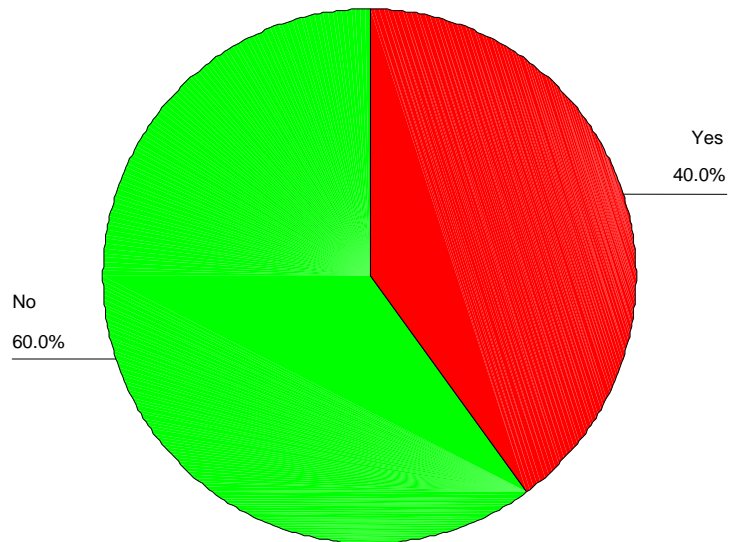
As shown in figure 4.6 the majority of teachers 126 (60%) indicated that they did

not make use of the internet in preparing the teaching .

Figure 4.7 Sources of internet access by teachers
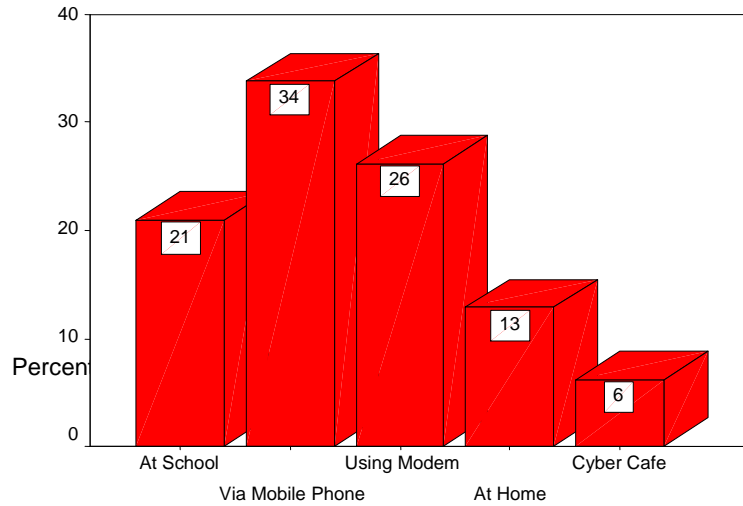
Out of those teachers that were using the internet as shown by figure 4.7 most of them 33.8% indicated that they accessed the internet through their mobile phone these indicated that mobile phones or smart phones have become useful tools to access internet and download information by teachers, cyber café were least used at 6.2% probably due to the fact that most cyber cafes are usually concentrated in urban setups

Average hours per week that teachers make use of internet or computers in teaching and learning.

Table 4.22 Average hours per week of Internet or computers use by teachers

Hours	Frequency	%	Cumulative %
Less than 5	185	88.1	88.1
5-10	20	9.5	97.6
11-20	5	2.4	100
Total	210	100	100

As shown in table 4.22, when asked the number of average hours that they used computers or the internet the majority of teachers, 185 (88.1%) indicated less than 5 hours per week while only 20 9.5% indicated a range between 11-20 hours per week. This indicates that teachers in Nyeri South District spend most of their teaching time using traditional method as opposed to technology enhanced methods that would require computer or access to the internet

Table 4.23 Frequency of using ICT by teachers in some basic teaching roles

	Task	Always	%	Often (once/twice a week	%	Sometimes (once/twice a month	%	Never	%	Total	%
i.	Information search/ browsing for lesson notes	58	27.6	29	13.8	97	45.2	26	12.4	210	100
ii.	Preparing of schemes of work			71	33.8	85	40.5	54	25.7	210	100
iii.	Preparation of records of work	29	13.8	29	13.8	55	26.2	97	46.2	210	100
iv.	Preparation of lesson plan (lesson planning)	14	6.7	44	21.0	41	19.5	111	52.9	210	100
v.	Keeping students records	45	21.4	43	20.5	83	39.5	39	18.6	210	100
vi.	Use of digitalized lesson notes	28	13.3	59	28.1	48	20.0	81	38.6	210	100
vii.	Preparing class assignment or exercise	14	6.7	44	21.0	56	26.7	96	45.7	210	100
viii.	Preparing of typed exams (opener and timely exams)	44	21.0	72	34.3	68	32.4	26	12.4	210	100
ix.	Preparation and issuing of handouts/ printouts as lesson notes	15	7.1	85	40.5	82	39.0	28	13.3	210	100
x.	Analysis of exams	43	20.5	71	33.8	57	27.1	39	18.6	210	100
xi.	Lesson presentation using projectors (in classroom)	14	6.7	72	34.3	15	7.1	109	51.9	210	100
xii.	Lesson presentation using projectors (in computer labs)	14	6.7	44	21.0	70	33.3	82	39.0	210	100

65

Frequency of using ICT by teachers in their basic operations relating to teaching

To determine exactly how and the frequency or intensity with which teachers make use of ICT in their work, the teachers were asked to rate their frequency of using ICT on a likert scale of often, sometime and never against some teaching related tasks. Some of the tasks included, sourcing for lesson notes, preparation of scheme of works, keeping of students records, setting and analyzing of examination and lesson delivery in class. Summary of their responses is shown in table 4.23

As shown in table 4.23 most of teachers did not use ICT in performance of the following tasks: Preparing records of work 46.2%, using digitized notes at 38.6%, preparing class assignment at 45.7% and lesson presentation in class using projectors 51.9%. The only activity that most teachers reported to had used ICT either often or for sometimes in browsing internet for notes 46.2%, typing exams 34.3% ,preparing teaching handouts 85% and analyzing student exams 33.8%.The findings acted as a confirmation of the data from principal's observation that the level of ICT integration in most teaching and learning activities were very low compared to traditional methods.

Number of average hours of accessing computers during classes in a week

Table 4.24 Students' average numbers of hours spend in accessing computers during classes in a week

Number of computer access in hours	Frequency	Percent
No access	180	56.8
1 -2	98	30.9
2-5	35	11.0
5-7	4	1.3
Total	317	100

Data from table 4.24 indicate that the majority of the students had no access to computers during classes 180 (56.8%) This reveals that something needs to be done as it is an indication that schools are not tapping onto the learning opportunities availed by both synchronous (online) and asynchronous (offline) learning using computers.

Table 4.25 Frequency in use of various ICT facilities by students for the purpose of learning

	Task	Always	%	Often (once/twice a week)	%	Sometimes (once/twice a month	% a	Never	%	Total	%
i.	Finding information via internet through browsing	53	16.7	53	16.7	49	15.5	162	51.1	317	100
ii.	Finding information from e-library e.g. Encarta										
iii.	Communicating with others students via email/text messaging	22	6.9	47	14.8	66	20.8	182	57.4	317	100
iv.	Chatting and networking e.g. Facebook/twitter	17	5.4	86	27.1	86	27.1	128	40.4	317	100
v.	Downloading music	33	10.4	107	33.8	64	20.2	113	35.6	317	100
vi.	Playing games										
vii.	Use education software	68	21.5	-	-	103	32.5	146	46.1	317	100
	which are subject specific	-	-	53	16.7	137	43.2	127	40.1	317	100
	e.g. physics and geography	39	12.3	31	9.8	118	37.2	129	40.7	317	100
viii.	Watch VCD or DVD on education issues	17	5.4	79	24.9	142	44.8	79	24.9	317	100

Frequency in use of various ICT facilities by students for the purpose of learning

To determine exactly how and the frequency with which students make use of ICT, students were asked to rate their frequency of using ICT on a likert scale of often, sometimes and never against some tasks including, browsing internet for information, use of e-library, chatting and networking with other students, playing games and music for leisure and use of subject specific software. The student responses were summarized in table 4.25

Table 4.25 indicates that most students sometimes watch VCD or DVD on educational issues and play games while most have never done all the other activities for learning purposes. This reveals that there is a very low level of ICT utilization in regard to learning by the students

Students rating of their ICT integration

Students were asked to rate their ICT usage in their learning as a percentage, against tradition methods their responses were as summarized in table 4.26

Table 4.26 Student general rating of themselves in terms of using ICT in their learning compared to the traditional methods

Students ICT usage in %	Frequency	Percentage
0	17	5.4
1-4	32	10.1
5-24	87	27.4
25-49	133	42
50-70	15	4.7
Above 70	33	10.4
Total	317	100

From table 4.26, cumulatively a majority of students 84.9% indicate that they utilize ICT at a percentage of between 0-49. Only a small number 33 (10.4%) rated themselves at a score of beyond 70% level of ICT usage in their learning, this clearly indicate that traditional methods of learning are more commonly used by students in their learning process as opposed to e-learning

4.4.4 Research questions 4: To what extent has the Ministry of Education ICT Integration Policy objective been implemented by schools in Nyeri South District ?

Principals, teachers and students were asked several questions relating to some key ICT integration policy objective as outlined in the Ministry of Education National ICT Strategy for Education and Training (2006) this was meant to establish level of implementation of some of the objectives stated which include:

a. **To establish functional networked computer labs in education institutions**

Only a small proportion 8 (25.8%) of the schools in Nyeri South District are yet to establish computer labs, pertaining to existence of LAN that facilitates communication of a computer within an institution and sharing of peripherals by computers only 11 (35.5%) had installed LAN while the majority 20 (64.5%) were yet to network their computers

b. **To equip education institution with digital equipment and internet connectivity**

Digital equipment imply the computers whether desktop or laptop and related peripheral devices. Apart from 8 (25.8%) schools, majority of the schools in Nyeri South District has more that 10 computers the mean of computer per school being 20.03 with a standard deviation of 16.9, From the table 4.27, it shows that most computers were acquired from school funds 45.2% followed by private

donors 25.8 and government donation is least at 9.7%. This underscores the role
of PTA and private donors in acquisition of computer and by extension the related
peripherals.

Table 4.27 Means by which schools acquired computers

Means of acquisition	Frequency	Percent	Valid percent	Cumulative percent
School funds	14	45.2	45.2	3.2
Government donation	3	9.7	9.7	12.9
Private donors	8	25.8	25.8	51.6
All the above named sources	6	19.4	19.4	100
Total	31	100	100	

30 (98.6%) of the schools had laptop computer each, other peripheral devices
like LCD projectors, printers and modems were also found to be available in
schools although the number was not adequate, 48.4% of the schools in Nyeri
South District are yet to be connected to the internet

c. To stimulate ICT integration in education in various regions

Integration of ICT in teaching and learning process in Nyeri South is still very
low as majority of the principals 74.2% rated their schools ICT usage as very low
and further most students rated their ICT at between 25 − 50%. Relating to

computer studies in secondary schools the findings obtained indicate that computer studies was being offered in 16 (51.6%) of the schools and out of those schools offered computer studies it was only 4 (12.9%) of the schools that the subject was examinable at K.C.S.E. These findings were congruent with the studies carried out on ICT integration including Ayere et al (2010) that indicate that since 1999 when the government declared that all secondary schools should introduce computer studies ,schools have been struggling to introduce computer studies and that schools that are offering computer have limited the number of students doing computer studies as they consider it a specialty or elective subject whereas it is an essential or core subject just like mathematics and languages

d. **To develop educational software to meet local education requirement in teaching and learning**

When asked to indicate whether they possessed some basic software only 14(45.2%) indicated they had time tabling software 21 (61.7%) had result analysis software and software on specific subject were owned by only 7 (22.6%) while digital curriculum from KIE was available in 8 (25.8%) of the schools. Many teachers and principals indicated the need to avail more relevant educational software and e-content for use in teaching and learning

e. **To build basic ICT capacity in ICT for all stakeholders in education**

80.5% of teachers, 58.4% of students and 61% of principals reported to have had some ICT training, however, most teachers rated themselves between average and

poor on some essential integration skills like file management, using excel and access application. Student only demonstrated greater confidence in switching on and off a computer and in networking though use of Facebook and twitter but they demonstrated low confidence in all the other skills tested. When asked on best strategies to increase ICT integration in teaching and learning, both teachers and principals under score the need for capacity building of teachers through in service training, seminars, workshops and refresher courses for teachers who were trained a long time ago.

f. **To stipulate minimum hardware specifications adequate for education use**

Specification for ICT equipment is important so as to ensure that schools acquire the right equipments that can perform the required ICT functions as well as ensure that schools do not become a dumping grounds for obsolete gadgets. Principals were asked to indicate the model of computers in their schools. All the principals indicated that their schools had Pentium 4 computers, Pentium 4 computers are of higher sophistication than Pentium 2 or 3. They also support higher processor speed and storage capacity in a computer, there was however no evidence of clear school policy on specification of computer or related peripherals in the schools in Nyeri South District

g. **To promote public and private sector investment in education subsector**

There was evidence of private sector involvement in ICT investment in education as 25.8% of schools in Nyeri South District reported to have received their

computer from non governmental organization NGOs, private companies and from computer for schools Kenya (CFSK). When school principals were asked to comment whether their schools had adequate funds to purchase ICT equipments all the principals indicated that their schools had inadequate funds owing to the fact that they had many other demanding needs, this under scores the need for intensified private sector and government support to schools.

Challenges facing ICT integration in secondary schools

Table 4.28 Rating of various computer challenges by teachers

	ICT related challenges	Major	%	Minor	%	Not a change	%	Total	%
i.	Insufficient No of computers	141	67.1	56	26.7	13	6.2	210	100
ii.	Inadequate/lack of skills in ICT	100	47.6	82	39.0	28	13.3	210	100
iii.	Inadequate copies of software on specific subject	156	74.3	40	19.0	14	6.7	210	100
iv.	Insufficient teacher time	142	67.6	68	32.4			210	100
v.	Inadequate technical assistance	114	54.3	55	26.2	41	19.5	210	100
vi.	Slow speed of www	121	57.6	49	23.3	40	19.0	210	100
vii.	Lack of administrative assistance	72	34.3	112	53.3	26	12.4	210	100
viii.	Lack of adequate computer lab	72	34.3	42	20.0	96	45.7	210	100
ix.	Lack of interest in teachers in ICT use	111	52.9	84	40.0	15	7.1	210	100
x.	Lack of policy or proper strategy on ICT in schools	98	46.7	54	25.7	58	27.6	210	100
xi.	Technophobia	85	40.5	97	46.2	28	13.3	210	100
xii.	Loss of data due to virus attack	126	60.0	28	13.3	56	26.7	210	100

Challenges facing the implementation of ICT integration in secondary schools

To establish the challenges or barriers to ICT integration in Nyeri South District, Teachers were asked to rate on a likert scale of major, minor or not a challenge a number of potential challenges. Their responses were as summarized in table 4.28. Table 4.28 indicate that most teachers were of the opinion that lack of adequate computer laboratory was not a challenge to ICT integration 45.7% while technophobia(fear of working with computers) was a minor challenge to a small majority 53.3%.All the other ten challenges listed were rated as major challenges by most of the teachers. Teachers also added that the conservative nature of some of them whereby most teachers are traditionally used to do telling than serious enquiry was a potential inhibiting factor to ICT integration as well as the fact that there is little pressure and rewards mechanisms in their schools to challenge the status quo. Generally, the findings implied that despite the efforts expended towards ICT integration policy by the government as well as individual schools, obstacles to the implementation were still to a large extent in existence.

CHAPTER FIVE

SUMMARY OF RESEARCH FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents summary of the study, research findings, conclusions drawn and the recommendations for the study and suggestions for further research

5.2 Summary of the study

The purpose of the study was to find the extent of information communication technologies integration in the teaching and learning process in secondary schools in Nyeri South District. The objectives of the study were:- To determine the extent of accessibility of computers to teachers and students , to determine the level of teachers' and students' expertise in ICT integration , to determine the ways in which ICT is integrated in teaching and learning process and to determine the level of implementation of the Ministry of Education policy on ICT integration . Literature reviewed on ICT integration laid the background for the study. The main data collection method used was questionnaire administered to teachers, principals and students in form 3 and form 4 . An observation checklist was used as a confirmatory tool

The study employed descriptive survey design. 355 students, 245 teachers were sampled for the study while all 34 principals in all the 34 secondary schools in

Nyeri South District, were purposively included for the study. Research instruments were appraised by my supervisor to enhance validity. Test- retest method was used to determine instrument reliability where two schools were sampled .The coefficient of reliability of the instrument were 0.93,0.96 and 0.82 for the principals questionnaire ,teachers and students respectively the responses from the questionnaires were included in the main study. Data collected from the respondents was both quantitative and qualitative in nature. Quantitative data was analyzed using descriptive statistics such as frequencies and percentage while qualitative data for open ended questions was coded and transcribed per research question item. The data was analyzed and summarized to identify the main research finding and there after conclusions and recommendations were made

5.3 Summary of research findings

The summary of the research findings has been presented as per research objectives in the study.

Extent of accessibility to computers and related peripherals

The study established that most schools in Nyeri South District were equipped to some extent with computer and related peripherals as all schools were connected to electricity and 54.8% of the schools had installed a standby generator, most of the schools 74.2% had at least one computer laboratory and 54.8 % of the schools had installed 20 or more computers accessible to students. The computer student ratio (CSR) for secondary school in Nyeri South District stood at 22 students per

1 computer (22:1).The study also established that the average number of computers per school was 20.03 with standard deviation of 16.91. In regard to internet connectivity, 51.6% of schools were connected to the internet. Basic ICT tools were widely available in most schools, including printers laptops, modems and LCD projectors. In almost all schools apart from printers and modems the school owned only one of each item.

Level of expertise in ICT integration

A majority of all the school community (teachers, students and principals) reported to have received some ICT training. It was further established that most teachers and principals had ICT literacy training of between 1-2 weeks duration .however, when tested on their skills to operate with various applications most teachers and students alike demonstrated low level of confidence in areas like using access and excel, technology management and file management indicating that there is still capacity building gaps that should be addressed.

Ways in which teachers and students integrate ICT in teaching and learning process

The study revealed that 60% of teachers in Nyeri South District do not use the internet or computers to prepare learning materials .Further, 88.1% of the teachers who use computers or the internet spend less than 5 hours per week in using the internet or computer for teaching and learning purpose. This indicates that most teachers spend most of their time using tradition methods like text

books, chalkboards, and handwritten notes as opposed to technology enhanced methods.

The majority of the students had no access to computers during their learning while most of those accessing the computers for learning purposes spend less than 2 hours per week. This clearly indicates that schools in Nyeri South District are yet to fully tap on the vast opportunities for learning using ICT. On regards to intensity or frequency in which teachers made use of ICT in performing basic teaching and learning roles, it emerged that the majority of teachers had never used ICT in performance of the following task;. Preparing records of work ,using digitalized notes and lessons presentation in class using projectors for the students, most indicated to have used ICT for sometimes in playing games 43.2% and for watching DVD and VCD on educational issues but most had never used ICT for finding information via internet, communication or networking with them or using specific subject software for learning purposes.

Indeed when asked to rate themselves in terms of utilizing ICT in their learning vis a vis traditional methods of text books and handwritten notes, cumulatively 84.9% rated themselves at a percentage of below 50% implying that most students felt they were more traditional users of learning methods than technology users.

Level of implementation of ICT integration policy

Most ICT integration objectives have only been implemented partially. The main objective of the policy was to increase ICT integration in teaching and learning which is still very low in the District. The implementation of ICT integration in education is faced by various challenges including inadequate relevant e-content, insufficient teachers time, insufficient number of computers and lack of internet connection. These challenges need to be addressed.

5.4   Conclusion

From the research findings it is clear that schools in Nyeri South District had installed computers and related peripherals. However they were not adequate for full ICT integration in the teaching and learning process due to the fact that in most schools some ICT equipments were very few for instance desktop and laptops computers and LCD projectors. The majority of teachers and students alike reported to have had some form of ICT training however, they demonstrated low level of confidence in performance of several skills. Generally there is low extent of ICT integration by both teachers and students and the implementation of ICT integration policy was hampered by various challenges that need to be addressed.

5.5 Recommendations of the study

The following are the recommendations of the study:-

a. School authorities need to create more facilitation for more ICT integration not only in the school but also in the classrooms including ensuring that all the classes have appropriate infrastructure like sockets for ICT equipments as well as replacing blackboards with whiteboard or smart boards so as to reduce dusty classrooms and improver projection of the work from the computer

b. Teacher's training colleges and universities should not only incorporate and strengthen ICT integration training in their teacher education programs but should also ensure that such training are based on equipping the student teachers with skills on actual integration of ICT in their respective disciplines.

c. Head teachers, policy makers and other education stakeholders in Nyeri South District should develop strategies concerning increasing the use of ICT in teaching and learning through addressing the various challenges identified that are inhibiting full implementation of ICT integration

d. There is still need for more intensified government as well as private sector support to secondary school towards acquisition of and maintenance of ICT equipments and facilities especially multimedia computers and broadband internet,

e. There is also need for a curricula that is not reliant on text book and course coverage but one that allow room for deep enquiry which is

supported by ICT as well as need to avail more relevant digital content for use in secondary schools

5.5 Suggestion for further research

The following are the suggestions for further research:

a) Similar study should be done in other regions for comparison purposes and in particular enable a clear assessment of e-readiness of secondary schools in Kenya

b) Further research be undertaken on new pedagogical models that involve technology use and the conditions under which teachers and students are motivated to adopt technology in teaching and learning.

c) Evidence based study is necessary to establish the real impact of ICT integration in education especially in relation to improvement in learning and performance in education.

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APPENDICES

APPENDIX I

TRANSMITTAL LETTER

Gatama S. Njenga

University of Nairobi,

Department of Educational

Administration and Planning

P.O. Box 30197 Nairobi.

Date: ………………….

Dear respondent,

REF: REQUEST TO FILL THE QUESTIONNAIRE FOR EDUCATIONAL RESEARCH PURPOSE

I am a post graduate student at University of Nairobi pursuing a Master of Education Course. Currently am carrying out a research on ;

EXTENT OF INFORMATION COMMUNICATION TECHNOLOGY INTEGRATION IN TEACHING AND LEARNING PROCESS IN SECONDARY SCHOOLS IN NYERI SOUTH DISTRICT

It is my request that you will respond honestly to all the items in the questionnaires attached .

I look forward to your cooperation.

Thank you very much for your assistance.

Yours sincerely,

Gatama S. Njenga

APPENDIX II

QUESTIONNAIRE FOR TEACHERS

Section A: demographic information

1. Indicate your Gender Male   [   ]   Female   [   ]

2. Indicate your age

     Below 25 years [   ]   25-30   [   ]   31-40   [   ]

     41-50   [   ]   51-60   [   ]   Above 60 [   ]

3. Which   are   your   teaching   subjects

     …………………,…………………………

4. Have you received any training in computer   Yes [ ]   No [   ]

     (a) If yes describe your level of computer literacy

	Level of ICT Qualification	Title of training received	Name of institution	duration
1	Proficiency e.g. seminar , apprenticeship, workshop			
2	Certificate e.g. KNEC, ICDL or Equivalent			
3	Diploma			
4	Degree			
5	Any other (specify)………………….			

     (b) Did your training above include ICT integration in teaching your subject areas or how to incorporate ICT tools in the teaching context? ……………………

5. Did you receive any ICT training from the TTC or University you studied?

   Yes [   ] No [   ]

   (a) If yes did the ICT training cover integration of ICT in teaching specific
       subject area?   Yes [   ]   No [   ]

6. How relevant can you rate the training in terms of equipping you with skills
   on lesson planning, lesson delivery and preparation using ICT tools?

   Very relevant [   ]   Relevant   [   ]   Slightly relevant [   ]   Not Relevant [

]

7. How can you rate yourself against the following computer operations

Level of ICT Competency	V. Good	Good	Average	Weak	Poor
Connecting computer cables to electricity and switching ON or OFF a computer					
Operating with Word processor					
File management e.g opening, renaming or saving					
Information browsing and downloading					
Email communication					
Networking/communicating with others e.g twitter and facebook					
Attaching files to email					
Printing hard copy documents from a computer					
Use of presentation software e.g PowerPoint					
Technology management e.g. troubleshooting (fixing basic faults)					
Operation using Access and Excel packages					

Section B: ICT Access, Usage and Attitude Factors

8. Which amongst the following software application can you appropriately choose to perform the task described below? (Ms Access, Ms Excel, Ms Word, Ms PowerPoint)

   i. Classroom graphical presentation in form of slides…..................................

   ii. Typing your examinations…………………………

   iii. Analyzing results in your subjects (mean, totals, grades, graphs etc)………….

10. Indicate using a tick (√) if you have the following

   Email address   [   ]   Facebook account   [   ]

   Twitter handle account   [   ]   Skype account   [   ]

11. Indicate if you own the following
   a) Laptop, I pad   Yes [   ] No [   ]   d) Flash disc   Yes [   ] No [   ]
   b) Desktop computer Yes [   ] No [   ]   e) Scanner   Yes [   ] No [   ]
   c) Printer   Yes [   ] No [   ]   f) Modem   Yes [   ] No [   ]

12 Do you use the internet to prepare teaching and learning materials? Yes [ ] No [ ]

   Where do you mainly access the internet?(check using (√) where appropriate

   At school [   ]   Via mobile phone [   ] Using a Modem [   ]   At home [   ]

   Cyber café [   ]   Any other form indicate………………………

13. On average how many hours per week do you use computers/internet on teaching
and learning related tasks …………………………………………..………….

14. How often do you use ICT to carry out the following *teaching and learning roles* in your work as a teacher?

	Task	Always (Everyday)	Often (once/twice a week)	Sometimes (once/twice a week)	Never
1	Information search/ browsing for lesson notes				
2	Preparation of schemes of work				
3.	Preparation of records of work				
4	Preparation of lesson plans (lesson planning)				
5	Keeping students records				
6	Use of digitized lesson notes				
7	Preparing class assignments or exercises				
8	Preparation of typed exams (opener or termly exams)				
9	Preparation and issuing of handouts/ printouts as lesson notes				
10	Analysis of exams				
11	lesson presentation using projectors (in classroom)				
12	Lesson presentation using projectors (in computer Laboratory)				

15. What is your **frequency of usage** of the following ICT resources as a teaching and   learning tool?

	Task	Always (Everyday)	Often (once/twice a week)	Sometimes (once/twice a week)	Never
1	Software use in specific subject area				
2	Use of social network to collaborate with others e.g. colleague teacher (facebook, twitter)				
4	Use of VCD or CD Rom for educational purpose e.g KIE Digital Curriculum				
5	Use of/ allowing student access to TV program for educational purpose				
6	Use of radio for educational purpose e.g. KIE media tapes				
8	Use of email for educational purposes				

16. Describe any importance computers have had in your in class teaching (how you   teach, what you teach) …………………………………………………….

17. How can you rate the following potential challenges on ICT implementation policy in your school

ICT related Challenges	A major challenge	A minor challenge	Not a challenge
Insufficient no. of computers			
Inadequate lack of skills on ICTs			
Not enough copies of software for specific subject			
Insufficient teacher time			
Lack of/ inadequate technical assistance			
Slow speed of www			
Lack of administrative assistance			
Lack of adequate computer lab			
Lack of interest in teachers on ICT use			

lack of policy or proper strategy on ICT usage in schools by ministry			
Technophobia (fear to encounter ICT challenges before students)			
Loss of data e.g. due to Virus attack			

18. Indicate any other challenges relating to ICT integration in your school………..

19. In the table below indicate your level of agreement or disagreement by ticking(√)

    against; Strongly Agree (SA), Disagree(D), Agree(A), Strongly Disagree(SD)

    and Undecided (U)

		SA	A	U	D	SD
1.	Computers can help to learn things easily					
2.	Computers are difficult to understand					
3.	Knowing how to use computers will help me do well in my career					
4.	The policy of ICT integration in teaching and learning all subject should be encouraged					
5.	All students and teachers should have an opportunity to learn about computers at school					
6.	Anything that a computer can be able to do I can just do as well					
7.	ICT integration will improve education standards					
8.	The challenge of solving problem with computers does not appeal to me					
9.	ICT integration is best suited for some subjects like sciences and not all subjects like humanities					
10.	Computers will relieve teachers of routine duties					
11.	Computers are for the younger generation					
12.	Male teachers are better than female teacher in computers					

20. In which ways do you think ICT integration in teaching and learning can be improved in regard to;

i. Access of student and teachers to computers and other ICT………………….

ii.   Teacher ICT skills and training………………………

iii.   ICT usage in classroom teaching in specific subjects………………………….

THANK YOU VERY MUCH

APPENDIX III

QUESTIONNAIRE FOR LEARNERS/ STUDENTS

SECTION A: demographic information

1. Indicate your gender   Male [   ]   Female [   ]

2. Indicate your age below 13 [   ]   14-16 [   ]   17-20 [   ]

3. Indicate your form   III [   ]   IV [   ]

4. Have you received any training on computer use? Yes [   ] No [   ]

    a. If yes, who taught you about computers?..

SECTION B: ICT Access, usage and attitude factors

5. How well can you do each of these tasks using a computer?

Task	V. Good	Good	Average	Weak	Poor
Connecting computer cables to electricity and switching ON or OFF a computer					
Operating with Word processor					
Information browsing and downloading					
Email communication					
Attach files to e-mail address					
Use spreadsheet to plot gaps					
Operation with Ms Access and Ms Excel					
Use presentation software e.g. PowerPoint					
Networking / communicating with other students or friend e.g. facebook & twitter					

6. Are you able to access computer during classes? Yes [   ]   No   [   ]

7. How often do you make use of the following ICT facilities?

		Always	Often	Sometimes	Never
1	Finding information via internet through browsing				
2	Finding information from e-library e.g. Encarta				
3.	Communication with other student via email /text messaging				
4	Chatting and networking e.g. facebook and twitter				
5	Downloading music				
6	Playing games				
7	Use education software which are subject specific e.g. physics, geography				
8	Watch VCD or DVD on education issues				
16	Other usage (Specify)……..				

8. List the subjects that you are taught in your school using computers and related ICTs e.g. LCD Projectors?

Subject	How/ areas it is taught using computers and related ICT	Frequency		
		Always	Sometimes	Rarely

9. Do you look for information on the internet?

Yes   [   ]   No   [   ]

10. How many hours per week do you use computer/internet in learning

   a) When schools are in session…………………..

b) During holidays…………………………

11. Indicate using a tick (√) if you have the following:

E-mail address   [   ]   Facebook name [   ]

Twitter handle account [   ]   Skype name [   ]

12. In which specific ways do you make use of the computers and related ICTs for learning   purposes?   Describe
………………………………………………………

13. Describe how computers have influenced your learning (how you learn and what   you learn)?……………………………………………………………………

14. How can you generally rate yourself in terms of ICT usage in the learning process against the traditional learning methods (notes and textbooks)?

0 % [   ]   1-4 [ ] 5-24   [ ] 25-49[ ] 50-70 [ ] above 70[ ]

Tick (√) as appropriate in the table below

		SA	A	U	D	SD
1.	Computers can help to learn things easily					
2.	Computers are difficult to understand					
3.	Computers and related ICT should be used in learning of all subjects					
4.	All students should have opportunities to learn about computers in school					
5	Computer usage would promote immorality in schools					
6	The internet is as resourceful as books can be					
7	ICTs can make learning enjoyable					
8	ICTs would assist in understanding of abstract concept e.g. sciences					
9.	Boys are better in computers than girls					

QUESTIONNAIRE FOR THE PRINCIPAL

Section a: demographic information

1. Please indicate your gender   Male   [   ]   Female [   ]

2. Indicate your experience as a secondary school principal in the whole of your teaching career in years …………………………………………..

3. Are you trained in ICT? Yes   [   ]   No   [   ]

   (a) If yes, describe your level of computer literacy

Level of ICT Qualification	Title of training received	Name of institution	Duration of training
Proficiency level e.g. workshop, seminar, apprenticeship			
Certificate e.g KNEC, or equivalent			
Diploma			
Degree			
Any Other (specify)……………			

4. How many teachers are in your school?.............................

5. How many students are in your school?.............................

Section B: ict Access, Usage and Attitude Factors

6. Is the school connected to electricity? YES [   ]   NO [   ]

7. If YES above, How can you rate power outage (loss of power) in your school against;

   Always   [ ]   Often [ ]

   Sometimes   [ ]   Never [ ]

8. Does your school have back-up power supply e.g a generator Yes [ ] No [ ]

9. Does the school have a computer lab   Yes [ ] No [   ]   How many computer labs are there? One   [ ]   Two   [ ]   More than two (indicate)…….

10. How   many   desktop   computers   (PCs)   are   there   in   the school?..................................

11. What is the model (Pentium) of the PCs named in the question above? (if all are not of the same model indicate the quantity against each model)

   P1   [ ]   P2   [ ]   P3 [ ]   P4   [ ]

12. How were the computers in the school acquired? Tick using (√) and give the number

Means of acquisition	Number of computers
1. From school funds (PTA, school fees) [ ]	
2. Government donations (MoE, ESP) [ ]	
3. From private donations (NGOs, Companies, CFSK) [ ]	
4. Any other means (Indicate) ………………………..	

13. How   many   computers   are   accessible   to: a)   Students……….b) Teachers……….

14. Is the school connected to the internet   Yes   [   ]   No   [   ]

   a. If yes, give the type of connectivity VSAT[   ]   Dial up[ ]   Wireless[   ]

   b. Who is your ISP provider …………………………………………

   c. What is the estimate average cost of internet connectivity per month? ……

   d. How many computers are connected to the internet? ....

15. Is computer studies offered in your school? Yes [   ]   No   [   ]

    a. If yes, how many students are doing computers?

16. Do you have a policy of computer literacy for all students? Yes [   ]   No   [
    ]

17. In which ways have you improved access for teachers to ICT tools or
    encouraged   the   use   of   ICT   in   your
    school?……………………………………………

18. Do you have a policy or a strategy to ensure ICT integration in your school in
    all the subjects? (Specify vision and policy) …………………………………..

19. Indicate whether the following ICT tools are available in your school and give
    the quantity; Tick if available then indicate quantity

Tool	**quantity**	**Tool**	**Quantity**
Laptop	[ ] [ ]	LCD projector	[ ] [ ]
Modems	[ ] [ ]	Printer (specify)	[ ] [ ]

20. In which group of subjects are ICT utilized in your school and in which ways?
    Specify in which area

    Maths   ………………………………………………………………

    Languages   ………………………………………………………………

    Humanities ………………………………………………………………

    Applied   ………………………………………………………………

    Computers

    studies…………………………………………………………………..

    Sciences   ………………………………………………………………

21. Do you have the following?

    1.   Timetabler software   Yes   [ ] No   [ ]

    2.   Results Analysis software Yes   [ ] No   [ ]

    3.   School Website   Yes   [ ] No   [ ]

    4.   School email   Yes   [ ] No   [ ]

    5.   Software on specific subjects (specify)…………………….

    6.   Digitized curriculum e.g. from KIE (specify) ………………….

22. Are the computers in your school networked under the following?

  (LAN) -Intra school Yes [ ] No [ ]

23. Does your school have a computer teacher?   Yes [ ]   No [ ]

    If yes how many computer teachers or coordinators are there in your school?
    One   [   ] Two   [   ]   More than two (indicate) …………..

24. How can you generally rate the level of ICT usage in teaching and learning activities in your school vis-a-vis the traditional methods (talk, chalk, textbooks)

   Very High [ ]   Fair [ ]   Low [ ]   Very low [ ]

25. Do you think secondary schools have adequate funding to purchase ICT equipment Yes [   ] No [   ] give seasons for your answer ……………

26. In which ways do you think ICT usage in teaching and learning can be improved……………….

27. What can you comment about the cost and maintenance of computers and related ICTs and the adequacy of financing sources in your school.

…………………………………………………………………………………….

28. What future plans do you have for ICT implementation in your school?

…………………………………………………………………………….

*****THANK YOU****

APPENDIX V

Observation Schedule

	Observation task	**What to observe**	**Remarks**
1.	Check if electricity is installed	Switches, wiring	
2.	Check if internet is connected	Routers, internet mast, telephone lines	
3.	Check existence of computer laboratory	Get to physical location	
	a) confirm if building is specially made/ improvised	Inside observation	
	b) confirm if furniture is specially made /improvised	Inside observation Physical count	
	c) get the number of the following: i) Computers in the lab ii) LCD projector iii) Any other ICT tool d) Confirm the computer specification	Physical count Physical count From one of the computers in the lab switched ON	
4.	Check school policy and future Plan on ICT integration	ICT Policy and strategy on the school strategic plan	
5.	Check if computer lab is used in the learning of other subjects other than computer studies	Computer lab bookings/scheduling	
6.	Check if computer studies is offered as a subject	From school master timetable	
7.	Check if timetabler software is used	If master time table is manual or computer print out	
8.	Check if student analysis software is used	Check one of the internal student performance analysis if manual or computer print-out	
9.	Check if teachers use ICT in teaching activities and related roles.	Handouts, lesson notes in digital format, schemes of work, typed exams, printed lesson plan	

Appendix VI

RESEARCH AUTHORIZATION PERMIT

PAGE 2

THIS IS TO CERTIFY THAT:
Prof./Dr./Mr./Mrs./Miss/Institution
Samuel Njenga Gatama
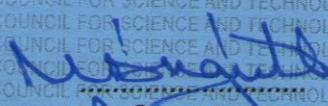of (Address) University of Nairobi
P.O.Box 30197-00100, Nairobi.
has been permitted to conduct research in

Location
Nyeri South   District
Central   Province

on the topic: Level of Information Communication Technologies integration in the teaching and Learning process in secondary schools in Nyeri South District, Kenya.

for a period ending: 31st December, 2013.

PAGE 3
Research Permit No. *NCST/RCD/13/013/20*
Date of issue   *19th April, 2013*
Fee received   *KSH. 1,000*

....
Applicant's
Signature

....
Secretary
National Council for
Science &Technology

APPENDIX VII
SECONDARY SCHOOLS IN NYERI SOUTH DISTRICT

CHINGA WARD

1. CHINGA BOYS
2. CHINGA GIRLS
3. GATHERA SEC
4. KARIKO SEC
5. KIAGUTHU SEC.
6. KIAMUYA SEC
7. MUCHARAGE SEC
8. MUIRUNGI SEC
9. MUMBUINI SEC
10. ST.MARY KARUTHI SEC

KARIMA WARD

1. GATUGI GIRLS SEC
2. GATUGI MIXED SEC
3. IRINDI SEC
4. KAGUMO MIXED SEC
5. KARIMA BOYS
6. OTHAYA BOYS
7. WITIMA SEC

IRIA-INI WARD

1. GATHUMBI SEC
2. GITUNDU SEC
3. IHURIRIO SEC
4. KAIRUTHI SEC
5. KIAHAGU SEC
6. KIHURI SEC
7. MARIA GORETI (RURUGUTI) GIRLS
8. OTHAYA BOYS
9. THUNGURI (IRIA-INI) GIRLS

MAHIGA WARD

1. BIRITHIA SEC
2. GAKUYU MAHIGA SEC
3. GITUGI SEC
4. KAGONYE SEC
5. KENYATTA BOYS
6. KIHOME SEC
7. MAHIGA GIRLS
8. MUNYANGE SEC

APPENDIX VIII

MAP OF NYERI SOUTH DISTRICT