E-LEARNING READINESS IN PUBLIC SECONDARY SCHOOLS IN KENYA: THE CASE OF NAKURU MUNICIPALITY

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DECEMBER, 2011
DECLARATION

This thesis is my original work and has not been presented for a degree in any other university or any other award.

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This work is dedicated to my two children; Joy and Bill that it may inspire them to work hard in their future endeavors.
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<th>Description</th>
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<tbody>
<tr>
<td>CBT</td>
<td>Computer Based Training</td>
</tr>
<tr>
<td>COMESA</td>
<td>Common Market for Eastern and Southern Africa</td>
</tr>
<tr>
<td>CXC</td>
<td>Caribbean Examination Council</td>
</tr>
<tr>
<td>DE</td>
<td>Distance Education</td>
</tr>
<tr>
<td>EIU</td>
<td>Economic Intelligence Unit</td>
</tr>
<tr>
<td>ERSWEC</td>
<td>Economic Recovery Strategy for Wealth and Employment Creation</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
</tr>
<tr>
<td>ISPs</td>
<td>Internet Service Providers</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>KENET</td>
<td>Kenya Educational Network</td>
</tr>
<tr>
<td>KESI</td>
<td>Kenya Educational Staff Institute</td>
</tr>
<tr>
<td>KESSP</td>
<td>Kenya Education Sector Support Program</td>
</tr>
<tr>
<td>KIE</td>
<td>Kenya Institute of Education</td>
</tr>
<tr>
<td>MDGs</td>
<td>Millennium Development Goals</td>
</tr>
<tr>
<td>MoE</td>
<td>Ministry of Education</td>
</tr>
<tr>
<td>NGOs</td>
<td>Non Governmental Organizations</td>
</tr>
<tr>
<td>ODL</td>
<td>Open and Distance Learning</td>
</tr>
<tr>
<td>OECD</td>
<td>Organization for Economic Corporation and Development</td>
</tr>
<tr>
<td>PCs</td>
<td>Personal Computers</td>
</tr>
<tr>
<td>PTCs</td>
<td>Participating Primary Teachers Colleges</td>
</tr>
<tr>
<td>R &amp; D</td>
<td>Research and Development</td>
</tr>
<tr>
<td>SAGAs</td>
<td>Semi Autonomous Government Agencies</td>
</tr>
</tbody>
</table>
SPSS  Statistical Package for Social Sciences
TSC  Teachers Service Commission
UNESCO  United Nations Education Scientific and Cultural Organization.
USAID  United States Agency for International Development
WBT  Web Based Training
ABSTRACT

This study sought to investigate the status of E-learning readiness in public secondary schools in Kenya given the agreement by educators and policy makers across the world on the importance of Information and Communication Technologies (ICTs) to the future of education. There is also a policy emphasis by Ministry of Education on ICT integration into education and training systems in Kenya. The main objective of the study was to assess the level of preparedness of public secondary schools in Kenya to implement E-learning so as to enhance access, equity and quality in secondary education. The study employed a descriptive survey design. Head teachers, teachers and students of public secondary schools were targeted. Systematic sampling technique was used to select ten (10) schools from a list organized in order of performance of Kenya Certificate of Secondary Examination (KCSE) (2009) by public secondary schools in Nakuru municipality. The researcher then used simple random sampling to select 24 students from each school. In mixed gender schools, stratified random sampling was employed to select the students with the sampling strata being student’s gender. Students in form three were stratified into boys and girls, and then simple random sampling employed to select 12 boys and 12 girls. The total students sample from the ten schools was 240. Five (5) teachers were randomly selected from each school for the study, giving a total of 50 teachers. Head teachers were purposively selected from the ten selected schools to have a total of 10 head teachers. The total sample size for the study was 300 respondents. Questionnaires were used to collect data. After coding the responses manually, data was entered into the Statistical Package for Social Sciences (SPSS) computer program for analysis. Descriptive statistics such as frequencies, percentages and mean were used to analyze the data quantitatively. Qualitative data obtained from the open-ended questions was analyzed according to themes based on the study objectives and the research questions and thereafter, inferences and conclusions were drawn. Analyzed data was presented using tables, bar graphs and charts. The study revealed that public secondary schools in Kenya lack adequate ICT infrastructure and connectivity to support effective E-learning delivery. There are no standardized software, application programmes and digital content suitable for E-learning and also there exist capacity building gaps among teachers on how to integrate ICT tools in education. E-learning is mostly limited to computer based training and schools are not benefiting from other modes like on-line learning, synchronous and asynchronous learning. On the strength of the findings and the subsequent conclusions drawn, this study recommended among other things that education stakeholders in the country should finance provision of ICT facilities, digital equipments and Internet connectivity in public secondary schools. The Ministry of Education should also train all the teachers on how to integrate ICTs in education in addition to providing standardized E-learning software, application programmes and digital content to all schools in the country to enhance their uptake of E-learning delivery systems.
CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

Information and Communication Technologies (ICTs) have the potential to enhance access, equity and quality in education across the board at primary, secondary and tertiary level and also support teacher training. Additionally, ICTs can enhance the effectiveness, efficiency and transparency in the management and administration of education. World Bank (2009) attest to this premise and assert that educators and policy makers are in agreement about the paramount importance of ICTs to the future of education and that they can help countries achieve their Millennium Development Goals (MDGs).

The MDGs are eight internationally agreed goals to be achieved by 2015 that respond to the World's main development challenges and they emphasize on the following: Elimination of extreme poverty and hunger; Universal Primary Education; gender equality; reduction in child mortality; improvement in maternal health; lower HIV/AIDS and major disease incidence; environmental sustainability; and better partnerships with international development partners.

Education receives special attention in MDG2, which focuses on enhancing primary education in terms of quality and access; in MDG3, which focuses on women's access to education; and in MDG8, which seeks to promote collaboration and develop a skilled workforce.

ICTs in education initiatives that focus on the following areas are most likely to successfully contribute to meeting the MDGs:
1.1.1 Increasing access through distance learning

ICTs can provide new and innovative means to bring educational opportunities to greater numbers of people of all ages, especially those who have been excluded, such as population in rural areas, women facing social barriers, and students with disabilities (World Bank, 2009). Wadi and Sonia (2002) add that ICTs in education can expand access through integrating populations that have been traditionally excluded from education for cultural and social reasons. They state that in cultures with strict rules regarding interaction between genders, girls may be forced to leave schools before puberty to avoid contact with male colleagues and teachers. Technologies can promote alternatives for educating women that are cost-effective than all-female schools without disrupting cultural traditions. Television and radio broadcasts or Internet-based technologies enable girls to continue their studies from home or small learning centers thus helping to promote gender equality and women empowerment through education.

For persons with disabilities, Wadi and Sonia (2002) state that technology provide essential support enabling them to participate in the educational system and job market. They observe that visual Technology can be used by people with visual disabilities to enlarge print materials; voice synthesizers can enable individuals with muscular dystrophies to communicate; special computer software can be used to ameliorate learning disabilities or to enhance the memory of individuals with traumatic brain injury; keyboard adaptations enable individuals with motor disabilities to write, and the Internet can connect home bound individuals to classrooms and workplaces;

1.1.2 Enabling a knowledge network for students

World Bank (2009) notes that with knowledge being the crucial input for productive process within today’s economy, the efficiency by which it is acquired and applied determines economic success. Effective use of ICTs can contribute to the timely transmission of information and
knowledge thereby helping education systems meet this challenge. ICTs have the potential to bring the product of the best teachers to classrooms anywhere in the world. For self-motivated, disciplined students, ICTs can speed the path toward a degree and expand their learning options through self study. Students can ‘shop’ a course on the Internet and choose their own program of study and schedules;

1.1.3 Training teachers

World Bank (2009) also projects that larger numbers of teachers will be needed to meet the Millennium Development Goals for education. The use of ICTs can therefore help in meeting teacher training targets. Moreover, ICTs provide opportunities to complement on the job training and continuing education for teachers;

1.1.4 Broadening the availability of quality education materials

Network technologies have the potential to increase the availability of quality educational materials. Their interactivity and global reach allows for customized sharing of knowledge, materials and databases, quickly and cheaply over long geographical distances (World Bank, 2009). Furthermore, online resources offer teachers access to a vast and diverse collection of educational materials, enabling them to design curricula that best meet the needs of their students. These can impact positively on the quality and relevance of education;

1.1.5 Enhancing the efficiency and effectiveness of educational administration and policy

Lastly, World Bank (2009) observes that new technologies can help improve the quality of administrative activities and process, including human resource management, student registration and monitoring of students enrolment and achievement. This initiative is fundamental in lowering the cost of education which can in turn encourage access and participation of all students including those from poor backgrounds.
Whereas the impact of ICTs on education goals is still inconclusive, reported observations include rapid expansion of knowledge, improved examination outcomes, enhanced communication and technical efficiency, as well as greater decentralization in the delivery of education services. There is no doubt, however, that ICT has the potential to play a more powerful role in increasing resources and improving the environment of learning. ICTs can also play a role in preparing students to acquire skills, competencies and social skills that are fundamental for competing in the emerging global "knowledge" economy (Republic of Kenya, 2006b).

1.1.6 Information Communication Technologies and E-learning

The use of ICTs in education promotes E-learning. E-learning refers to learning that is supported by electronic technology and use of Internet. E-learning integrates ICTs in the learning process. This gives rise to different modes of learning such as Computer Based Training (CBT), Web Based Training (WBT), Synchronous and Asynchronous learning and Distance Learning (DL).

In Kenya, there are currently over 4000 public secondary schools and the recent massive increase in primary schools enrolment due to Free Primary Education (FPE) is putting pressure on the demand for and access to secondary schools. There are also concerns about the quality of secondary education which is characterized by poor performance in core subjects such as mathematics, science and languages (Republic of Kenya, 2005b).

This study seeks to establish how public secondary schools in the country are prepared to adopt E-learning as a mode of delivery so as to enhance access, equity and quality in secondary education and also help in production of e-literate learners who can properly fit in the global knowledge economy. Anouk, Bart and Nyaga (2005) points out that in order to function in the new world economy, students and teachers have to learn to navigate large amounts of
information, analyze and make decisions in order to master new knowledge and accomplish complex tasks collaboratively. Additionally, UNESCO (2008) observes that companies are now seeking employees who have the skills to maximize the potential of ICTs to enhance productivity in the workplace. Schools are therefore under pressure to prepare students for these changes in society and in the workplace.

The US Department of Education (1996) reports that by 1996, 91% of secondary schools in USA were using computers, 62% were using advanced telecommunications and 73% had integrated technology into school curriculum. Most schools in USA have Internet access and the percentage of public schools with Internet access has been on the rise, with secondary schools reporting the highest Internet access as shown in table 1.1 below.

Table 1.1: Percentages of USA public secondary schools with Internet access by 1994, 1997 and 1998

<table>
<thead>
<tr>
<th>School characteristics</th>
<th>1994(%)</th>
<th>1997(%)</th>
<th>1998(%)</th>
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<tbody>
<tr>
<td>Elementary</td>
<td>30</td>
<td>75</td>
<td>88</td>
</tr>
<tr>
<td>Secondary</td>
<td>49</td>
<td>89</td>
<td>94</td>
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</table>


In Spain, the penetration of IT in primary and secondary schools is very close to a 100% in urban areas and only schools located in isolated rural zones are unequipped (Betty, 1994).

According to Infinedo (2005), African countries are not prepared or compare poorly with other economies on the global networked economy. South Africa leads with a higher attainment of e-readiness which is attributed to good leadership and well nurtured policies (Miller, 1999).
Makau (1988), in a review of literature on ICT, notes that Uganda’s adoption and integration of ICTs into professional development program for primary school teachers, is a step in the right direction. Through governmental agencies, the United States Agency for International Development (USAID), Uganda has been able to set up multimedia training laboratories in Kampala which enhances the curriculum with ICTs by developing, testing and distributing online multimedia training modules for teachers and tutors. These teachers in turn will train current and future teachers at the Participating Primary Teachers Colleges (PTCs).

1.1.7 The Kenya ICT Policy

Through the Ministry of Information and Communications, Kenya drafted an ICT policy in January 2006. Based on the Common Market for Eastern and Southern Africa (COMESA) model adopted by the COMESA council of ministers in March 2003, the policy aims to encourage sustained economic growth and poverty reduction, promote social justice and equity, mainstream gender in national development, empower youth and disadvantaged groups, stimulate investment and innovation in ICT, and achieve universal access. Some of the strategies proposed in the growth and implementation of E-learning are that the government will:

i. Promote the development, sharing and integration of E-learning resources to address the educational needs of primary, secondary and tertiary institutions.

ii. Enhance the dissemination of E-learning initiatives through provision of affordable infrastructure (Republic of Kenya, 2006a).

The ICTs in Education Options paper for the Ministry of Education, Science and Technology (MOEST) discusses the ways in which ICTs can be leveraged to support and improve the delivery of quality education for all Kenyans (Republic of Kenya, 2006a). The ideas presented here respond to the educational priorities outlined in Sessional paper No. 1 of 2005 and the
Kenya Education Sector Support Program (KESSP). The KESSP provides a roadmap for investment in E-learning and suggests provisional budgets to support educational activities. E-learning is identified in the following investment programs;

1. Primary Teacher In-service Training: This program aims at in-servicing teacher trainer on E-learning methodologies so that teachers can be equipped with the skills on how to integrate ICT in education.

2. ICT in Education investment program: This program outlines the strategies and policies that will foster E-learning delivery systems, build the necessary capacity and promote the development of required ICT infrastructure and institutional management systems (Republic of Kenya, 2005b).

The Ministry of Education in collaboration with the private sector through the Kenya ICT Trust Fund developed a National ICT Strategy for Education and Training aimed at making ICT integration possible at all levels of education and training. The strategy outlines how Information and Communication Technology will be adopted and utilized to improve access, quality and equity in the delivery of education services in Kenya. It identifies the strategic pillars for sector ICT implementation as: Establishment of a policy framework; Digital equipments; Connectivity and network infrastructure; Technical support; Harnessing emerging technologies; Digital content development; Integration of ICTs in education; Training (capacity building including professional development); Research and development; Partnership and resource mobilization; Legal and regulatory framework and monitoring and evaluation (Republic of Kenya, 2006b).

Following the above efforts by the government and other stakeholders to leverage use of ICT in education, schools in Nakuru municipality seem to be implementing E-learning initiatives going by the vacancies for computer teachers advertised in the municipality by the Teachers Service
Commission (TSC) on 15th August, 2010 in Sunday Nation News paper. Some of the schools however, may be lacking the basic E-learning resources like infrastructure, digital equipment, connectivity and adequately trained personnel. It is against this background that the researcher wishes to assess the actual E-learning readiness in public secondary schools in Nakuru municipality as the Ministry of Education prepares to roll out the E-learning curriculum in schools.

1.2 Statement of the Problem

Given the important role that ICTs in education have been depicted to play in enhancing access, equity, relevance and quality of education; the Kenyan government through the National Information and Communications Technology (ICT) policy outlined various strategies to help promote the growth and implementation of E-learning in Kenyan education sector. The Ministry of Education policy on ICT as stated in the Kenya Education Sector Support Program (KESSP) is to integrate ICTs into education and training systems in order to prepare the learners and staff for the Kenyan economy and enhance the nations ICT skills. To facilitate this, the Ministry in collaboration with the private sector through the Kenya ICT Trust Fund developed a National ICT strategy for Education and Training aimed at making ICT integration possible at all levels of education and training. Despite these efforts, there are concerns over institutions E-learning readiness in terms of infrastructure, connectivity, and adequately trained human resource required in order to realize the full benefits of ICT use in education. For instance, during the 1st Regional Education Conference on E-learning held in Nairobi between 29th-31st March, 2010 at Kenya Institute of Education (KIE), the Minister for Education noted that although much had been done on ICT integration, capacity building, and localization of digital content, a paradigm shift in implementation strategy would go beyond just putting computers on the desks by dealing
with the other strategic pillars for sector ICT implementation as well (S. Ongeri, Minister's speech, March 30th, 2010). It is in this context that the current study sought to investigate the question: How prepared are public secondary schools in Kenya to implement E-learning so as to facilitate acquisition of quality and relevant secondary education?

1.3 Purpose of the Study

The study investigated the extent to which public secondary schools in Kenya are prepared to adopt E-learning as a mode of teaching and learning so as to enhance access, equity and quality in secondary education at the current heights of limited places and falling standards of education in the secondary sub-sector.

1.4 Objectives of the Study

The objectives of the study were:

i. To assess the availability of E-learning infrastructure like computer laboratories, computer hardware and software programs for E-learning in the schools.

ii. To determine the schools connectivity to the Internet.

iii. To establish teachers and students’ use of E-learning in their respective roles of teaching and learning.

iv. To establish the hindrances that teachers and students are encountering in the use of E-learning in secondary schools.

v. To establish the teachers and students preparedness in terms of skills and training for using ICT tools for teaching and learning respectively.

vi. To determine strategies that can be applied to hasten E-learning implementation in public secondary schools in Kenya.
1.5 Research Questions

The study was guided by the following research questions:

i. What is the status of E-learning infrastructure and equipment in public secondary schools?

ii. What is the state of the schools' connectivity to the Internet services?

iii. To what extent are secondary schools utilizing electronic technology in teaching and learning?

iv. What hindrances do teachers and students encounter in the use of E-learning in secondary schools?

v. What is the teachers and students preparedness in terms of skills and training for using ICT tools for teaching and learning respectively?

vi. What strategies can be applied so as to hasten E-learning implementation in public secondary schools in Kenya?

1.6 Assumptions of the Study

The following were the assumptions of the current study

i. Secondary schools in Kenya are currently utilizing ICT tools in their teaching and learning process.

ii. Teachers have knowledge in using ICTs to give instructions, use computer interactive mode of study and Internet as a source of teaching and learning materials.

iii. Students have been taught how to use ICTs to receive instructions, use computer interactive mode of study and Internet as a source of learning materials.

iv. Some secondary schools are not prepared for E-learning.
1.7 Limitations of the Study

i. The study was limited to a small sample of 10 public secondary schools in Nakuru municipality due to financial and time constraints.

ii. There was a dearth of literature on Kenya E-learning readiness leading to difficulty in review of related literature.

1.8 Delimitations of the Study

i. The study was only limited to the preparedness of public secondary schools to implement E-learning delivery systems. The impact of E-learning to educational output of these schools was not investigated by the current study due to time and financial resources constraints.

ii. The study was also limited to public secondary schools because they are beneficiaries of Ministry of Education Computerization Project.

1.9 Significance of the Study

It is envisaged that the findings of this study will inform educators, curriculum specialists, policy makers and the Ministry of Education on the status of E-learning preparedness in public secondary schools as preparations to roll out the E-learning curriculum get underway so that appropriate measures can be undertaken to facilitate a smooth implementation of E-learning delivery systems in secondary subsector of education in Kenya.

The government can also use the findings to mobilize resources from the public and private sector in order to support E-learning initiatives in Kenyan education.

The research will also add to the body of knowledge in the area of E-learning and e-readiness by contributing literature to the area.
1.10 Theoretical Framework

The study was guided by the New Growth Theory which was developed by Stanford economist, Paul Romer in the late 1980s and early 1990s. The theory emphasizes that economic growth results from the increasing returns associated with new knowledge.

New Growth Theory is a view of the economy that incorporates two important points. Firstly it views technological progress as a product of economic activity. It is often called "endogenous" growth theory, because it internalizes technology into a model of how markets function. Secondly, new growth theory holds that unlike physical objects, knowledge and technology are characterized by increasing returns, and these increasing returns drive the process of growth (Cortright, 2001).

This theory views knowledge as an additional factor of production (Romer, 1994). The role played by ICT in enhancing creation, storage and distribution of knowledge is emphasized. According to this theory, a country's capacity to take advantage of knowledge economy depends on how quickly it becomes a learning economy. The use of ICT enhances lifelong learning. The theory gives an explanation for technological advancement in promoting economic growth. It incorporates the concept of human capital, the skills and knowledge that makes workers productive. Knowledge is regarded as a basic form of capital. Knowledge is subject to increasing returns because it is a non-rival good. It can be shared and has positive externalities (Cortright, 2001). The use of E-learning in educational institutions will promote the acquisition of knowledge and skills. E-learning also promotes the development of IT skilled economy and will therefore enhance economic growth.

Investment in E-learning infrastructure, digital equipment, connectivity and human capacity in secondary schools will therefore enable them to embrace use of E-learning. E-learning will in
turn help in production of e-literate students who can properly fit in the global knowledge economy.

1.11 The Conceptual Framework

ICT in education initiatives have been suggested by educators and policy makers' world over as a tool that will enable nations to meet their Millennium Development Goals by enhancing access, equity, relevance and quality of education. The investment in E-learning infrastructure, digital equipment, connectivity and capacity building is therefore a major requirement for a nation to achieve these goals.

This investment in the educational institutions can be considered as the independent variable. Teaching, learning and outcomes of education systems are the dependent variables because they depend on the level of E-learning investment in schools as depicted in Figure 1.1 below.
Figure 1.1: The Conceptual Framework Showing Impact of E-learning on Teaching and Learning Objectives.

**Investment in E-learning infrastructure in schools, digital equipment, connectivity and capacity building**

**Teaching Objectives**
- Availability of teaching materials
- Easy development of teaching materials
- Easy dissemination of information and knowledge
- Enhanced teacher training and development
- Improved quality of administration

**Learning Objectives**
- Access to education
- Timely transformation of information and knowledge
- Student centered methods and active participation
- Bringing abstract concepts to life

**Outcomes**
- Efficient education system
- Low cost of education
- High education outputs

Source: Researchers own design

From the above framework, investment in E-learning infrastructure, digital equipment, connectivity and capacity building by government and institutions will enhance E-learning delivery systems in schools. In teaching, there will be broadened availability of quality educational materials; easy development of teaching materials; easy dissemination of
information and knowledge and enhanced teacher development through on the job training and continuing education. These factors are crucial for promoting quality in education. Additionally, improved quality of administration through use of ICTs will enhance effectiveness, efficiency and transparency in educational institutions thus lowering the cost of secondary education and making it affordable and accessible to many students.

In the learning process, learners who are excluded from education by various socio-economic constraints can access education using E-learning; there will be easy transmission of information and knowledge to learners thus enabling a knowledge network for students; use of student centered approaches which will facilitate active participation of learners in the teaching and learning process. Moreover, E-learning brings abstract concepts to life, especially when concepts go against immediate intuition and common knowledge of learners.

Republic of Kenya (2005b, p.149) asserts that E-learning delivery systems are intended to achieve increased access to education opportunities, increased access to learning materials, enhanced teaching/delivery methods; increased sharing of learning materials and more affordable education.

Enhanced and effective use of E-learning will lead to quality outcomes that encompass efficient education system; low cost of education and high education outputs.
1.12 Operational Definitions of Significant Terms

Asynchronous learning- Participants engage in the exchange of information without the dependency of other participants' involvement at the same time e.g., e-mail.

Computer based training- Learning through the use of computer aided by CD ROMs and other accessories without hooking up to the Internet.

Computer- An electronic device used for storing and processing data, making calculations and controlling machinery.

Connectivity- How are networks easy and affordable to access and to use.

Digital divide- Refers to the gap between those regions which are able to access and use information technology and those which are not able to do so.

Distance learning- Using information technologies to deliver instructions to learners who are at remote locations from a central site.

E-learning- The ability to electronically transfer, manage, support, and supervise learning.

E-literate- Having knowledge about the use of computers and other electronic devices.

E-readiness- The state in which an institution is prepared to use and benefit from information technology.

Information Communication Technologies- Tools which allow digitized information to be accessed, stored, manipulated and exchanged.

Infrastructure- Computer hardware, and software and network connections that can take advantage of the existing digital resources and create new digital resources in the schools.

Online learning- Learning through which instructions are given through the Internet.
Synchronous learning- Activities that involve the exchange of ideas and information with one or more participants at the same time e.g. video conferencing.

Web based learning- Learning in which students access their training course via an Internet connection.
CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter reviewed literature related to the e-readiness status of the world, status of ICT use in Education from a World perspective, African perspective and Kenyan perspectives. It went on to depict how the various regions have fared in E-learning and lastly discussed the impact of ICT use on education.

2.2 E-readiness Status of the World

According to the Economic Intelligence Unit (EIU, 2009), Denmark reclaimed the world’s e-readiness leadership in 2009, a position it had relinquished to the USA in 2008. Other North European countries such as Sweden (2nd), the Netherlands (3rd) and Norway (4th) having, among other attributes, higher levels of ICT usage reaffirmed their places among the top ten e-readiness countries.

EIU (2009) continued to note that progress in the “connectivity and technology infrastructure” category of indicators was particularly notable in the Middle East and Africa, Eastern Europe and Latin America. But there remained a large gap between these and mature markets, which may have a negative knock-on effect on the usage score of less well-connected countries.

In the social and cultural environment where education weight in overall score is 15%, USA had 9.03%, Australia 8.67%, Sweden 8.63% and Denmark 8.53%. Africa was led by Nigeria at 5.37%, Egypt at 5.17% and Algeria at 4.37% (EIU, 2009). The category criteria was Educational level (measured by school life expectancy and gross enrolment in education); Internet literacy; degree of entrepreneurship; technical skills of workforce; degree of innovation (measured by the generation of patent and trademarks as well as R&D spending).
2.2.1 Status of E-learning in the World

Pelgrum (2001) observes that the last two decades have witnessed a worldwide proliferation of Information and Communication Technologies (ICTs) into the field of education. The global adoption of ICT into education has often been premised on the belief that the new technological tools will revolutionize an outmoded educational system, better prepare students for the information age, and accelerate national development efforts. In developing countries in particular, the above promises have generated a whole set of wild speculators about the necessity of educational reforms that will accommodate the new tools.

According to the Commission of The European Communities (CEC) (2008), member states meeting in Lisbon identified ICT as a core component of the knowledge society and a necessary instrument for adopting education to it. As a result, E-learning initiatives and programs were adopted with specific funding and strong support from stakeholders. CEC (2008) continues to state that all member states have programs and actions to integrate ICT in education. This translated into intensive efforts to provide equipment and train teachers in ICT skills. This has led to wider use of ICT in schools in Europe. The European Union aims at promoting digital literacy, setting up European virtual campuses and e-twinning of schools which refers to partnering schools where students and teachers share academic and social knowledge with their counterparts in other countries. ICT use in Europe is widespread in higher education, nearly all universities have websites and nine out of ten have Intranet.

Elina (2008) observes that in a study carried out in Romania between August 2007 and May 2008, to investigate ICT use in education, seven out of ten teachers preferred to teach using computers. The teachers linked good performance in their disciplines to use of ICT. This study
indicated that students considered the most important effect of using ICT for school lessons as a simplified learning process followed by easier understanding of content.

In another survey of ICT and Education conducted in the Caribbean, Gaible (2008) notes that the base of ICT infrastructure in schools has the potential to contribute to education system more effective response to policy goals and to internal and external forces affecting the Caribbean today. Most secondary schools and some primary schools provide access to computers and, where the telecommunications systems permits, to the Internet. Several countries- Jamaica, Trinidad and Tobago, Barbados and others- have major technology implementations in process or nearing completion. However, the study concludes that computers and the Internet have had limited impact in Caribbean primary and secondary education beyond serving as a base supporting students achievement on the practical portions of the CXC IT examinations. Major barriers to effective education, such as teacher's capacity, the relevance of the curriculum, information management, and graduates competencies have not been affected by the past decade’s investments in ICT.

In Hong Kong, according to the Education and Manpower Bureau (EMB, 1998), the Special Administrative Region (SAR) government’s five year strategic plan on ICT implementation in schools was launched in late 1998. EMB (1998) adds that this five year strategic plan was embedded within a broader framework of education reforms that aim to develop students' capacities for self-learning, problem solving, information seeking and analysis and critical thinking as well as the ability to communicate, collaborate and learn abilities that figured much less importantly in previous school curricula. Yuen, Law and Wong (2003), noted that with this launch, Hong Kong entered a very exciting period of rapid expansion and development in ICT. According to Yuen et al., the challenge involved was not simply a case of technological
adoption, but rather a process of innovation, which required both financial and training support for schools, as well as cooperation between teachers and school leadership to ensure success.

2.3 Status of E-learning in Africa

A study by Infineon (2005) observes that Africa has long been disadvantaged by lack of fast and affordable connectivity with the rest of the globe. African countries are not prepared or compare poorly with other economies on the global networked economy. The study indicated that on the African map, South Africa led the rest of the countries in terms of e-readiness. Likewise Southern African countries had e-readiness scores that were relatively better than those of Africa’s average whilst those in North Africa had scores that compared with Africa’s average. Collectively, Africa’s e-readiness was poor within the global economy.

In a survey of ICT and Education in Africa, Farrell and Shafika (2007) found that there was a great deal of variance in ICT policies for education among the 53 African countries surveyed. South Africa clearly is unique in terms of being able to move its ICT agenda forward. Several of the countries of North Africa that have both resources and high bandwidth connectivity with Europe have also been able to make excellent progress implementing their ICT plans. Those countries that are steadily moving to sustainable economies (Mauritius, Ghana, and Botswana, for example) constitute another group making remarkable progress. The survey added that the largest group is made up of those countries that are in transition from a sustained period of conflict and economic instability and are looking to ICT applications to help them meet myriad challenges particularly the development of their human resource capacity. They are among the neediest in terms of assistance. Unfortunately there remains a group of countries that are still plagued with political instability and internal conflicts that make progress on the ICT for education agenda impossible.
In terms of ICT Infrastructure for education in Africa, Farrell and Shafika (2007) noted that most countries surveyed have, or are in the process of liberalizing their telecommunications policies to enable more competition and diversity of service providers in the industry. While this is having the effect of lowering the cost of access to information and telecommunication infrastructure, the cost of connectivity remain unaffordable for most educational institutions. Furthermore, there are huge gaps between urban and rural areas in terms of access to ICT infrastructure.

For the case of Infrastructure in schools, the survey observed that African Ministries of Education have begun to be more proactive in coordinating and leading the development of ICT infrastructure in schools systems as their ICT policies and implementation plans have taken shape. However, civil society, principally the Non Governmental Organizations (NGOs) working with donor agencies, continue to play a major role in providing computers to schools and lobbying governments to take a leading role.

As pertaining to teacher professional development, the survey noted that most countries surveyed have had some investment in developing the capacity of teachers to use ICTs as a teaching and learning resource through both in-service and pre-service programmes. Most teacher training programmes in Africa involve the development of basic ICT skills, sometimes as an end in itself, although in some cases these include the application of ICTs as learning tools for teachers.

The issues of leadership and commitment by African governments as well as the reliance of the developed and richer international community in providing the ingredients to help bridge the widening digital divide between Africa and the rest of the world were proposed in the Infinedo (2005) study.

Mutula (2003) identified the ICT constraints as: high cost of access to telecommunications; government policy towards ICT; under utilization of existing technologies; limited indigenous
base; digital illiteracy. In addition to these, Jain (2006) mentioned lack of skilled and trained manpower; inadequate IT exposure in schools; lack of National IT policy; poor communication infrastructure; ignorance of IT benefits; expensive ICT equipment and resistance to change as the major impediments to ICT use in education in Africa. Jain observes that, despite developments in Internet growth in Africa, poor telephone infrastructure, low international bandwidth and high-dial-up tariffs levied on Internet users continue to be limiting factors to accessing the Internet.

Butcher (2003:68) sums up the low level of technology penetration in Africa as due to the following reasons: The general low level of economic activity often makes technology unaffordable; many African countries still have irregular or non-existent electricity supplies, which makes ICT use problematic; rail, road and air transport is limited and this infrastructure is needed to implement and support ICT infrastructure, as well as the increased social and economic activity that this technology should stimulate; many tax regimes define computers and cellular phones as luxury items, which adds to the price of these goods especially as the vast majority must be imported; and lastly, lack of skills together with the problem of brain drain makes widespread adoption of new technology difficult.

Tables 2.1 and 2.2 below respectively provide a summary of the economic and technology/infrastructure status of selected African countries, as well as various OECD countries, and low, middle and high-income countries.
Table 2.1: Technology in Africa

<table>
<thead>
<tr>
<th>Country</th>
<th>Technology and Infrastructure</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Telephone/1000</td>
<td>Cost/local call /3min</td>
<td>Personal computers/1000</td>
<td>Internet host/1000</td>
</tr>
<tr>
<td>Benin</td>
<td>-</td>
<td>-</td>
<td>1.5</td>
<td>0.0</td>
</tr>
<tr>
<td>Egypt</td>
<td>75.0</td>
<td>12.0</td>
<td>4.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Kenya</td>
<td>10.3</td>
<td>0.1</td>
<td>6.4</td>
<td>0.0</td>
</tr>
<tr>
<td>Nigeria</td>
<td>-</td>
<td>-</td>
<td>54.7</td>
<td>33.4</td>
</tr>
<tr>
<td>South Africa</td>
<td>125</td>
<td>0.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Table 2.2: Technology in OECD countries and Economic groups

<table>
<thead>
<tr>
<th>Country</th>
<th>Technology and Infrastructure</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Telephone/1000</td>
<td>Cost/local call /1000</td>
<td>Personal computers/1000</td>
<td>Internet host/1000</td>
</tr>
<tr>
<td>Switzerland</td>
<td>699</td>
<td>0.1</td>
<td>461.9</td>
<td>370.6</td>
</tr>
<tr>
<td>Norway</td>
<td>709</td>
<td>0.1</td>
<td>446.6</td>
<td>753.1</td>
</tr>
<tr>
<td>USA</td>
<td>664</td>
<td>-</td>
<td>510.5</td>
<td>1479.7</td>
</tr>
</tbody>
</table>

Economic groups

| Sub-Saharan Africa | 18 | 0.1 | 8.4 | 2.3 |
| Low income         | 26.3 | 0.1 | 4.4 | 0.3 |
| Middle income      | 121.3 | 0.1 | 27.1 | 7.6 |
| High income        | 582.3 | 0.1 | 345.1 | 603.1 |


Table 2.1 and 2.2 above show the low level of technology penetration in African countries compared to OECD countries. In addition, the differences between different African countries are highlighted in table 2.1.
2.4 Status of E-learning in Kenya

Only a few studies have been done to ascertain the level of preparedness of Kenyan institutions in as far as use of ICT in education is concerned. One of them was conducted by Kenya Education Network (KENET) in 2006. The survey sought to assess the level of preparedness of higher education institutions to use ICT in teaching, learning, research and management and the capacity of readiness of the institutions to use electronic learning to improve the quality of education (Kashorda, Waema, Omosa and Kyalo, 2007). The study found out that most institutions were not ready to use ICT for E-learning and that the institutions authorities allocated minimal resources to the development of ICT. Kashorda et al. (2007) also noted that the institutions were characterized with inadequate bandwidth, low access to networked personal computers by staff and students, low quality of campus network infrastructure and limited campus access to library resources.

In another survey of ICT and education in Africa: Kenya country report, very few secondary schools had sufficient ICT tools for teachers and students and even in schools that had computers, the student-computer ratio was 150:1 (Farrell, 2007). In addition, a study by Wabuye (2003) indicated that while ICT has penetrated many sectors including banking, transportation, communications, and medical services, the Kenyan educational system seems to lag behind. The study found that computer use in Kenyan classrooms is still in its early phases, and concluded that the perceptions and experiences of teachers and administrators do play an important role in the use of computers in Kenyan classrooms. Kenya School Net (2003) also found out that although schools were aware of benefits of computers, few had them and only one school had a website.
The following table 2.3 from the World Economic Forums (WEF) Global Information Technology Report 2005-2006 help to benchmark the status of ICT use in Kenya including in the education sector.

Table 2.3 Kenyan selected ICT indicator ranking

<table>
<thead>
<tr>
<th>Growth competitiveness index technology</th>
<th>Rank out of 25 African countries</th>
<th>Rank out of 102 countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of competition in the ISP sector</td>
<td>11</td>
<td>73</td>
</tr>
<tr>
<td>Internet access in schools</td>
<td>14</td>
<td>86</td>
</tr>
<tr>
<td>Laws relating to ICT</td>
<td>9</td>
<td>67</td>
</tr>
<tr>
<td>Internet users, 2002</td>
<td>9</td>
<td>80</td>
</tr>
<tr>
<td>Internet host, 2002</td>
<td>8</td>
<td>77</td>
</tr>
<tr>
<td>Personal computers, 2002</td>
<td>14</td>
<td>86</td>
</tr>
<tr>
<td>Cellular phones, 2002</td>
<td>10</td>
<td>82</td>
</tr>
<tr>
<td>Telephone lines, 2002</td>
<td>13</td>
<td>89</td>
</tr>
<tr>
<td>Government prioritization of ICT</td>
<td>20</td>
<td>81</td>
</tr>
</tbody>
</table>


In terms of policy environment, the Ministry of Education has articulated role of ICT in education in documents such as Kenya Education Sector Support Program (KESSP). Republic of Kenya (2005b) states that the Ministry of Education policy on ICT is to integrate ICT into education and training systems in order to prepare learners and staff for Kenyan economy and enhance national ICT skills. Among the strategies proposed are the facilitation of universal access to ICT infrastructure and connectivity in addition to building institutional and human capacity to enable use of ICT in education and training in all institutions of learning in Kenya.
The Ministry of Education in collaboration with the private sector through the Kenya ICT Trust Fund have also developed a National ICT strategy for Education and Training aimed at making ICT integration possible at all levels of education and training (Republic of Kenya, 2004).

This strategy outlines how Information and Communication Technologies (ICTs) will be adopted and utilized to improve access, quality and equity in the delivery of education services in Kenya. The overall objective of the plan is to ensure that systematic efforts are made towards strengthening adoption and use of ICT in education sector with appropriate attention given to education development priorities as outlined in the Economic Recovery Strategy for Wealth and Employment Creation (ERSWEC, 2003-2007); Sessional paper No.1 of 2005, entitled "A Policy Framework for Education, Training and Research" and the United Nations' Millennium Development Goals (MDGs).

The National ICT strategy for Education and Training also identifies the strategic pillars for sector ICT implementation as: Establishing of a policy framework; Digital equipment; Connectivity and Network Infrastructure; Technical support; Harnessing emerging technologies; Digital content development; Integration of ICTs in education; Training (capacity building including professional development); Research and development; Partnerships and resource mobilization; Legal and regulatory framework and Monitoring and evaluation (Republic of Kenya, 2006).

The National Information and Communication Technology (ICT) policy of Kenya which is a product of the ERSWEC (2003-2007) was developed by the Ministry of Information and Communication in January 2006. To improve the quality of teaching and learning in Kenyan schools, the policy aims to promote the growth and implementation of E-learning. To do this, the government will employ the following strategies:
1. Promote the development, sharing and integration of E-learning resources to address the educational needs of primary, secondary and tertiary institutions: facilitate public-private partnerships to mobilize resources in order to support E-learning initiatives, develop integrated E-learning curriculum to support ICT in education and promote distance education and virtual institutions, particularly in higher education and training.

2. Enhance the dissemination of E-learning initiatives: this will entail provision of affordable infrastructure to facilitate dissemination of knowledge and skills through learning platforms, promote the establishment of a national ICT centre of excellence, create awareness of the opportunities offered by ICT as an educational tool of education sector, exploit E-learning opportunities to offer Kenyan education programmes for export (Republic of Kenya, 2006a, pp.12-13).

It thus should be noted that the National ICT policy embedded the intent of KESSP (of mainstreaming ICTs into the teaching and learning process) as a national priority and provided the impetus for the ministry to develop its sector policy on ICT in education as contained in the National ICT Strategy for Education and Training document.

Despite these efforts, Farrell (2007) observes that the education sector in Kenya lacks adequate connectivity and network infrastructure although a small number of schools have direct access to high speed connectivity through Internet service providers. However, there is light at the end of the tunnel as noted by Check Point (2008) who points out that Kenya has become the third African country to launch E-learning facilities in secondary schools after South Africa and Nigeria. In its article, Check point states that the program sponsored by Intel, aims at equipping schools to use computers and wireless connectivity for all types of class work. The new program aims to replace the blackboard with touch screen and students to send their work to teachers
through wireless connectivity. However rolling of this program may not be effective in rural areas since they lack the basic infrastructure to enhance this type of learning.

2.5 Impact of ICT Use on Education

Use of ICT in education has enormous benefits. Butcher (2003:75) lists some of these benefits as:

a) Delivery of educational resources: ICTs can be used to provide immediate, up-to-date resources, using one or more media, to large numbers of educators and learners, easily and relatively cheaply.

b) Facilitating communication: ICTs can be used to support a range of communication strategies, especially easy asynchronous communication between educator and learner, and amongst learners.

c) Facilitating interaction in resources: ICTs can provide educators with a range of very interesting opportunities for creating resources that allow learners different levels of interactivity. This can lead to the creation of interesting and exciting interaction of learners with educational resources.

d) Building and exploiting information bases: ICTs enable storage of information in such a way that it can also be manipulated for future purposes. This is important because value lies not in possessing information, but rather in developing the skills and capacity to manipulate it effectively for new applications.

According to a study done on the use of ICTs in schools in OECD countries it was noted that ICT rarely acts as a catalyst by itself for schooling change yet can be a powerful lever for
realizing planned educational innovations (Venezky and Davis, 2002:13). Very often most effective use of ICT is as a lever of educational change rather than as a change in and of itself.

ICTs that promote E-learning in schools have benefits in that there are diversified forms of learning such as online learning, blended learning and open learning. The use of electronic devices in education has positively revolutionized the education sector. E-learning reduces the overall cost of education such as traveling, accommodation and other hidden costs. Learners can get access to resources, meet their tutors, and sit for examinations without being physically present in a class. Chambers (2000) points out that E-learning eliminates the barriers of time and distance, creating universal learning-on-demand opportunities for people, companies and countries. Students who lack access to education through barriers such as geographical distance, work, time, family responsibilities, cultural and social barriers and lack of money can get access through online learning.

2.6 Summary of Literature Reviewed

From the literature review, it can be observed that the USA and Western Europe have built a strong base for the ICT use in all fields including education. This has largely been attributed to good e-strategy, developed infrastructure and large investments in the ICT sector. Despite the notable progress in e-readiness in Africa, there still exists a large digital divide between the developing and the developed world. Africa still lags behind in using ICT and there is need for good e-strategies to improve its connectivity to the globe. In Kenya, the government prioritization of ICT is very low as depicted in Table 2.3 and there is need for a paradigm shift in matters pertaining to leadership in ICT so that the country can leap the benefits of ICT use in education. This study aimed at assessing the level of e-readiness in public secondary schools. Most studies have concentrated on e-readiness in the tertiary level of education and ICT
constraints. This study sought to fill the gap in research by evaluating the progress made and assessing the level of E-learning preparedness in secondary level of education.

According to Republic of Kenya (2006a, p.26), the government targets to provide all primary schools with affordable Internet access by the year 2015, and all secondary schools and tertiary institutions were to have affordable Internet access by the year 2010.

Moreover, the Ministry of Education through the ICT investment program under the Kenya Education Sector Support Program (KESSP) also proposes to facilitate universal access to ICT infrastructure and connectivity in addition to building institutional and human capacity to enable use of ICT in education and training in all institutions in Kenya. This study was therefore timely to evaluate the progress made as the Ministry of Education prepares to roll out the E-learning curriculum in schools.

Lastly, the Kenyan government recognizes the role of technology in helping to attain the educational goals of Vision 2030 which are to provide globally competitive education, training and research for development. Among the implementation strategies specified by the government is to establish a computer supply program that will equip students with modern ICT skills (National Economic and Social Council of Kenya (NESC), 2007). There however exists a gap in knowledge today as pertains to the readiness of schools in Kenya to implement E-learning delivery systems. This study therefore aimed to fill this gap by describing the preparedness of public secondary schools to use electronic technology so as to help in achieving the education aspirations of Vision 2030 which are to reduce illiteracy by increasing access to education, improve the transition rate from primary to secondary schools, and raise the quality and relevance of education.
CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter gives an account on research design, location of the study, target population, sample and sampling procedure, research instruments, piloting, data collection procedure and data analysis methods that were used in the study.

3.2 Research Design

The study adopted a descriptive survey design. The design was appropriate for this study because as noted by Borg and Gall (1989:5) descriptive survey research is intended to produce statistical information about aspects of education that interest policy makers and educators. Lockesh (1984) also notes that descriptive survey studies are designed to obtain pertinent and precise information concerning the current status of phenomenon and wherever possible to draw valid general conclusions from the facts obtained. This study surveyed a sample of public secondary schools in Nakuru municipality to describe the state of E-learning readiness among public secondary schools in Kenya.

3.3 Location of Study

The study was carried out in Nakuru municipality in Nakuru County. The municipality has middle and high income earners who reside in Kiamunyi, Naka, Teachers and Milimani areas in addition to the low income earners who are largely concentrated in Kaptembwa, Mwariki, Kivumbini, Ng’ambo, and Kwa Rhoda slums. The rationale for choosing the municipality was that it is home to several public secondary schools that are categorized as National secondary schools, Provincial secondary schools and District secondary schools. Resource allocation to these schools is largely determined by this categorization and since the current study aimed to
assess the preparedness of public secondary schools in Kenya to adopt E-learning which in itself require resources, Nakuru municipality provided a credible accessible population that would enable generalization of results to the targeted population in the country. Another reason for selecting the municipality for the study was due to the researcher’s own interest and knowledge of the area. Singleton (1993) observes that the ideal setting for any study is one that is directly related to the researcher’s own interests.

3.4 Target Population

Mugenda and Mugenda (2003:9) define target population as that population to which a researcher wants to generalize the result of a study. The current study targeted the 20 head teachers, 465 teachers and 2400 students in form three in all the 20 public secondary schools in Nakuru municipality. The head teachers were required to give the status of E-learning readiness in their schools, level of ICT investment and the strategies in place to enhance E-learning in their schools. Teachers and students gave information on their preparedness, whether they are adequately equipped with skills to use E-learning, how they utilize electronic technology in teaching and learning respectively and challenges faced in using E-learning in their schools.

All the head teachers and teachers in the municipality were targeted for the study because of the emphasis that the Ministry of Education is putting on primary, secondary and higher learning institutions to adopt ICTs in educational institutions so as to lower the cost of education, enhance access to educational opportunities and provide quality education in tandem with the Ministry’s vision.

All the students in form three were targeted for the study because according to the revised Secondary Education Curriculum, the skill of using the Internet is taught in form two to achieve objective seven (7) in the English syllabus that states that “At the end of the course the learner
should be able to make an efficient use of range of sources of information including libraries, dictionaries, encyclopedias and the Internet” (Republic of Kenya, 2006c:61). In the current study it was thus assumed that since English is a core subject in all secondary schools in the country, the skill of using the Internet which is important for E-learning had rightfully been imparted to the students in form two and therefore students in form three were already practicing it as a source of information and knowledge.

3.5 Sample and Sampling Procedures

Systematic sampling technique was used to select 10 (50%) schools from a list organized in order of performance by public secondary school in the municipality in the KCSE examination 2009 so as to get a sampling frame. Orodho (2008) states that systematic sampling involves selecting members at equal intervals by picking some random point in the list and every $nth$ element is selected until the desired sample size is obtained. From each of the 10 schools, simple random sampling (folding of papers) was used to select 24 students. In mixed-gender schools, stratified random sampling was used with the sampling strata being students' gender. Students were stratified into boys and girls, and then simple random sampling used to select 12 boys and 12 girls.

To select the students, the names of all students in form three were written down in separate pieces of papers. The pieces of papers were folded and put in two containers (one for boys and one for girls in mixed-gender schools and one container in case of single sex schools). After shuffling, the researcher picked 12 papers at random from each container for mixed schools and 24 papers at random for single sex. The student whose name was picked constituted the sample in that form.
The total students sample from the ten schools was 240 (10%). Five (5) teachers were randomly selected from each school to give a total of 50 (10.7%) teachers while the head teachers were selected using purposive sampling, thus giving a total number of 10 (50%) head teachers. The total sample size used in the study was 300 (10.4%) respondents. Gay (1992) suggests that a sample of 10% should be considered minimum for a large population and 20% for a small population. The sample size for the current study is represented in Table 3.1 below.

Table 3.1: The sample size for the study

<table>
<thead>
<tr>
<th>Category</th>
<th>Target population (N)</th>
<th>Sample size (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head teachers</td>
<td>20</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>Teachers</td>
<td>465</td>
<td>50</td>
<td>10.7</td>
</tr>
<tr>
<td>Students</td>
<td>2400</td>
<td>240</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2885</strong></td>
<td><strong>300</strong></td>
<td><strong>10.4</strong></td>
</tr>
</tbody>
</table>

3.6 Research Instruments

The researcher used questionnaires and observation schedule as research instruments.

3.6.1 Questionnaires

The researcher designed questionnaires to collect information from head teachers, teachers and students. According to Kombo and Tromp (2006), questionnaires facilitate the collection of information from a large sample and diverse regions. The questionnaire instruments were
preferred for this study because they allow greater uniformity of questions, hence ensuring
greater comparability of the information elicited by each set. The three sets of questionnaires
constructed included:

i. **Questionnaires for head teachers.** These sought to establish their level of preparedness
to integrate ICTs in their schools, whether they have attended any ICTs integration
courses organized by the Kenya Education Staff Institute (KESI) which are aimed at
impacting ICT usage in schools administration, the status of E-learning infrastructure in
their schools, connectivity of the schools to the Internet, accessibility of E-learning
equipment to staff and students and level of preparedness of the school to roll out E-
learning.

ii. **Questionnaires for teachers:** These sought to establish their level of preparedness to use
E-learning in teaching, determine their skills and training in using ICT tools for teaching
and learning and the hindrances in utilizing E-learning in the schools.

iii. **Questionnaires for students:** These sought to establish students' preparedness to use E-
learning, whether they are adequately equipped with skills to use ICTs for their studies
and for future employment and how E-learning is helping them in their education.

### 3.6.2 Observation Schedule

Kombo and Tromp (2006) explain that an observation schedule is used as a checklist to record
what the researcher observes during data collection. In the current study, the observation
schedule was used to verify the information collected on the number of computer laboratories
available in each school, total number of computers available for use by teachers and students,
the schools connectivity to the Internet and how the schools were Implementing E-learning.
3.7 Piloting

Before visiting the selected schools for data collection, the questionnaires were pre-tested using two schools in the municipality, but which were not included in the final sample. The purpose of the pilot study was to verify the reliability and validity of the research instruments and it enabled the researcher to modify and remove ambiguous items on the instruments.

3.7.1 Reliability of the Instruments

According to Mugenda and Mugenda (2003), reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials. Test-retest method was used in the current study to check the reliability of the instruments. The instruments were piloted in two secondary schools not included in the final sample of schools. The questionnaires were given to the respondents to fill in. The answered questionnaires were scored manually and after a period of two weeks the same questionnaires were administered to the same group and scored manually. A comparison of the first and second score was made using Pearson’s product moment correlation coefficient to determine the reliability of instruments. A correlation coefficient of 0.75 was obtained for head teacher’s, teacher’s and student’s questionnaires. This showed that the instruments were reliable because 0.75 was lower than the 0.8 correlation coefficient that Orodho (2008) propose to be considered high enough for judging any instruments as reliable for a study.

3.7.2 Validity of the Instruments

Mugenda and Mugenda (2003) define validity as the accuracy and meaningfulness of inferences, which are based on the research results. Thus, content validity is a non-statistical method used to validate the content employed in the research instrument. Firstly, the researcher went through the instruments and compared their content with the set objectives to ensure that they contained all
the information that addressed the study objectives. Secondly, the researcher discussed with his supervisors and authorities in E-learning field about content validity of the instruments and thereafter incorporated their recommendations and inputs so as to improve on validity of the instruments.

3.8 Data Collection

The researcher obtained a letter of introduction from the university and then visited the National Council of Sciences and Technology (NCST) to obtain a research permit. He then reported to the Nakuru Municipality Education Officer for permission before proceeding to book appointments with the head teachers of the sampled schools. During the visit, the researcher would interact and develop a rapport with the head teachers of respective schools while at the same time explain to them the purpose of his study. After acquiring permission from head teachers, the researcher would go on to sample the other respondents using the techniques explained in 3.5 above and also explain to them the purpose of his study before administering the instruments. The students would fill the questionnaires and the researcher would carry them the same day but the head teachers and teachers' questionnaires would be left to be picked on the next day after filling because they elicited more comprehensive detail than those of the students.

3.9 Data Analysis

After collecting the data, the responses were coded manually before entering them into the Statistical Package for Social Sciences (SPSS) computer program for analysis. Descriptive statistics such as frequencies, percentages and mean were used to analyse data quantitatively. Qualitative data obtained from the open-ended questions were analyzed according to themes
based on the study objectives and the research questions and thereafter, inferences and conclusions were drawn. The analyzed data was presented using tables, graphs and charts.
CHAPTER FOUR
DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter presents the findings of the study. The purpose of this study was to investigate the extent to which public secondary schools in Kenya are prepared to adopt E-learning as a mode of teaching and learning so as to enhance access, equity and quality in secondary education at the current heights of limited places and falling standards of education in the secondary sub-sector.

The findings are discussed according to the following research objectives.

i. To assess the availability of E-learning infrastructure like computer laboratories, computer hardware and software programs for E-learning in the schools.

ii. To determine the schools connectivity to the Internet.

iii. To establish teachers and students use of E-learning in their respective roles of teaching and learning.

iv. To establish the hindrances that teachers and students are encountering in the use of E-learning in secondary schools.

v. To establish the teachers and students preparedness in terms of skills and training for using ICT tools for teaching and learning respectively.

vi. To determine strategies that can be applied to hasten E-learning implementation in public secondary schools in Kenya.

4.1.1 Demographic Information of the Respondents

The study involved a survey of public secondary schools in Nakuru Municipality, Nakuru County. The schools types included 1 (10%) boys; 1(10%) girls and 8 (80%) mixed schools.
while the schools categories included 2 (20%) National; 4 (40%) Provincial and 4 (40%) District schools. This shows that all types and categories of schools were represented in the study.

The respondents included 10 (50%) head teachers who were found to be 8 (80%) males and 2 (20%) females; 50 (10.7%) teachers who were found to be 28 (56%) males and 22 (44%) females; and 240 (10%) students who were found to be 134 (55.8%) males and 106 (44.2%) females. All the head teachers and teachers involved in the study were found to be professionally trained educators suited for secondary schools teaching.

4.2 Availability of E-learning Infrastructure

The first objective sought to assess the availability of E-learning infrastructure like computer laboratories, computer hardware and software programs for E-learning in the schools. Data obtained from the 10 sampled public secondary schools in Nakuru Municipality revealed that 8 (80%) of the schools had one computer laboratory each while 2 (20%) had two computer laboratories each as depicted in Figure 4.1.

Figure 4.1: Number of Computer Laboratories in Secondary Schools
One of the schools that had two laboratories had in addition established a school cyber café where teachers and student frequented to access Internet. The data also revealed that the schools were equipped with an average of 80 personal computers that served both teachers and students.

The average student per computer ratio in the sampled secondary schools was noted to be fifteen students per computer which was considered to be poor for effective adoption of E-learning.

In terms of software, application programmes and digital content for teaching different subjects, the findings revealed that the secondary schools were ill equipped with only 2 (20%) of the schools affirming that they had acquired software suited for E-learning while 8 (80%) affirmed that they did not have any of the afore said resources for E-learning as depicted in Figure 4.2.

**Figure 4.2: Availability of Software, Application Programmes and Digital Content Suited for E-learning in Schools**

In addition, 8 (80%) of the schools sampled reported to allocate some financial resources for E-learning purposes while 2 (20%) reported that no financial resources were allocated for the same with a justification that there was no specific vote head set aside for such initiatives by the MoE.
4.2.1 Accessibility to E-learning Facilities in Schools

As regards to the accessibility to E-learning facilities in the schools, 68% of the sampled teachers reported that the facilities in their schools were accessible to teachers any time they required to use them. As pertains to students, 54% reported that the E-learning facilities in their schools were accessible to them during designated times that included lesson breaks and allocated times in the preps time table. The remaining 46% students felt that the facilities were not accessible and preference was only given to students who were taking computer studies as a subject in the respective schools.

4.3 Schools Connectivity to the Internet

The second objective sought to determine the school connectivity to the Internet. E-learning is highly dependent on the use of computers and the Internet. In online learning, instructions are given through the Internet while in Web based learning students access their training course via an Internet connection. Internet is also a rich source of academic materials and learners have an opportunity of sharing ideas with their colleagues in addition to meeting some of the best teachers from any corner of the world. The findings of this study revealed that 80% of the sampled schools were connected to the Internet and most school administrators affirmed that Internet was affordable because the cost was minimal compared to the schools annual budget. This can be attributed to the concerted efforts undertaken by the government to bring down the cost of Internet connection by laying the undersea optical fiber and completion of the national optical fiber backbone in 2009.

However, despite the fact that most schools (80%) were found to be connected to the Internet, only 10% and 30% indicated that they were using the Internet for E-learning at a very great extent and great extent respectively as depicted in Table 4.1.
Table 4.1: The Extent at which Schools Use the Internet for E-learning (N=10)

<table>
<thead>
<tr>
<th>Extent</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very great extent</td>
<td>1</td>
<td>10.0</td>
</tr>
<tr>
<td>Great extent</td>
<td>3</td>
<td>30.0</td>
</tr>
<tr>
<td>Little extent</td>
<td>2</td>
<td>20.0</td>
</tr>
<tr>
<td>Very little extent</td>
<td>2</td>
<td>20.0</td>
</tr>
<tr>
<td>Not applicable</td>
<td>2</td>
<td>20.0</td>
</tr>
</tbody>
</table>

All the sampled schools reported to be using computer based mode of learning which entail the use of computer aided by CD ROMs and other accessories without hooking up to the Internet. No school was found to be using the other modes like online, synchronous or asynchronous learning. Additionally, only 30% of the schools reported to be having a school website where they only posted information relating to the school profile.

As pertains to accessibility to the Internet connected computers, 40% of the schools were found to have connected computers accessible to teachers and students to the Internet. The main uses of Internet here were reported to be search for supplementary academic materials and personal communication. This means that Internet as an E-learning resource was inadequate in the schools and the minimal that was there was underused and misdirected as far as E-learning is concerned.

4.4 Use of E-learning in Secondary Schools

The third objective sought to establish whether teachers and students are using E-learning in their respective roles of teaching and learning. Findings revealed that teachers are using E-learning at the extent depicted in Table 4.2.
Table 4.2: The Extent at which Teachers are using E-learning (N=50)

<table>
<thead>
<tr>
<th>Extent</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very great extent</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>Great extent</td>
<td>9</td>
<td>18.0</td>
</tr>
<tr>
<td>Little extent</td>
<td>12</td>
<td>24.0</td>
</tr>
<tr>
<td>Very little extent</td>
<td>5</td>
<td>10.0</td>
</tr>
<tr>
<td>Non-respondents</td>
<td>23</td>
<td>46.0</td>
</tr>
</tbody>
</table>

Table 4.2 revealed that only 20% of the sampled teachers are currently using E-learning as mode of delivery at a considerable extent of great and very great extent. The teachers gave valid reasons as to why they were using E-learning at the extent they had reported. Six percent of the teachers indicated that they were using it at a very great extent because it was a schools policy where every subject had been allocated time in the main time table once every week for the teachers and their students to access E-learning facilities in the school. Eighteen percent indicated that they were using it at a great extent because of the availability of E-learning infrastructure in their schools. These reasons are further summarized in Figure 4.3.
In addition, data collected from the students about subjects taught using E-learning revealed that computer studies led by 30% followed by the three sciences at 23% cumulatively; Geography at 3%; Mathematics at 0.8%; Agriculture at 0.8%; French at 0.4% and English at 0.2%. These findings show that E-learning is practiced in the secondary schools at very minimal levels with students taking computer studies as an examinable subject getting the most exposure to E-learning.
4.5 Hindrances to the Adoption of E-learning in Public Secondary Schools

The forth objective sought to establish the hindrances that teachers and students are encountering in the use of E-learning in secondary schools. Several factors were highlighted by head teachers, teachers and students as the main hindrances to the smooth adoption of E-learning in public secondary schools. Firstly, the reasons given by head teachers as factors inhibiting acquisition of E-learning infrastructures in secondary schools are summarized in Figure 4.4.

**Figure 4.4: Factors Inhibiting Acquisition of E-learning Infrastructure**

![Diagram showing factors inhibiting acquisition of E-learning infrastructure]

Figure 4.4 revealed that (40%) of the head teachers unanimously decried the lack of financial resources as the main inhibitor of acquisition of E-learning infrastructure in their schools. This finding is consistent with that of Kashorda et al. (2007) who found out that most institutions of higher learning in Kenya were not ready to use ICT for E-learning because of the minimal financial resources allocated to the development of ICT.
Secondly, close to half of the teachers (48%) reported that lack of ICT skills among teachers and students was the main impediment to adoption of E-learning in public secondary schools followed by lack of infrastructure to support E-learning at 36% as depicted in Figure 4.5.

**Figure 4.5: Impediments to the Adoption of E-learning by Teachers**

Figure 4.5 show that, despite the various capacity building courses organized by the Kenya Educational Staff Institute (KESI) to train teachers on integration of ICT in education, there still exits capacity building gaps among teachers on ICT integration skills which are paramount for effective adoption of E-learning. Jain (2006) and Mutula (2003) mentioned lack of skilled and
trained manpower and digital illiteracy as the main impediments to Africa’s adoption of the new technologies in the field of education.

In addition, close to half of the students (43.3%) decried the lack of E-learning equipments like functional computers as the main hindrance to using E-learning in their schools. Table 4.3 summarize the main inhibitors to E-learning adoption mentioned by students.

<table>
<thead>
<tr>
<th>Hindrance</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of computers</td>
<td>104</td>
<td>43.3</td>
</tr>
<tr>
<td>Lack of connectivity to the Internet</td>
<td>30</td>
<td>12.5</td>
</tr>
<tr>
<td>Lack of facilities (e.g computer laboratories)</td>
<td>45</td>
<td>18.8</td>
</tr>
<tr>
<td>Lack of E-learning software and programmes</td>
<td>2</td>
<td>0.8</td>
</tr>
<tr>
<td>Lack of IT skills in students</td>
<td>13</td>
<td>5.4</td>
</tr>
<tr>
<td>Lack of support from school administration</td>
<td>25</td>
<td>10.4</td>
</tr>
<tr>
<td>Non-respondents</td>
<td>21</td>
<td>8.8</td>
</tr>
</tbody>
</table>

The concern by students about the inadequacy of computers is further supported by data presented in 4.2 which put the average number of computers in public secondary schools at 80 translating to an average student-computer ratio of 15:1. The situation is made worse by the fact that not all students are allowed access to E-learning facilities because they are usually being
used by their colleagues for computer studies lessons. In a survey of ICT and education in Africa: Kenya country report, (Farrell, 2007) had observed that very few secondary schools had sufficient ICT tools for teachers and students and even in schools that had computers, the student-computer ratio was very high. Additionally, the students concern concurs with a study by Olaniyi (2006) that noted lack of computers in schools as a major hindrance to E-learning in Less Developed Countries.

4.6 Preparedness of Teachers and Students to use ICT Tools in Education

The fifth objective sought to establish the teachers and students preparedness in terms of skills and training for using ICT tools. The study sought to establish whether teachers had obtained any skills in using ICTs in education. Specifically the study set out to know if they had any skills on how to use computers for teaching and learning; how to prepare digital content; their knowledge on Internet use and how they use it to source academic materials; how they utilize ICTs in classrooms and the measures the schools are taking in preparing them for E-learning.

4.6.1 Skills on how to use Computers for Teaching and Learning

All the sampled teachers 50 (100%) reported to having some basic skills on how to operate computers. Amongst these, 21 (42%) said that they had acquired the skills from training formally in colleges; 20 (40%) said that they had acquired the skills through personal interactions with computers while the remaining 9 (18%) said that they had acquired the skills through seminars and courses sponsored by their respective schools. The study went further to establish how frequently teachers were using computers to enhance E-learning in their schools and the findings are summarized in Table 4.4.
Table 4.4: The Frequency in which Teachers use Computers for E-learning (N=50)

<table>
<thead>
<tr>
<th>Extent</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very frequently</td>
<td>7</td>
<td>14.0</td>
</tr>
<tr>
<td>Frequently</td>
<td>10</td>
<td>20.0</td>
</tr>
<tr>
<td>Less frequently</td>
<td>10</td>
<td>20.0</td>
</tr>
<tr>
<td>Not at all</td>
<td>23</td>
<td>46.0</td>
</tr>
</tbody>
</table>

Table 4.4 depicted that only 14% and 20% of the teachers in the sampled schools are using computers to enhance E-learning very frequently and frequently respectively. This finding can be attributed to lack of requisite skills to integrate ICTs in education as earlier shown in Figure 4.5 where 48% of the teachers mentioned lack of skills among teachers as the main impediment to adoption of E-learning in public secondary schools in Kenya. This is also supported by data presented in Figure 4.10 where a higher number of teachers suggested enhanced capacity building in ICT in education integration as a measure that could boost the adoption of E-learning in schools meaning that the basic computer operating skills that all of them claimed to have were not adequate for E-learning implementation.

4.6.2 Teachers Skills on Electronic Content Development

The study also investigated the percentage of teachers with skills in the preparation of electronic content for students. 52% reported to having some basic skills in the preparation of electronic content. However, only 16% of the teachers said that they usually prepared E-content for their students. The reasons given by teachers for not preparing E-content for their students are summarized in Table 4.5.
Table 4.5: Reasons for not Preparing E-content by Teachers (N=50)

<table>
<thead>
<tr>
<th>Reason</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of ICT equipments such as computers and projectors</td>
<td>15</td>
<td>30.0</td>
</tr>
<tr>
<td>Lack of E-content development skills</td>
<td>20</td>
<td>40.0</td>
</tr>
<tr>
<td>Time limitations</td>
<td>5</td>
<td>10.0</td>
</tr>
<tr>
<td>Lack of support from the administration</td>
<td>10</td>
<td>20.0</td>
</tr>
</tbody>
</table>

Table 4.5 revealed that lack of E-content development skills was the reason given mostly at 20 (40%) as to why teachers did not prepare electronic content for their students. It was followed by lack of necessary ICT equipments at 15 (30%); lack of support from the administration at 10 (20%); and lastly, time limitation at 5 (10%). This also pointed to the teachers’ lack of adequate skills for using ICT tools which is a major requirement for enhancing E-learning delivery systems in schools.

4.6.3 Knowledge on how to use Internet for Teaching and Learning

The knowledge on use of the Internet for teaching and learning by teachers was investigated in this study. Internet is a rich source of academic materials especially the most current because knowledge is posted on a regular basis. Internet is integral in E-learning because students can access instruction online or even obtain courses through the web in a mode termed as web based or on-line learning. The study aimed at assessing the extent which teachers are using the Internet as a resource in teaching and learning process in their respective schools.
Twenty six (52%) of the teachers affirmed that they were using Internet as an aid in the teaching and learning process. These teachers however reported to be using the Internet for E-learning purpose at the frequency depicted in Figure 4.6.

**Figure 4.6: The Frequency in which Teachers are using the Internet for E-learning Purposes**

Figure 4.6 depicted that only 32% of the teachers were using Internet for E-learning very frequently and frequently respectively while 48% said that they were not using Internet at all as a resource for teaching and learning. Moreover, only 2% of the teachers said that they encouraged their students to submit their assignments through e-mail. This can also be attributed to lack of requisite skills to integrate Internet in the teaching-learning process just like with the other ICT tools reported in 4.6.1 and 4.6.2 bearing in mind that Internet has been found to be a rich source of educational materials that can interest teachers and students.
4.6.4 Preparedness of Students to use ICT Tools in Education

The study also investigated whether students had acquired any skills to use the ICT tools in their learning process. Two hundred and seventeen (90.4%) affirmed that they knew how to operate a computer. In addition, 212 (88.3%) reported that their schools offered some ICT training to students. These trainings were imparted through introduction to computer studies subject and some schools also organized teachers with IT skills to train students in basic computer operation skills. The students reported to use the computers for the functions summarized in Figure 4.7.

Figure 4.7: The Uses of Computers by Students
Figure 4.7 showed that most students (69.2%) were using computers to search for academic materials on-line; 10% used computers to work out assignments while 2.5% used computers to do revision using materials saved by their teachers. This shows that students were more enthusiastic to use computers for E-learning than their teachers which can be attributed to the acquired skills flexible attitude of the former towards technology.

As pertains to skills on use of the Internet, 209 (87.1%) of the students said that they had knowledge on use of the Internet as a source of academic materials. When asked where they accessed the Internet from, the students gave valid responses as summarized in Table 4.6 below.

**Table 4.6: Places where Students Access the Internet (N=240)**

<table>
<thead>
<tr>
<th>Place</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>My school</td>
<td>64</td>
<td>26.7</td>
</tr>
<tr>
<td>Public cyber cafe</td>
<td>124</td>
<td>51.7</td>
</tr>
<tr>
<td>My home</td>
<td>41</td>
<td>17.1</td>
</tr>
<tr>
<td>On mobile phones</td>
<td>4</td>
<td>1.7</td>
</tr>
<tr>
<td>Non-respondents</td>
<td>7</td>
<td>2.9</td>
</tr>
</tbody>
</table>

Table 4.6 shows that most students (51.7%) accessed Internet from public cyber cafes and only 26.7% accessed it from their schools. This findings agrees with the head teachers report that only 40% of Internet connected computers in the sampled schools are shared by teachers and students a fact that shows that lack of adequate Internet connectivity in many public secondary schools is greatly hindering their successful implementation of E-learning. The finding also concurs with Farrell (2007) who observed that the education sector in Kenya lacks adequate connectivity and network infrastructure although a small number of schools have direct access to high speed connectivity through Internet service providers.
This notwithstanding, the students reported to derive the benefits summarized in Figure 4.8 from E-learning.

**Figure 4.8: How Students have benefited from E-learning**

Figure 4.8 revealed that most students (90%) were finding E-learning beneficial to their education because it made learning interesting as well as exposing them to numerous educational resources. This finding is consistent with that of Elina (2008) who observed that in a study carried out in Romania between August 2007 and May 2008 to investigate ICT use in education, students considered the most important effect of using ICT for school lessons as a simplified learning process followed by easier understanding of content.
4.7 Strategies to Hasten E-learning Implementation in Public Secondary Schools

The sixth objective sought to determine the strategies that can be applied to hasten E-learning implementation in public secondary schools in Kenya. Firstly, because E-learning in public secondary schools requires investment in financial resources, head teachers were asked to suggest measures that could ensure that financing of E-learning in public secondary schools is improved. The suggestion given by head teachers are summarized in Figure 4.9 below.

**Figure 4.9: Head teachers Suggestions on how to Improve Financing of E-learning in Public Secondary Schools**

The head teachers being the key implementers of programmes in their schools gave suggestions to improve financing of E-learning in public secondary schools as enumerated in Figure 4.9. A half of the head teachers (50%) suggested that the Ministry of Education should allocate specific funds for E-learning and services in schools. Most schools especially day secondary schools felt that they were constrained financially because the tuition fee allocated for Free Day Secondary
Education was spent in purchasing basic tuition resources like books and stationeries. Forty percent suggested that the private sector and donors should be encouraged to finance E-learning in public secondary schools while 10% suggested that parents should be sensitized on the use and appropriateness of E-learning so that they can also participate in financing of E-learning in their respective schools.

4.7.1 Strategies Suggested by Teachers

Teachers gave varied suggestions on measures that can hasten implementation of E-learning in public secondary schools and they are enumerated in Figure 4.10.

Figure 4.10: Strategies suggested by teachers to hasten implementation of E-learning in public secondary schools

Figure 4.10 revealed that a higher number of teachers (38%) suggested enhanced capacity building in teachers to induct them on ICT integration in education. Most of the teachers pointed
out that the ICT integration courses offered by KESI should be decentralized and made affordable so that they can be reachable to many teachers who are not trained. This means that there are capacity building gaps as pertains to ICT integration that should be filled if effective E-learning is to be implemented in schools.

In addition, 36% and 24% respectively suggested that the government should provide ICT infrastructures to public secondary schools and MoE should prioritize E-learning programmes in schools. This shows that the teachers believe that E-learning delivery systems in schools can be enhanced if the government and MoE invest in the required infrastructure.

4.7.2 Suggestions Made by Students

The students gave their suggestions on what can be done to improve E-learning programmes in their schools and they are as summarized in Table 4.7.

Table 4.7: Students Suggestions to Improving E-learning in their Schools (N=240)

<table>
<thead>
<tr>
<th>Suggestion</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity building of teachers and students</td>
<td>6</td>
<td>2.5</td>
</tr>
<tr>
<td>Provision of E-learning facilities and equipments</td>
<td>142</td>
<td>59.2</td>
</tr>
<tr>
<td>Provision of Internet connectivity to schools</td>
<td>30</td>
<td>12.5</td>
</tr>
<tr>
<td>Government to make E-learning compulsory in schools</td>
<td>44</td>
<td>18.3</td>
</tr>
<tr>
<td>Non-respondents</td>
<td>18</td>
<td>7.5</td>
</tr>
</tbody>
</table>
Table 4.7 revealed that provision of E-learning facilities and equipments was suggested by most (59.2%) of the students as a measure that can improve the status of E-learning in their schools. This gives evidence of the strained E-learning facilities as revealed in 4.2 and also is consistent with the measures suggested by the teachers as depicted in Figure 4.10.

4.8 Discussion

A detailed discussion of the research findings is done according to the six objectives of the study. Discussion flows from the first research objective to the last consecutively.

The first objective set out to assess the availability of E-learning infrastructure like computer laboratories, computer hardware, and software programs for E-learning in the schools. As pertains to facilities, this study established that public secondary schools in Nakuru municipality had at least one computer laboratory. This could act as the basis for improving upon the ICT facilities in these schools.

The average student per computer ratio was however found to be 15:1 which is unfavorable for effective E-learning implementations. This finding notwithstanding, there seem to be some improvement in lowering the students per computer ratio by schools because Farrell (2007) had found the ratio to be 150:1 in Kenyan secondary schools in 2006.

The greatest losers in this scenario are students because the number of computers accessible to them is too low to facilitate meaningful E-learning delivery in their schools. This calls for concerted efforts by the entire stake holders in the education sector so that schools are provided with enough computers that will bring down the current ratio.

As pertains to availability of E-learning software, application programmes and digital content, schools are poorly endowed and this greatly hampers E-learning. Though there has been some efforts by the MoE to provide download programmes and documents like widows vista contents
for ICT integration, guidelines for teachers and students interaction during delivery of multimedia lessons, E-learning lab user manuals and currently the ‘Elimika’ Learning Management System which is a platform developed by KIE to enhance online delivery of curriculum, no school reported to have or be aware of any of the resources thus making E-learning implementation in public secondary schools difficult.

The second objective sought to determine the schools connectivity to the Internet. This study noted that although most head teachers acknowledged that the cost of the Internet was now affordable to schools, only 40% of the schools sampled were found to have connected computers availed to teachers and students to the Internet. This means that a greater number of teachers and students can not easily access information on the Internet neither can they post information there. The implication of this is that many schools are not ready to benefit from on-line learning that reduces the barrier of distance in accessing education and also enhances more people to access to education.

It is worth noting here that the intent of the government to make Internet affordable to secondary schools as envisioned in the National ICT policy (Republic of Kenya, 2006a, p.26), is being felt on the ground as illustrated by 80% of the head teachers who acknowledged that the cost of Internet was now affordable to their schools. This makes the current finding to be in contrast with other findings like Mutula (2003) and Jain (2006) that had noted that Internet cost in Africa was very high and impending schools from adopting modern technologies in education.

The question that arises though is why only 40% of the schools sampled were found to have connected the computers availed to teachers and students to the Internet despite the principals views on its affordability. The answer to this question could be found in Jains’ assertion that
ignorance of IT benefits and resistance to change could be the other major impediments to ICT use in education in Africa.

The third objective sought to establish teachers and students use of E-learning in their respective roles. The study revealed that only 20% of the teachers sampled were using E-learning as a mode of delivery at a considerable extent of great and very great as depicted in table 4.2. The others were either using it minimally or not at all meaning that they and their students were not benefiting from E-learning. This clearly shows that very little E-learning is taking place in secondary schools despite the emphasis by the MoE through its ICT policy and even within the KESSP document. This finding agrees with a study by Wabuyele (2003) which found that computer use in Kenyan classrooms was still in its early phases, and concluded that the perceptions and experiences of teachers and administrators do play an important role in the use of computers in Kenyan classrooms.

The forth objective sought to establish the hindrances that teachers and students are encountering in the use of E-learning in public secondary schools. Most teachers and students said that the main impediments to the adoption of E-learning in public secondary schools were lack of ICT skills and inadequate number of computers as depicted in figure 4.5 and table 4.3 respectively. The head teachers on their part decried the insufficient funds and the high cost of ICT infrastructure. These findings agree with those of Jain (2006) who mentioned lack of skilled and trained manpower; inadequate IT exposure in schools; poor communication infrastructure and expensive ICT equipment as being some of the major impediments to ICT use in education in Africa. This highlights the need to provide pre-service and in-service training programs to enable teachers to successfully teach using computers in the classrooms as well as provide enough
computers for students use so as to enhance E-learning delivery systems in public secondary schools.

Objective five sought to establish the teachers and students preparedness in terms of skills and training for using ICT tools for teaching and learning respectively. From this study, only 34% of the sampled teachers said that they are using computers to enhance E-learning frequently and very frequently in their respective schools, only 16% said that they usually prepared electronic content for their students; only 32% reported to be using the Internet frequently and very frequently for E-learning purposes and only 2% said that they encouraged their students to submit their assignment online through e-mail. The low use of the ICT tools was mostly attributed to lack of skills on how to integrate them in the teaching and learning process. These results were startling considering that MoE through KESI has been conducting ICT in education integration courses that appear not to have benefited most of the teachers sampled.

As pertains to students' preparedness, most of them (90.4%) affirmed that they knew how to operate a computer, 87% said that they had knowledge on use of the Internet as a source of academic materials. This can be attributed to skills obtained at school because 88.3% of the students reported that their schools offered some ICT trainings to students through mainly computer studies subject. The students confided that the knowledge to use ICT tools in education makes their search for learning materials easy and fast in addition to making the learning process interesting to them as depicted in figure 4.7.

While this finding could be encouraging, students in public secondary schools might not derive the full benefits of E-learning due to the inadequacy of E-learning infrastructure and the low school connectivity to the Internet. Only 26.7% access Internet from their schools as shown in table 4.8 while the rest rely on cyber cafés and private sources which might not be well
monitored and might also not offer conducive environment for quality learning process to take place. These concerns are also shared by Farrell (2007) who observed that the education sector in Kenya lacks adequate connectivity and network infrastructure although a small number of schools have direct access to high speed connectivity through Internet service providers.

Lack of E-learning infrastructure and Internet connectivity in Kenya’s public secondary schools also mean that the teachers and students are disadvantaged because they cannot share in the global knowledge economy which is propelled by the use of new ICTs. This also hinders Kenya from realizing the gains of on-line learning that is meant to enhance greater access to education opportunities by mitigating barriers brought about by geographical distances and other social aspects like cultures that prevent girls from accessing education together with boys.

Lastly, objective six sought to determine the strategies that can be applied to hasten E-learning implementation in public secondary schools in Kenya. To begin with, a study by Kashorda et al. (2007) had found out that most institutions authorities in Kenya allocated minimal resources to the development of ICTs and E-learning. The current study therefore investigated from the head teachers how funding to E-learning in public secondary schools could be improved so as to raise the allocation to the same. As depicted in figure 4.9, 50% suggested that the Ministry of Education should allocate specific funds for E-learning and services in schools. Most of them felt that the tuition fee allocated by MoE went mostly to the purchase of basic tuition resources like books and stationeries and hence was not adequate to fund E-learning initiatives in schools. 40% suggested that the private sector and donors should be encouraged to finance E-learning in public secondary schools while 10% suggested that parents should be sensitized on the use and appropriateness of E-learning so that they can also participate in financing of E-learning in their respective schools.
The issue of E-learning funding not withstanding, caution should be taken because other studies (Ford, 2007 and Kessy et al., 2006) have found out that there are many unsustainable ICT programs where schools have computers that do not work as resources that are often redirected and misused. On the same note, the current study found out that 80% of the schools sampled had Internet connectivity but only 40% had availed the same to students and teachers suggesting that the rest of the schools were either redirecting or misusing the same Internet resource that is benefiting others.

On their part, a higher percentage of teachers suggested enhanced capacity building of teachers to induct them on ICT integration in education as depicted in figure 4.10. This is a good strategy that can hasten E-learning implementation in public secondary schools because despite all the teachers having said that they had acquired some basic computer skills and also all the sampled schools having at least one equipped computer laboratory as shown in figure 4.1, only 20% of the teachers as shown in table 4.2 reported to be using E-learning as a mode of delivery at a considerable extent. This puts to question their skills to integrate ICT tools in education. Other studies (Wabuyele, 2003; Mutula, 2003 and Jain, 2006) had also noted that equipping teachers with requisite skills on how to integrate technologies in education was a sure way of speeding the implementation of E-learning in Kenya and in Africa as whole.

In addition, Fourie and Alt (2002) had noted that perceived difficulty in the integration of ICT in education is based on the belief that technology use is challenging, its implementation requires extra time, technology skills are difficult to learn, and the cost of attaining and maintaining resources is prohibitive. This is well illustrated in the current study because figure 4.3 shows that some teachers reported that they don’t use E-learning as it consumes a lot of time during lesson preparation. The MoE has an enormous task to change such attitudes in teachers through pre-
service and in-service training on how to integrate ICTs in education for schools to adopt E-learning as envisioned in the KESSP document. The document asserts that E-learning delivery systems are intended to achieve increased access to education opportunities, increased access to learning materials, enhanced teaching/delivery methods; increased sharing of learning materials and more affordable education (Republic of Kenya, 2005b, p.149).
CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter gives a summary of the findings, conclusion, recommendations and suggestions for further research. The purpose of this study was to investigate the extent to which public secondary schools in Kenya are prepared to adopt E-learning as a mode of teaching and learning so as to enhance access, equity and quality in secondary education at the current heights of limited places and falling standards of education in the secondary sub-sector. It was envisaged that the study would come up with recommendations on strategies that could be used to hasten the implementation of E-learning delivery systems so as to facilitate acquisition of quality and relevant secondary education in Kenya. The study was guided by the following research objectives:

i. To assess the availability of E-learning infrastructure like computer laboratories, computer hardware and software programs for E-learning in the schools.

ii. To determine the schools connectivity to the Internet.

iii. To establish teachers and students use of E-learning in their respective roles of teaching and learning.

iv. To establish the hindrances that teachers and students are encountering in the use of E-learning in secondary schools.

v. To establish the teachers and students preparedness in terms of skills and training for using ICT tools for teaching and learning respectively.

vi. To determine strategies that can be applied to hasten E-learning implementation in public secondary schools in Kenya.
5.2 Summary of the Research Findings

Based on the results broadly presented in chapter four about the E-learning readiness of public secondary schools in Nakuru Municipality, the following is a summary of the study findings.

1. The public secondary schools in Nakuru Municipality are not adequately equipped with necessary infrastructure for effective E-learning to take place. The average computer per student ratio of 15:1 established is very high to enhance effective E-learning. The computer laboratories are also not very accessible to all students especially those who are not taking computer studies subject. In addition, all schools lack standardized software, application programmes and digital content that can support E-learning.

2. Although 80% of the schools were found to have Internet connectivity, only 40% have availed Internet connected computers to the teachers and students which they mostly use for searching for supplementary materials and personal communications.

3. Only 20% of the teachers sampled indicated that they are using E-learning mode of delivery at great and very great extent. Computer based training is the mostly used mode of E-learning and no school was found to be using the other modes like on-line learning, synchronous or asynchronous learning that entail hooking to the Internet.

4. Close to half of the teachers (48%) reported that lack of ICT skills among teachers and students is the main hindrance to effective implementation of E-learning in public secondary schools followed by lack of infrastructure to support E-learning at 36%. On their part, most students (62.1%) mentioned lack of adequate computers and facilities like computer laboratories as the main impediments to E-learning in their respective schools.

5. Most teachers indicated that they felt ill prepared to use ICT tools to enhance E-learning in their schools. This was attributed to lack of requisite skills and training on how to
integrate the tools in the teaching and learning process. As pertains to students' preparedness, those who take computer studies as an examinable subject appeared to be better prepared in terms of skills for E-learning than those who are only trained in basic computer operation.

6. All the respondents suggested that the government through the Ministry of education and other educational stakeholders should improve the existing E-learning infrastructure and connectivity in public secondary schools, increase funding to schools for purchase of digital equipments like computers, projectors and accessories, and most importantly enhance capacity building in teachers in the integration of ICTs in education for them to be able to implement E-learning mode of delivery in public secondary schools effectively.

5.3 Conclusion

From the findings of the study, it can be concluded that

1. Public secondary schools in Nakuru Municipality lack adequately equipped facilities in terms of computer laboratories and cyber cafes required for successful E-learning implementation. The average student per computer ratio of 15:1 is very high for effective E-learning to take place. In addition, the lack of standardized E-learning software, application programmes and digital content makes the implementation of E-learning difficult in public secondary schools.

2. The schools connectivity to the Internet is inadequate even though the cost of the Internet has come down considerably as acknowledged by the schools principals. This prevents the government and schools from reaping the benefits of on-line and distance learning.
that can enhance access to education by groups that have traditionally been excluded by
the face to face mode of teaching and learning.

3. Despite the policy emphasis by the MoE that all schools should adopt E-learning so as to-
increase access to education, improve the quality of education and lower the cost, only a
handful of public secondary schools in the Municipality are using E-learning mode of
delivery at a very small extent through mainly computer based training.

4. The main hindrances to full implementation of E-learning in public secondary schools is
lack of adequate E-learning infrastructure, connectivity, digital equipments, trained
personnel and ignorance of IT benefits on education by schools administrators.

5. Very few teachers have acquired the requisite skills and training on ICT in education
integration that can enhance effective E-learning implementation. The ICT in education
integration courses organized by the Ministry of Education through KESI appear strange
to most teachers and there are no clear modalities on how schools should sponsor their
staff to benefit from such initiatives.

The study therefore concludes that E-learning readiness in Kenyan public secondary schools is
still in its early phases. There is need to address the issue of how its implementation will be
hastened for Kenya to benefit from the use of electronic technology in education. This is the
aspiration of the Kenyan government through Vision 2030 which recognizes the role of
technology in helping to attain the educational goals of providing globally competitive
education, training and research for development.
5.4 Recommendations

Based on the findings from this study, the researcher makes the following recommendations:

1. Education stakeholders in the country should finance provision of ICT facilities and digital equipments in public secondary schools. This will enhance access to ICT facilities by students and teachers, improve the current student computer ratio and ensure that teachers get the necessary equipments to enhance E-learning in their respective schools. In addition, MoE should provide standardized E-learning software, application programmes and digital content to all schools in the country to enable them adopt E-learning delivery systems with ease.

2. The government and the schools should invest in adequate, fast and reliable Internet connectivity that will enhance the schools uptake of the other E-learning modes like the online, synchronous and asynchronous learning that requires hooking to the Internet. These can increase access to education and educational resources to all students regardless of distance, time or physical barriers that militate against education access.

3. There is need to conduct training on ICT integration and strategic planning for ICT integration to public secondary school administrators. The administrators should also be educated on how to respond to the various opportunities created by the government, the private sector and donors that will enhance their schools E-learning uptake and use.

4. The corporate world should be encouraged to invest in ICT infrastructure and capacity building in public secondary schools. This will enable the schools' to adopt to the changing aspect of human capital development that is today driven by technological advancement and the need for lifelong learning enhanced by use of ICTs in education.
All the teachers should be trained on using ICTs in education, especially how to integrate the ICT tools in teaching. Courses like the one organized by KESI to induct teachers on ICT use in education should be mandatory to teachers and made affordable and reachable so as to fill the capacity building gaps among teachers in the country. Moreover, the teacher educators in teacher training institutions should be encouraged to integrate ICTs to instruction so as to serve as models to the pre-service teachers. In addition, computer studies subject should be made compulsory and examinable to all the students so that it is used as an avenue to equip students with E-learning skills.

The government through MoE should increase its allocation on tuition fees and encourage schools to have a specific vote head for E-learning so as to ensure reliable funding of E-learning initiatives by schools. However, measures should be put in place by MoE to ensure that school administrators use the funds efficiently and effectively to create sustainable E-learning programmes in their schools.

5.5 Suggestions for Further Research

i. A similar study is proposed in a rural setting so as to get a clearer picture of E-learning readiness in all public secondary schools across the country.

ii. A study to establish the impact of technology use on learning in secondary schools may be undertaken.

iii. While this study only involved public secondary schools, a comparative study involving public and private learning institutions can be carried out to establish the extent of ICT uptake in the education sector so as to guide the government in further planning of ICT integration in education.
REFERENCES


APPENDIX I

QUESTIONNAIRES FOR HEADTEACHERS

This study seeks to establish the preparedness of secondary schools in Kenya to benefit from using electronic technology so as to enhance access, equity and quality in secondary education. Your secondary school is one of the few that have been selected for this study. Your honest response to this questionnaire will make this study a success.

SECTION A: BACKGROUND INFORMATION

1 (i) (a) Name of the school

(b) Type of School

Boys ( ) Girls ( ) Mixed ( ) (Please Tick appropriately)

(ii) What is the category of this school?

National ( ) Provincial ( ) District ( )

(iii) What is your gender?

Male ( ) Female ( )

(iv) What is your professional qualification?

M.ed ( ) B.ed ( ) PGDE ( ) Diploma in education ( )

(v) Have you ever attended any course on integration of ICTs in schools?

Yes

No

Don’t know

N/a

(b) If yes above, indicate who organized the course and explain how the course has helped you to integrate ICTs in your school.
SECTION B: E-LEARNING FACILITIES AND PERSONEL

2 (i) How many computer laboratories are there in your school? ...........................................

(ii) What is the total number of personal computers (PCs) in your school? ..............................

(iii) How adequate are the available computers to the teachers and student population?

| Very adequate |  
| Adequate     |  
| Not adequate |  

(iv) What is the student per computer ratio? .................................................................

(v) What times of the day are computers accessible to?

(a) Students ..................................................

(b) Teachers ..................................................

(c) Non-teaching staff ...................................

(vi) Has the school employed a computer laboratory technician(s)?

| Yes |  
| No  |  

If yes, what is the qualification of the technician(s)? ......................................................

(vii) What is the average age and speed of the computers in your institution?

(viii) What are the hindrances to acquiring E-learning infrastructure in the school?
(ix) (a) Does the school allocate financial resources for E-learning purposes?

Yes
No
Don’t know
N/a

(b) If yes above, state the adequacy of the financial resources allocated.

Very adequate
Adequate
Don’t know
Inadequate
Very inadequate

(x) How is the school equipped with computer accessories?

Well equipped
Moderate
Ill equipped
SECTION C: INTEGRATION OF ELECTRONIC TECHNOLOGY IN LEARNING

3 (i) Are the software modules, application programmes and digital content to teach different subjects available in your school?

Yes
No
Don’t know
N/a

(ii) Which of the following E-learning applications does the school use?

(Tick on the ones that are used in your school)

1 Web-based (online) learning
2 Computer-based learning
3 Virtual classrooms
4 Digital collaborations
5 None

Others (specify) .........................................................................................................................

(iii) Are there courses organized by your school for teachers who have no knowledge on use of electronic technologies (i.e., computers and Internet) in teaching and learning process?

Yes
No
Don’t Know
N/a

(iv) If yes in (iii) above, please state the type of courses?
.................................................................................................................................................
(v) If no in (iii) above, please explain your response:


(vi) How are teachers periodically updated on the new developments on ICT use in education?


SECTION D: SCHOOL CONNECTIVITY TO THE INTERNET

4(i) (a) Is your school connected to the Internet?

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</thead>
<tbody>
<tr>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Don’t know</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N/a</td>
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</tr>
</tbody>
</table>

(b) If yes, to what extent does your school use the Internet?

<table>
<thead>
<tr>
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<th>□</th>
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</thead>
<tbody>
<tr>
<td>A very great extent</td>
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<tr>
<td>Great extent</td>
<td></td>
<td></td>
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<tr>
<td>Undecided</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Little extent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A very little extent</td>
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<td></td>
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</table>

(ii) (a) Is the cost of the Internet affordable to the school?

<table>
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<th></th>
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<tbody>
<tr>
<td>Yes</td>
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<td></td>
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<tr>
<td>No</td>
<td></td>
<td></td>
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<tr>
<td>Don’t know</td>
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<td></td>
</tr>
<tr>
<td>N/a</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
(b) Explain your response in (ii) above.

(iii) Do the students and teachers have access to Internet connected computers?

Yes [ ]
No [ ]

(iv) (a) Does the school have a website?

Yes [ ]
No [ ]

(b) If yes, which information is posted on the school website?

- Admissions
- Staff emails
- Students' emails
- Course content
- Others (specify)

SECTION E: FINANCING OF E-LEARNING ACTIVITIES IN THE SCHOOL

5 (i) Indicate the percentage of financial support from the following to E-learning and services in the school

Government
Donors
Parents
Others (specify)
(ii) (a) In your opinion, is financing of E-learning in your school adequate?

Yes
No

(b) Rate the extent of adequacy of E-learning financing in your school.

Very adequate
Adequate
Average
Inadequate
Very inadequate

(iii) How can the financing of E-learning be improved?

6 Suggest measures that can hasten the implementation of E-learning in public secondary schools in Kenya.

Thank you for answering this questionnaire
APPENDIX II

QUESTIONNAIRES FOR TEACHERS

This study seeks to establish the preparedness of secondary schools in Kenya to benefit from using electronic technology so as to enhance access, equity and quality in secondary education. Your school is one of the few that have been selected for this study. Your honest response to this questionnaire will make this study a success.

SECTION A: PERSONAL INFORMATION

1) (i) Name of school where you are teaching. .................................................................

(ii) Gender: Male ( ) Female ( ) Tick as appropriate

2) Which are your areas of subject specialization?.................................................................................

3) (i) Have you acquired skills on using electronic technologies (i.e. computers and the Internet)?

Yes

No

(ii) If yes, how did you acquire the skills?

Formal training in college

Personal interaction with computers

Seminars organized by school

Others (specify) ............................................................................................................................................
(iii) Rate the extent to which your ICT skills enhance your use of electronic technologies in your work.

- Very great extent
- Great extent
- Undecided
- Little extent
- Very little extent

SECTION B: USE OF E-LEARNING IN TEACHING

4) (i)(a) In your teaching, do you use E-learning (learning that is supported by use of electronic technologies)?

- Yes
- No

(b) If yes, to what extent?

- Very great extent
- Great extent
- Undecided
- Little extent
- Very little extent

(c) Please explain your response above

........................................................................................................................................
........................................................................................................................................
........................................................................................................................................
(ii) Besides each of the aspects or components presented below, please indicate the frequency in which you and your students use them for E-learning.

<table>
<thead>
<tr>
<th>Component/Aspect</th>
<th>Very frequently</th>
<th>Frequently</th>
<th>Less frequently</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Computer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. C.D ROMS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Internet</td>
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<tr>
<td>4. Email</td>
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</table>

(b) Explain why you are using each of the components/aspects at the rate in which you have indicated above.

(c) If you have indicated any component/aspect in the column labeled ‘Not at all’ above, please explain why this is so.

(iii) In which ways do you benefit from the use of electronic technologies in your subject specialization?

(iv) What are the hindrances in integrating electronic technologies in the teaching and learning process in your school?
(vi) Do you use the Internet as an aid in the teaching and learning process?

Yes [ ]
No [ ]

(vii) If yes above, where do you normally access the Internet?

From my school [ ]
From my server [ ]
From cyber café [ ]

(viii) Which support do you receive from the school in accessing the Internet?

(ix) Do your students submit their assignments through e-mail?

Yes [ ]
No [ ]

(ix) If yes, how effective is the arrangement?

SELECT C: E-LEARNING IN SCHOOLS

5) (i) E-learning is currently being emphasized by the Ministry of Education, do you feel prepared to roll out this program in your school?

Yes [ ]
No [ ]
(ii) Have you received any training in use of electronic technologies in teaching?

Yes ☐

No ☐

(iii) Do you have skills in the preparation of electronic content for use in E-learning?

Yes ☐

No ☐

(iv) If yes, do you always prepare electronic content for your students?

Yes ☐

No ☐

(v) Which challenges do you encounter in preparing electronic content for your teaching?

..................................................................................................................

..................................................................................................................

..................................................................................................................

SECTION D: ACCESSIBILITY TO E-LEARNING FACILITIES

6) What is your comment on accessibility to E-learning facilities in your school?

..................................................................................................................

..................................................................................................................

7) E-learning increase sharing of knowledge and hastens a knowledge economy, how has its use helped you promote sharing of knowledge and information with other professionals.

..................................................................................................................

..................................................................................................................
8) In your view, which steps can be taken to hasten the rolling out of E-learning in public secondary schools in Kenya?

Thank you for answering this questionnaire
APPENDIX III

QUESTIONNAIRE FOR STUDENTS

This study seeks to establish the preparedness of secondary schools in Kenya to benefit from using electronic technologies so as to enhance access, equity and quality in secondary education. Your secondary school is one of the few that have been selected for this study. Your honest response to this questionnaire will make this study a success.

SECTION A: PERSONAL INFORMATION

1) (i) Name of the school

(ii) Gender  Male ( )  Female ( ) (Tick as appropriate)

SECTION B: KNOWLEDGE ON USE OF COMPUTERS AND INTERNET

3) (i) Do you know how to operate a computer?

Yes  
No  

(ii) If yes above, how do you use computers in your academic life?

........................................................................................................................................................................................
........................................................................................................................................................................................
........................................................................................................................................................................................

(iii) (a) In your school, do you receive any training on how to use computers in your learning process?

Yes  
No  

(b) If yes above, explain what type of training........................................................................................................................................................................................................................................................................................................................................................................................................................................................................................
........................................................................................................................................................................................................................................................................................................................................................................................................................................................................................
........................................................................................................................................................................................................................................................................................................................................................................................................................................................................................
4) (i) Do you have knowledge on use of the Internet as a source of academic materials?
   Yes [ ]
   No [ ]

(ii) Where do you access Internet from?
   My school [ ]
   From cyber cafe [ ]
   At home [ ]
   Others (specify) ........................................................................................................

(iii) (a) Do you use the Internet to exchange learning materials with colleagues from other schools?
   Yes [ ]
   No [ ]

   (b) If yes above, explain how ........................................................................................................
   ..............................................................................................................................................
   ..............................................................................................................................................
   ..............................................................................................................................................

(iv) Apart from academic work, which other areas do you use the Internet for?
   ..............................................................................................................................................
   ..............................................................................................................................................
   ..............................................................................................................................................
   ..............................................................................................................................................
SECTION C: ACCESSIBILITY TO E-LEARNING EQUIPMENT

5) (i) (a) How accessible are E-learning equipment (e.g. computers) in your school?

- Very accessible
- Accessible
- Undecided
- Inaccessible
- Very inaccessible

(b) Explain your response.

(ii) Apart from your school, do you have access to E-learning facilities elsewhere?
Yes ( ) No ( )

Explain your response.

(iii) E-learning is learning that is supported by electronic technologies e.g. computers and use of the Internet. How has it helped you in your education?

(iv) Apart from your education, how else has E-learning helped you?
(v) (a) Do your teachers use electronic technologies when teaching?

Yes  
No  
Don't know  
N/a

(b) If yes, which subjects are taught through E-learning?

(c) To what extent are the subjects noted in (b) above taught through E-learning?

Very great extent  
Great extent  
Undecided  
Small extent  
Very small extent

(vi) What are the hindrances to using E-learning in your school?

(vii) In your opinion what can be done to improve use of E-learning in your school?

Thank you for answering this questionnaire
APPENDIX IV

OBSERVATION SCHEDULE

1. Name of the school .................................................................

2. Number of computer laboratories available ................................

3. Number of computers available for use by
   i. Teachers .............................................................................
   ii. Students ...........................................................................

4. Internet connectivity of the schools ............................................

5. Accessibility to E-learning facilities by
   i. Teachers .............................................................................
   ii. Students ............................................................................

6. Number of computer technicians available ..................................

7. Usage of E-learning by the school .............................................
# APPENDIX V
## RESEARCH TIME TABLE

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>DURATION</th>
<th>FROM-TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation of proposal</td>
<td>3 months</td>
<td>Jan-March, 2010</td>
</tr>
<tr>
<td>Proposal submission at the department</td>
<td></td>
<td>April, 2010</td>
</tr>
<tr>
<td>Correcting the proposal</td>
<td>2 months</td>
<td>May-June, 2010</td>
</tr>
<tr>
<td>Defending the proposal at School Postgraduate Studies Committee (SPSC) and making corrections</td>
<td>2 months</td>
<td>July-Aug, 2010</td>
</tr>
<tr>
<td>Piloting</td>
<td>2 weeks</td>
<td>Aug, 2010</td>
</tr>
<tr>
<td>Data collection</td>
<td>3 months</td>
<td>Sep-Nov, 2010</td>
</tr>
<tr>
<td>Data analysis, writing and revision of first draft of Thesis</td>
<td>3 months</td>
<td>Jan-March, 2011</td>
</tr>
<tr>
<td>Preparation and revision of final draft of Thesis</td>
<td>2 months</td>
<td>April-May, 2011</td>
</tr>
<tr>
<td>Thesis examination and defense</td>
<td>3 months</td>
<td>June-Aug, 2011</td>
</tr>
<tr>
<td>Correction and submission of bound copies of Thesis</td>
<td>2 months</td>
<td>Sep-Nov, 2011</td>
</tr>
</tbody>
</table>
## APPENDIX VI
### RESEARCH BUDGET

<table>
<thead>
<tr>
<th>ITEM</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Proposal writing</td>
<td></td>
</tr>
<tr>
<td>(i) Typing and printing</td>
<td>5,000</td>
</tr>
<tr>
<td>2. Piloting</td>
<td></td>
</tr>
<tr>
<td>(i) Photocopying research instruments</td>
<td>2,000</td>
</tr>
<tr>
<td>(ii) Travelling and subsistence</td>
<td>3,000</td>
</tr>
<tr>
<td>3. Data collection</td>
<td></td>
</tr>
<tr>
<td>(i) Photocopying of research instruments</td>
<td>5,000</td>
</tr>
<tr>
<td>(ii) Travelling</td>
<td>4,000</td>
</tr>
<tr>
<td>(iii) Subsistence</td>
<td>4,000</td>
</tr>
<tr>
<td>4. Data analysis and presentation</td>
<td></td>
</tr>
<tr>
<td>(i) Typing and printing</td>
<td>8,000</td>
</tr>
<tr>
<td>(ii) Photocopying and binding</td>
<td>8,000</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>39,000</strong></td>
</tr>
</tbody>
</table>
APPENDIX VII
RESEARCH PERMIT
REPUBLIC OF KENYA

NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telegrams: "SCIENCETECH", Nairobi
Telephone: 254-020-241349, 2213102
254-020-310571, 2213123.
Fax: 254-020-2213215, 318245, 318249

When replying please quote
Our Ref: NCST/RRI/12/1/INF-011/16/5

Daniel Karanja
Kenyatta University
P. O. Box 43844
NAIROBI

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "E-Learning readiness in public secondary schools in Kenya: The case of Nakuru Municipality" I am pleased to inform you that you have been authorized to undertake research in Nakuru Municipality in Nakuru District for a period ending 31st August 2011.

You are advised to report to the District Commissioner and the District Education Officer, Nakuru District before embarking on the research project.

On completion of the research, you are expected to submit one hard copy and one soft copy of the research report/thesis to our office.

P. N. NYAKUNDI
FOR: SECRETARY/CEO

Copy to:
The District Commissioner
Nakuru District

The District Education Officer
Nakuru District