THE INFLUENCE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) ON THE SERVICE DELIVERY OF TEACHERS IN PUBLIC SECONDARY SCHOOLS – NYERI COUNTY, KENYA

BY

WANJOHI, Timothy Gachara

D53/OL/1869/2003

A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILMENT FOR THE REQUIREMENT OF THE DEGREE OF MASTERS OF BUSINESS ADMINISTRATION (HRM) IN THE SCHOOL OF BUSINESS, KENYATTA UNIVERSITY.

OCTOBER 2011
DECLARATION

This research proposal is my original work and has not been presented for a degree award or any other university programme.

Wanjohi, Timothy Gachara

Date

D53/OL/1869/2003

This research proposal has been submitted for examination with our approval as Kenyatta University Supervisors

Signature ... Date ... 02/11/2011...
Mr. Isaac Mungai
Lecturer School of Business
Kenyatta University

Signature ... Date ...
Mr Peter Phillip Wambua
Lecturer School of Business
Kenyatta University

Signature ... Date ...
Chairman
School of Business
Kenyatta University
DEDICATION

This project proposal is dedicated to my family: wife - Mary Wambura Gachara, Children – Lectisiah Wangui Gachara and Francis Wanjoji Gachara for their support and love.
ACKNOWLEDGEMENT

This work would not have been successful without the assistance and encouragement from the following people, who in one way or another gave in their contributions:

My special gratitude and appreciation goes to my supervisors: Mr Mungai and Mr Wambua, who willingly and cheerfully taught me how to write a research project and even went out of their way to ensure that this project is finished in time. God bless you gentlemen.

I profoundly thank my parents Mr Francis Wanjohi Gachara and Mrs Lectisiah Wanjohi, for their support and encouragement as I pursued this course.

I will forever be grateful to my colleagues Mrs Rose Mwangi (Kagumo High School), Mr William Warui (Kerugoya Girls) and Mr Daniel Gichuhi (Kenyatta University) for their moral support and advice.

May the Almighty God shower you all with His Blessings.
ABSTRACT

The appearance of information and communication technology (ICT) in schools through provision of computer, infrastructure and connectivity is evidence of the global, social and technological changes that have contributed to the 'new times' in which we live in. For proper integration of ICT in teaching and learning, teachers have a central role to play. The 21st century teacher has to be confident, digitally competent and have the necessary ICT didactic skills. In a nut shell, ICT is set to influence all spheres of the education sector.

This project looks at the influence of ICT on the service delivery of secondary school teachers in public secondary schools in Nyeri County. The researcher used both quantitative and qualitative research approaches in the data collection and analysis processes. The research aimed at collecting opinions from teachers and principals, about influencing factors of ICT on the service delivery of teachers in Nyeri County. Both primary and secondary data were sourced, with the primary data been collected using questionnaires, observation and face-to-face interview schedules, while secondary data was sourced from the internet, journals and other relevant books.

Nyeri County has three thousand seven hundred and twenty six (3,726) secondary school teachers from two hundred and seven (207) public secondary schools. It is important to note that nine (9) of these schools were on record as having benefited from the Computer for Schools Kenya (CFSK) programme. The research shall therefore considered all the nine (9) schools because of the ICT infrastructure already in place plus a random sample of twelve (12) secondary schools from the region for the purpose of this study.

This study sort to find out if a relationship between ICT use and improved service delivery by teachers in public secondary schools exists, further the study sort to confirm whether or not the use of ICT has "no benefits or has unclear benefits" as claimed by Empirica (2006). This study answers these concerns by among other things showing that a strong positive relationship of $+ 0.650479966$ Person correlation coefficient, exists between those schools that have a high average mean score in the last three years and those that have a high number of computers at their disposal.

This study may help teachers adopt ICT and integrate it in the teaching and learning process and better still, it may help in policy formulation and decision making in the education sector.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Title of Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>TITLE</td>
<td>i</td>
</tr>
<tr>
<td>DECLARATION</td>
<td>ii</td>
</tr>
<tr>
<td>DEDICATION</td>
<td>iii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENT</td>
<td>iv</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>v</td>
</tr>
<tr>
<td>TABLE OF CONTENT</td>
<td>vi</td>
</tr>
<tr>
<td>LIST OF TABLES AND GRAPHS</td>
<td>viii</td>
</tr>
<tr>
<td>ABBREVIATIONS</td>
<td>ix</td>
</tr>
<tr>
<td>DEFINITION OF OPERATIONAL TERMS</td>
<td>x</td>
</tr>
<tr>
<td>1.0 CHAPTER ONE - INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Background to the Study</td>
<td>1</td>
</tr>
<tr>
<td>1.1.1 Secondary School Education in Kenya</td>
<td>2</td>
</tr>
<tr>
<td>1.2 Statement of the Problem</td>
<td>4</td>
</tr>
<tr>
<td>1.4 Research Objectives</td>
<td>6</td>
</tr>
<tr>
<td>1.5 Research Questions</td>
<td>6</td>
</tr>
<tr>
<td>1.6 Significance of the Study</td>
<td>7</td>
</tr>
<tr>
<td>1.7 Scope of the Study</td>
<td>7</td>
</tr>
<tr>
<td>1.8 Assumptions and Anticipated Limitations</td>
<td>7</td>
</tr>
<tr>
<td>2.0 CHAPTER TWO - LITERATURE REVIEW</td>
<td>9</td>
</tr>
<tr>
<td>2.1 Introduction</td>
<td>9</td>
</tr>
<tr>
<td>2.2 Importance of ICT in the Education Sector</td>
<td>10</td>
</tr>
<tr>
<td>2.2.1 ICT Factors that may Influence Service Delivery of Teachers</td>
<td>11</td>
</tr>
<tr>
<td>2.3.1 Negative Attitude towards ICT Integration in the Teaching and Learning Process</td>
<td>11</td>
</tr>
<tr>
<td>2.3.2 Enabling Environment</td>
<td>12</td>
</tr>
<tr>
<td>2.3.3 Policies at Government and School Level</td>
<td>12</td>
</tr>
<tr>
<td>2.3.4 ICT Infrastructure</td>
<td>13</td>
</tr>
<tr>
<td>2.3.5 School Management and Technical Support</td>
<td>13</td>
</tr>
<tr>
<td>2.3.6 Shifting Pedagogies</td>
<td>14</td>
</tr>
<tr>
<td>2.4 Empirical Review</td>
<td>14</td>
</tr>
<tr>
<td>2.5 Research Gaps</td>
<td>17</td>
</tr>
<tr>
<td>2.6 Conceptual Framework</td>
<td>19</td>
</tr>
<tr>
<td>3.0 CHAPTER THREE - RESEARCH METHODOLOGY</td>
<td>22</td>
</tr>
<tr>
<td>3.1 Study Design</td>
<td>22</td>
</tr>
<tr>
<td>3.2 Target Population</td>
<td>22</td>
</tr>
<tr>
<td>3.3 Sampling Design</td>
<td>23</td>
</tr>
<tr>
<td>3.4 Research Instruments</td>
<td>24</td>
</tr>
<tr>
<td>3.5 Validity and Reliability</td>
<td>25</td>
</tr>
<tr>
<td>3.5.1 Validity</td>
<td>25</td>
</tr>
<tr>
<td>3.5.2 Reliability</td>
<td>25</td>
</tr>
<tr>
<td>3.6 Data Collection Procedures</td>
<td>26</td>
</tr>
<tr>
<td>3.7 Data Analysis</td>
<td>26</td>
</tr>
<tr>
<td>3.8 Presentations</td>
<td>26</td>
</tr>
<tr>
<td>4.0 CHAPTER FOUR - DATA ANALYSIS, RESULTS AND PRESENTATION</td>
<td>27</td>
</tr>
<tr>
<td>4.1 Introduction</td>
<td>27</td>
</tr>
<tr>
<td>4.2 Responses and General Findings</td>
<td>27</td>
</tr>
<tr>
<td>4.2.1 Questionnaire Return Rate by Age and Gender</td>
<td>27</td>
</tr>
<tr>
<td>4.2.2 Respondents’ Profile</td>
<td>28</td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
</tr>
<tr>
<td>--------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>4.2.2 Respondents' Profile</td>
<td>28</td>
</tr>
<tr>
<td>4.2.3 School Performance (KSCE) in Nyeri County</td>
<td>29</td>
</tr>
<tr>
<td>4.3 &quot;ICT Use&quot; Penetrations by Teachers in Secondary Schools</td>
<td>30</td>
</tr>
<tr>
<td>4.4 ICT Influence in the Teaching and Learning Process</td>
<td>32</td>
</tr>
<tr>
<td>4.5 ICT Influence in School Administration</td>
<td>33</td>
</tr>
<tr>
<td><strong>5.0 CHAPTER FIVE- SUMMARY, CONCLUSIONS AND RECOMMENDATIONS</strong></td>
<td>39</td>
</tr>
<tr>
<td>5.1 Introduction</td>
<td>39</td>
</tr>
<tr>
<td>5.2 Summary of Findings</td>
<td>39</td>
</tr>
<tr>
<td>5.3 Conclusion from the Findings</td>
<td>40</td>
</tr>
<tr>
<td>5.4 Recommendations</td>
<td>42</td>
</tr>
<tr>
<td>5.4.1 Recommendations for Practice</td>
<td>42</td>
</tr>
<tr>
<td>5.4.2 Recommendations for Further Study</td>
<td>44</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>45</td>
</tr>
<tr>
<td><strong>APPENDIX</strong></td>
<td>47</td>
</tr>
<tr>
<td>Letter of Introduction</td>
<td>47</td>
</tr>
<tr>
<td>Questionnaire</td>
<td>48</td>
</tr>
</tbody>
</table>
LIST OF TABLES AND GRAPHS

Table 1  Conceptual Framework 19
Table 2  Parent Population as Per the 2010 Provincial Examination Analysis 22
Table 3  Sampling by Average Academic Mean Score Recorded in the Last 3 Years 24
Table 4.1  Questionnaire Return Rate by Age and Gender 27
Table 4.2  Education Qualification In Relation to ICT Units Done In College / University 28
Table 4.3  Further Training in ICT / Computer Studies 29
Graph 4.1  Average School Mean Score for the Last Three Years 29
Graph 4.2  Average Percentages (%) Of “ICT Use” Penetration by Teachers In Secondary Schools 30
Graph 4.3  ICT Influence in the Teaching and Learning Process 32
Graph 4.4  ICT Influence in School Administration 34
Graph 4.5  Location of Computers in Secondary Schools 35
Graph 4.6  The Number of Computers in Studied Secondary Schools 36
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOG</td>
<td>Board of Governors</td>
</tr>
<tr>
<td>BPO</td>
<td>Business Process Outsourcing especially Offshore Outsourcing</td>
</tr>
<tr>
<td>CFSK</td>
<td>Computer for Schools Kenya</td>
</tr>
<tr>
<td>ESP</td>
<td>Economic Stimulus Programme ICT Project 2011</td>
</tr>
<tr>
<td>HODs</td>
<td>Head of Departments in Secondary Schools</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
</tr>
<tr>
<td>KESSP</td>
<td>Kenya Education School Support Programme</td>
</tr>
<tr>
<td>KIE</td>
<td>Kenya Institute of Education</td>
</tr>
<tr>
<td>KNEC</td>
<td>Kenya National Examination Council</td>
</tr>
<tr>
<td>MOE</td>
<td>Ministry of Education: MOEST before 2008</td>
</tr>
<tr>
<td>SMASSE</td>
<td>A division in the ministry of education aimed at strengthening mathematics and sciences in secondary schools</td>
</tr>
<tr>
<td>TSC</td>
<td>Teachers Service Commission</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
</tr>
</tbody>
</table>
DEFINITION OF OPERATIONAL TERMS

ICT A diverse set of technological tools and resources to communicate, create, disseminate, store and manage information. (Blurton, 2002)

ICT Integration The seamless incorporation of technology to support and enhance student engagement in meaningful learning and for attainment of curriculum objectives (MOE, 2011)

21st Century Skills These skills are: creativity and innovation, critical thinking and problem solving, information and communication, analysis, curiosity and collaboration.

21st Century Tools Which include; ICT technologies including the computers, the internet and other technologies like audio, video and other multimedia tools.

Nyeri County As described in the new Kenyan Constitution

Pedagogy The methods and principles of teacher instruction

Fibre Optic Cables Terrestrial fibre-Optic cables that are being laid out across the country by Kenya Data Networks and other partners
CHAPTER ONE
INTRODUCTION

1.1: Background to the study.

The overall purpose of human resource management is to ensure that the organization is able to achieve success through people. In a school organization scenario, results are achieved through teachers (human resource). HRM systems on the other hand can be the source of organizational capabilities that allow firms to learn and capitalize on new opportunities and trends (Armstrong, 2006). One of HRM aims is to support the development of firm-specific knowledge and skills that are the result of organizational learning processes. Scarborough et al, (1999) referred to this as Knowledge management. According to Armstrong (2006), knowledge management deals as much with people and how they acquire, exchange and disseminate knowledge as with information technology. That is why it has become an important area for HR practitioners, who are in a strong position to exert influence in this aspect of people management. This description of knowledge management properly defines a secondary school teacher in an organization set up known as a school and the services he renders to his clients known as students.

Service delivery refers to the capacity of the organization-school or individuals-teachers in the organization to provide effective levels of service that meet the needs of internal customers-students (Armstrong, 2006). The Macmillan English dictionary (2007) refers to service as the performance of duties or duties performed. Service delivery is therefore part and parcel of human resource management.

The appearance of information and communication technology (ICT) in schools through improved provision of computer hardware, infrastructure and connectivity should not be seen as an isolated example of change. More correctly, it is evidence of the global, social and technological changes that have contributed to the 'new times' in which we all live. Further, it is imperative that educators, school managers and teachers are aware of and able to skillfully manage at the classroom level the impacts that result from social, cultural, political, and economic trends and educational policies and programs (Romina, 2006). ICTs are used in education in two general ways: to support existing ‘traditional’ pedagogical practices (teacher-
centric, lecture-based, rote learning) as well as to enable more learner-centric, ‘constructivist’
learning models (Gillian, 2000).

The use of ICT in education has the potential to enhance the quality of teaching and learning, the
research productivity of teachers and students, and the management and effectiveness of
institutions (Kashorda et al. 2007). This therefore implies that ICTs are at the core of teaching
and learning in the 21st Century.

1.1.1: Secondary School Education in Kenya

According to Kenya Education School Support Programme (KESSP) 2005-2010 ‘Delivering
Quality Equitable Education and Training to All Kenyans’, students are admitted to Kenya’s
secondary schools (high schools) on the basis of score in Kenya Certificate of Primary Education
(KCPE). They take four years to prepare for tertiary education. Most students start to shape their
future in pursuing subjects that will take them to their careers. Kenya Certificate of Secondary
Examination (KCSE) is taken at the end of secondary education. There are two categories of
secondary schools: Public secondary schools and private secondary schools. Public secondary
schools are government aided (funded) in terms of tuition fees and teachers. Public secondary
schools are further categorized into national schools, provincial schools and district schools.
Public secondary schools are the majority and admit the bulk of secondary school students.

According to a manual for heads of secondary schools in Kenya (1987), public schools are
managed by a Board of Governors (BOG) appointed by the minister for Ministry of Education
Science and Technology (MOEST) and are responsible for formulating school policy. The
principal is responsible for the overall running and control of the school, while the Head of
departments (HODs) are responsible to the principal for the performance in the departments.
The teacher is the primary source of instruction in most societies and has been recognized as
such by most curricula and forms of classroom organization.” (UNESCO, 1992)

Kanja et al. (2001) outlines a baseline study of Strengthening of Mathematics and Science in
Secondary Education (SMASSE) project conducted in nine selected pilot districts of Kakamega,
Butere-Mumias, Lugari, Central Kisii, Southern Kisii, Murang’a Maragua, Makuene, and
The study identified the challenges affecting teachers as including: poor working conditions that made teachers feel with low esteem; overloaded syllabi and timetables; feelings of being foreigners in their schools; stagnation in one job group; lack of guidance from head teachers; teachers' attitude towards teaching profession and school administration, the subject and students, use of inappropriate teaching approaches and methods; inadequate mastery of content; inadequate use of assessments and inadequate quality assurance mechanisms. The situation on the ground in most secondary schools in Nyeri County is not so different from the nine pilot schools. The KCSE 2009 examination analysis indicates that Nyeri North district was ranked position nine out of the eleven districts in central province with a mean score of 4.890 a slight improvement from 4.651 and 4.480 for the years 2008 and 2007 respectively. Nyeri South on the other hand recorded the highest percentage of grades D- to E of 11.98% in 2009 yet the province recorded a decline in grades D- to E from 11,429 (20.15%) in 2008 to 11,311 (18.33%) in 2009. Though there appears to be no single or simple solution to all these challenges, ICT offers a wealth of possibilities to support teaching. Its effective use will depend upon the choices that teachers make about how to use ICT as part of their teaching (Higgins, 2004).

From early 1990s, increasing numbers of secondary schools in Kenya acquired computers for use in the institutions. The initiative was partly due to pressure from parents, communities and politicians. Some of the computers installed in these schools came in the way of donations (Kavagi, 2001; Scott, 1987). In a similar study The challenges of using information communication technology (ICT) in school administration in Kenya done by Menjo et al, (2004) in Nandi North District, it emerged that about 60% of the schools have been beneficiaries of computer donations from well wishers, either foreign or from within the country. Only four of the schools he studied, had managed to acquire a sizable number of computers using their own funds, ranging in number from 10-15. Nyeri County secondary schools have had a similar experience and have greatly benefited from these computer donations, yet the secondary school teacher has not formally adopted the use of ICT in his daily duties and in the teaching / learning process. For example: The rural electrification programme in Nyeri County is very successful, where over 80% of the secondary schools have power in the schools. However, the teachers in the remaining 20% of the schools attribute lack of ICT infrastructure to lack of electric power in their schools.
The United Nation’s Millennium Development Goals (MDGs) Goal 8: *Develop a global partnership for development*, has its target as “in cooperation with the private sector, make available the benefits of new technologies, especially information and communications” this was to be measured through Telephone lines per 100 population; Cellular subscribers per 100 population and Internet users per 100 population. Kenya’s Vision 2030 has one of the 2012 Flagship Projects for Education and Training as establishing a computer supply programme that will equip Kenya’s human resource with modern ICT skills; The Ministry of Education has already developed a document which discusses the ways in which information and communication technology (ICT) can be leveraged to support and improve the delivery of quality education for all Kenyans: ‘*Draft ICTs in Education Options Paper (2005)*’ This ICT policy document, recognizes the secondary school teacher as a major stakeholder in the education sector and therefore an important driver of ICT development in Kenya (MOE, 2005). Through a circular dated 12th April 2011, titled *guidelines for implementation of economic stimulus programme on ICT infrastructure for selected schools*, the ministry of education further acknowledges that adoption and integration of ICT in education will play a critical role in the transformation of Kenya into a knowledge –based economy and that this will only be possible through enabling schools and teachers to use modern technologies in their preparation and delivery of curriculum in order to enhance access and promote quality of education.

1.2: Statement of the Problem

The pace of technology revolution and emergence of a technologically knowledgeable society has changed the traditional role of the teacher and the students. Traditionally, the teacher used to be the source of knowledge where this knowledge was limited to textbooks (MOEST, 2005). The development of ICT has changed the epic centre of knowledge, there exists some cooperation among students to explore new knowledge and in many cases, the teacher does not posses adequate knowledge to supplement the views of the students. The Teacher Education web-site (2010) further recons that in a number of cases the student is more informed than the teacher. There is likely to be confusion in the teacher’s mind about his/her new role in relation to use of these technologies (ICT).ie the teachers now find themselves in a situation where they are no longer the principal source for delivery of information.
According to data posted by internet world of statistics, on its web site, Kenya is ranked fifth in Africa in terms of internet usage by end of March 2008. It had 2.8 million internet users representing 7.5% of her population and 6.3% of the continents internet users. With the introduction of the fiber optic cables, Kenya will seriously upgrade its internet connectivity. The government of Kenya's (GOK, 2007) Vision 2030 envisages Kenya becoming the top “business process outsourcing” (BPO) destination in Africa. European companies will favour Kenya over her main rival India because of: Low salary levels make Kenya highly competitive in the cost department, The time zone has only to shift by a couple of hours from the European time, thus facilitating meetings and other day activities, Though Kenya does not have India’s one plus billion population, a population of 38 million is still a large pool to recruit from, Unlike India, Kenya is an English-speaking nation.

The Kenyan youth rely on teachers to take them to this envisaged land of immense potential. However, the teachers have not taken up the challenge; they still rely on the traditional methods of knowledge acquisition and dissemination (ICT for Teachers website, 2010). The website further claims that teachers lack adequate qualifications and training in ICT to engage their students in learning. Their lesson plans and schemes of work are often outdated or irrelevant. Gillian (2001), identified other challenges faced by teachers in this field as; too little time to plan and learn the skills effectively; lack of money leading to limited access to computers; expensive software; timetable restrictions; lack of creativity; limited availability of equipment such as LCD projectors; unwillingness to change; difficulty in linking ICT to the curriculum and needing IT facilities in classrooms rather than laboratories. All these of course jeopardize the available quality of education; (ICT for Teachers, 2010). With ICT, secondary school teachers are practically better equipped to handle some of these challenges.

Khalid (2008) identified the key barrier to ICT integration in teaching and learning as teachers’ negative attitude and an inherent resistance to change. This view is supported by many researchers (Cox et al 1999a; Watson, 1999; Earle, 2002; Becta, 2004; Gomes, 2005; Schoepp, 2005). He sees all the other barriers like lack of confidence, lack of competence and lack of infrastructure and access as just factors involved in resistance to change. According to Empirica
(2006), teachers who do not use new technology are still of the opinion that the use of ICT has no benefits or has unclear benefits. This view is supported by Trucano (2005) when he claimed that the impact of ICT use on learning outcomes is unclear and open to much debate. This research attempts to bridge this glaring gap by answering the question “What influence does ICT have on the service delivery of teacher in public secondary schools? 

1.4: Research Objectives

1.4.1 General Objective

To establish the influence of information and communication technology (ICT) on the service delivery of teachers in public secondary schools

1.4.2 Specific Objectives

Specific objectives for this study shall be to establish:

i. The actual penetration of “ICT use” by teachers in public secondary schools from Nyeri County

ii. The influence of ICT on the service delivery of teachers in the teaching/learning process in public secondary schools in Nyeri County.

iii. The influence of ICT on the service delivery of teachers in school administration of public secondary schools in Nyeri County.

1.5: Research Questions

The following questions will guide this study:

i. What is the actual penetration of “ICT use” of teachers in public secondary schools in Nyeri County?

ii. How does ICT influence service delivery of teachers in the actual teaching/learning process?

iii. How does ICT influence service delivery of teachers in school administration of public secondary in Nyeri County?
1.6 **Significance of the Study**

This study may help teachers adopt ICT and integrate it in the teaching and learning process. The study may help teachers understand their students in a better way and improve the quality of their relationship hence better their performance.

This study may help in policy formulation and decision making in the education sector. This is only possible if the policy makers read the paper. The researcher foresees an introduction of ICT application implementers in the near future at all levels of education; secondary school level, County level and at national levels (a duplication of the human resources officers’ structure in the education sector). This research paper may play a leading role in this regard.

All educational stakeholders and future researchers in the area of study may also use this study as a reference document.

1.7 **Scope of the Study**

The researcher limits the scope of study in terms of area coverage to Nyeri County, only for ease of questionnaire administration. Nyeri County is one of the forty-seven (47) counties in Kenya. The county is divided into six constituencies namely; Nyeri Town, Othaya, Kieni, Mukurweini, Tetu and Mathira. The total number of public secondary schools in this County is two hundred and seven (207). Given that each school has an average of eighteen (18) teachers, then the County has three thousand seven hundred and twenty six (3,726) secondary school teachers. It is important to note that nine (9) of these schools are on record as having benefited from the Computer for Schools Kenya (CFSK) programme. The research shall therefore consider all the nine (9) schools because of the ICT infrastructure already in place plus a random sample of twelve (12) secondary schools from the region for the purpose of this study.

1.8 **Assumptions and Anticipated Limitations**

There is evidence from research that ICT can help students to learn and teachers to teach more effectively, however there is no simple message in that evidence that ICT will make a difference simply by being used (Higgins, 2004). This research thus assumes that providing ICT equipment to schools or teachers will not necessary make a difference, it is how this equipment and the other resources are used that makes the difference. ICT changes rapidly and new innovations
offer new possibilities for teaching and learning. This therefore implies that knowledge of and experience with computers is not enough to enable the best use of ICT in classrooms. There is therefore no simple solution to the effective use of ICT in teaching and learning.
CHAPTER TWO
LITERATURE REVIEW

1. Introduction

Human resource management is defined as a strategic and coherent approach to the management of an organization's most valued assets — the people working there who individually and collectively contribute to the achievement of its objectives (Armstrong, 2006). HRM therefore operates on a philosophy that appeal to managements who are striving to increase competitive advantage and appreciate that to do this they must invest in human resources as well as new technology. More specifically, HRM is concerned with achieving objectives in the areas of organizational effectiveness, human capital management, knowledge management, reward management, employee relations, meeting diverse needs and bridging the gap between rhetoric and reality (Armstrong, 2006). Knowledge management for example deals as much with people and how they acquire, exchange and disseminate knowledge as with information technology. That is why it has become an important area for HR practitioners, who are in a strong position to exert influence in this aspect of people management.

The term ICT (Information Communication Technology) has a long history in its evolution process. According to Pelgum and Law (2003), towards the end of the 1980's, the term 'Computers' was replaced by 'IT' (Information Technology). This signified a shift from computing technology to computer's enhanced capability to store and retrieve information. This was followed by the introduction of the term 'ICT' around 1992, when e-mail started becoming available to the general public. Blurton (2002) defines ICT as a diverse set of technological tools and resources used to communicate, and to create, disseminate, store and manage information. The Information Technology Association of America (2007) defines ICT as the study that involves the support, management, study, design, development and implementation of information systems that are computer based. This includes physical components of the information system also known as the hardware and programs that help the machine function also known as software. Karimi (2010) on the other hand defines ICT as including technologies both traditional (e.g. radio, television, print, video/film) and newer technologies (internet, virtual reality, distance education, mind-computer interface technologies, mobile phones etc) that are
intended to fulfill information processing and communication functions. ICT therefore goes beyond computer studies and computer literacy skills.

Service delivery refers to the capacity of the organization or individuals in the organization to provide effective levels of service that meet the needs of internal customers (Armstrong, 2006). Ultimately, this is what HR professionals are there to do, bearing in mind that the services they provide will be concerned with the development and implementation of value-adding and integrated HR strategies as well as operational services. The Macmillan English dictionary (2007) defines service as the performance of duties or duties performed. This study therefore attempts to examine the influence of ICT on the service delivery of teachers in public secondary schools.

2.2 Importance of ICT to the Education Sector

During the past decade, there has been exponential growth in the use of information and communication technology (ICT); this has made pervasive impact on both society and educational institutions. It is therefore a fact that there is increasing interest, attention and investment in the use of ICT in education all over the world. The impact of ICT in our daily life has led many education institutions to redefine their education program and classroom facilities in an effort to harness the immense benefits derived from utilizing new technology. The nature of the ICT adoption goes beyond using information and communication systems to improve education administration; to large scale adoption of technologies that impact on curricular and pedagogical structures (Wai-Kong, 2009).

Integration of ICTs enhances the quality of education by helping teachers to do their job and by helping students learn more effectively. Moreover, with the rapid growth of innovation technologies, teachers need to keep abreast of technological innovation so that they can know where to retrieve information and obtain resources and tools. Technology as a tool supports the educational objectives such as skills for searching and assessing information, cooperation, communication and problem solving which are important for the preparation of children for the knowledge society. ICTs play various roles in learning and teaching process. It has great
potential to enhance student achievement and teacher learning. It can support face-to-face teaching and learning in the classroom (Bingimlas, 2009). ICT may not be optimized if there is no shift in the learning and teaching paradigm. New technologies can help teachers and enhance their pedagogical practices and assist students in learning. It expands the pedagogical resources available to teachers. ICT increase students’ awareness of the world around them, of citizenship and of a scientifically literate community. As a tool it enhances science teaching/learning in schools. These include data capture, multimedia software for simulations, publishing and presentation tools, digital recording equipment, computer projection technology, and computer-controlled microscopes (MOEST, 2005)

ICT plays a major role in bringing efficiency of delivery mechanisms which are an important component of overall school management. ICTs can provide the efficiency of delivery mechanisms of educational services by supplementing conventional delivery mechanisms as observed by UNESCO (2002) this includes: Technology’s capacity to reach learners in any place and at any time; Use of virtual laboratories where technology allows for video and digital demonstrations as well as digital simulation of laboratory activities in a very real manner – but without the risks and costs associated with laboratory experiments; Simulations will not replace hands-on activity completely rather, they prepare the learner to conduct real-life experiments in the same manner as flight simulations prepare the student pilot for test flying; Multimedia-enabled learning modules can be developed by a group of master teachers and instructional designers, which can then be shared with all schools to assure quality standards of learning delivery.

2.3 ICT Factors that may Influence Service Delivery of Teachers

2.3.1 Negative Attitude towards ICT Integration in the Teaching / Learning Process

Empirica (2006) suggests that teachers who do not use new technology in their classrooms, are still of the opinion that the use of ICT has no benefits or has unclear benefits. Schoepp (2005) found out that, although teachers felt that there was more than enough technology available to them for use, they did not believe that they were being supported, guided, or rewarded in the integration of technology into their teaching. All these form the big picture that Kalid (2008)
referred to as negative attitude and an inherent resistance to change by secondary school teachers.

2.3.2 Enabling Environment

Already a reference point for many countries on the continent due to inroads made in ICT infrastructure development, Kenya has made milestones in e-Learning development and implementation, in part due to the commitment by the Government to ICTs as an engine for growth, (Mutembe, 2010). For example, in the World Statistics, website, (2007) Kenya’s average Internet usage grew by 230 per cent to 700MB in 2010 from the previous years 304 MB. The fibre optic networks are expected to supplement satellite in boosting the capacity, since satellite bandwidth demand in Africa far outstrips the supply from the highly consolidated satellite fleet operator industry. The International Telecommunications Union (ITU) report (2010), says Kenya has the third highest number of mobile phone subscribers, after Nigeria and South Africa that respectively account for 26 per cent and 19 per cent of mobile cellular subscriptions in sub-Saharan Africa. Kenya had 17.4 million mobile phone subscribers by end of June 2010, translating to 45.7 per cent penetration.

2.3.3 Policies at Government and School Level

The Ministry of Education has already developed a document which discusses the ways in which information and communication technology (ICT) can be leveraged to support and improve the delivery of quality education for all Kenyans: Draft ICTs in Education Options Paper (2005). The paper proposes an investment into up grading computer labs and building ICT capacity at teacher training institutions as an intervention that can quickly yield high returns. On the issue of computers in secondary schools, the Ministry of Education (MOEST) acknowledges that there are obvious benefits for integrating computers into secondary schools as students at this age need to focus on subjects-specific content, greater critical thinking skills, scientific inquiry, maths, sciences and languages. MOEST further proposes ICT for in-service teacher training. Where large – scale ICT capacity building workshops for in-service teacher training build off existing structures that deliver quality ongoing professional development for teachers.
2.3.4 ICT Infrastructure

Kenya Institute of Education’s (KIE, 2009) “Summative Evaluation findings on secondary school education curriculum 2009” report observes that the Kenya secondary school curriculum does not adequately equip the learners with the necessary competencies to meet the aspirations of vision 2030. The report further identifies inadequate ICT infrastructure in schools, as having limited teachers and students in embracing contemporary forms of knowledge acquisition. It recommends ICT integration in pedagogy and further recommends development of on-line programmes to continuously enhance management skills for principals and deputies.

2.3.5 School Management and Technical Support

The computer equipment in the few fortunate schools that have them tends to be underused and lacks appropriate education content. Commonly, the computer equipment is used as objects in computer lessons. The absence of policies and management support to the use of ICT in schools is hindering the progress of the use of ICT in the classrooms. It is not uncommon that one comes across computers in schools not being used because they are out of order and there is no technical support to repair them; the computers cannot be accessed because they are locked away in computer rooms after school hours; or there is lack of funds for developing educational software to make the hardware become productive (Omwenga, 2006). Teachers may fear to use computers because they are not sure where to turn to for help when something goes wrong while using computers. Without good technical supports in both the classroom and whole school resources, teachers cannot be expected to overcome barriers preventing them from using ICT. (Lewis, 2000 cited in Bingimlas (2009). These technical problems include; mal-functioning computers, failing to connect to internet, faulty printers, use of old computers. Technical support is deemed essential in many aspects of ICT use, including the use of particular software packages and in the use of learning management system for ICT- enhanced lesson. Besides insufficient training, educators frequently note that lack of technical support determines their use of technology (Invers, 2003).
2.3.6 Shifting Pedagogies

In many ways technology can be seen as affecting the curriculum both in terms of content and pedagogy. There is lack of integration of ICT into the existing curriculum and textbooks; the current Computer Science syllabi, for example, may not be appropriate to enable the integration of ICT into teaching and learning (Omwenga, 2006). A few other subject teachers do undertake courses in software packages but are unable to integrate or meaningfully insert this knowledge in their daily teaching work. According to Reform Forum (April 2003) - Journal for Educational Reform in Namibia - Information Technology literacy is very different from integrating technology into teaching to enhance learning. In other words, being “digitally fluent” means not only knowing how to use the technological tools, but also knowing how to construct things of significance with those tools. There is need to shift pedagogies, redesign the ‘curriculum and assessment’ and provide more autonomy to schools.

2.4 Empirical Review

In a survey done by Muriithi (2005), *A framework for integrating ICT in the teaching and learning process in secondary schools in Kenya*, a field study was conducted with the following objectives in mind to finding out how ICT was being used in secondary schools in Kenya; the teachers' level of skills and their attitudes towards its use; the types of support, training and environment that facilitates the effective integration of ICT in teaching and learning. In presenting the findings, Muriithi, argued that in Kenya like most developing countries ICT usage is still limited to computer literacy training. She contends that the present ICT curriculum merely deals with ‘teaching about computers’ and not how computers can be used to transform the teaching and learning in our schools. She says that integration should consider learning pedagogy, the pattern of student use of ICT and the extent of use in teaching and learning programmes. Muriithi argues that teachers do not need to learn about technology; they need to learn how to use technology to enhance their learners’ understanding and critical thinking skills. There needs to be more emphasis placed on training in pedagogy, as opposed to the current trend in many education systems where the major focus is on specialized knowledge in specific curricular subjects. Teachers must be adequately equipped with more teaching competencies so as to assume their new role as experts in the teaching/learning process. Finally, teaching professional development should incorporate ICTs into teaching and learning as an ongoing
process and should not be thought of as one ‘injection’ of training. Teachers need to update their knowledge and skills as the school curriculum and technologies change.

Gillian (2000) researched on the impact of ICT on schools: classroom design and curriculum delivery in Australia, USA, England and Hong Kong. His lead objective was to determine current and possible future ICT trends in creating what he called the schools of the future. Gillian notes that during the 1990’s, many educators took only an academic interest in computers simply because they had computer access and their own knowledge of this new tool was limited, and teaching styles and expected educational outcomes seldom included using computers. The advent of the Internet then rapidly advanced the numbers of teachers using computers as an information source, but it is taking much longer for schools to respond significantly to this new medium than it has in the business world. He claims that teachers in schools using ICT effectively soon find that much of the repetitive “busy work” and unreal, contrived exercises are no longer relevant in an environment that allows students direct access to engaging information sources. Gillian is of the opinion that computer use has the potential to transform the education process for both learners and teachers.

Gillian (2000) proposes future schools which will have the following key features; collaborative endeavors will become more common among schools and districts; there will be a greater emphasis on communication, community and creativity for high, value-added organizations; interactive, asynchronous discourse becomes an important learning method; simulations and virtual field trips become more common; schools must recognize the need for authentic learning and that it cannot be assessed in old ways or against “old” criteria; students will spend less time on schools; formalized relationships with experts will develop beyond school; the learning process becomes dynamic, exciting and fun using technology to learn in ways never before possible finally There will also be a continuing focus on ways ICT can streamline administrative tasks, giving students 24-hour access to learning resources.

Trucano (2005) researched on the effective uses of information and communications technology in education in developing countries under what he called Knowledge Maps. He identifies the following ICT factors as having some impact on teacher’s performance or service delivery;
Pedagogy, Teacher technical abilities and knowledge of ICTs; Teacher’s confidence and motivation; Teacher’s professional development and an Enabling environment. Trucano’s (2005) key findings were quite disturbing for he found out that; The impact of ICT use on learning outcomes is unclear and open to much debate; There is an absence of widely accepted standard methodologies and indicators to assess impact of ICTs in education; There is a disconnect between the rationales most often put forward to advance the use of ICTs in education (to introduce new teaching and learning practices and to foster 21st century thinking and learning skills) and their actual implementation (predominantly for use in computer literacy and dissemination of learning materials).

Wheeler (2000) on his part researched on the role of the teacher in the use of ICT in the Czech Republic. His research was guided by two key questions; what will be the long term impact of the introduction of these technologies into the classroom? And what kind of skills will teachers need to acquire in order to be effective in an ICT based learning environment? He acknowledged that ICT will bring into class; shared learning resources, shared learning spaces, the promotion of collaborative learning and the move towards autonomous learning. Wheeler (2000) further gave three key reasons as to why the role of the teacher must change: role of the teacher must change because ICT will cause certain teaching resources to become obsolete; ICT may also make some assessment methods redundant and finally the role of the teacher must change in the sense that it is no longer sufficient for teachers merely to impart content knowledge.

Romina et al (2006) researched on the ICT integration and teachers confidence in using ICT for teaching and learning in Queensland state schools in Australia. Romina et al (2006) started by declaring that the Australian governments have clearly taken up the challenge of transforming schools to meet the challenges of the information age, he cites the launching of the three-year ICT for learning strategy of 2002 which played an import role in connecting teachers and students with the new technologies by developing a sustainable technology infrastructure in schools and providing more funds for ICT in Queensland schools, including teachers professional development.
Romina et al (2006)’s key objective was to investigate the teachers perceptions about their confidence to use ICT with their students for teaching and learning and its resultant impact on the quantity and quality of students use of ICT for learning in Queensland state school. In his study, he used parameters such as; relationship between gender and teacher confidence in ICT use; relationship between gender and frequency of ICT use; relationship between teaching experience and teacher’s confidence to use ICT; relationship between school type and teacher confidence in ICT use; relationship between teachers curriculum area and teacher confidence in ICT use. Among other findings, Romina et al, (2006) observed that; male teachers report significantly higher levels of confidence in ICT use in teaching and learning; there was no significant relationship between years of teaching experience and teacher confidence in ICT use, however, teachers with least experience preferred their students to use ICT more to both enhance and transform the curriculum; Secondary School teachers were found to be more confident than Special Education and Primary School teachers in ICT use.

2.5 Research Gaps

The foregoing literature review under scores ICT use in the education sector is relatively new and that the sector is taking much longer than the business world to respond and take advantage of this new trend. However, most of the researchers are in agreement that the use of ICT by teachers has many advantages (Gillian, 2000; Omwenga, 2006 and Karimi, 2010)

Muriithi’s (2005) key finding was that ICT usage in Kenyan schools is still limited to ‘computer literacy training’ and proposes equipping the teacher with more teaching competencies so as to assume their new role as experts in the teaching / learning process; Gillian (2000) on the other hand compares the current trends in the USA, England and Hong Kong and proposes the use of the 21st century skills in the future classes. The two researchers left a research gap of how to move from the current scenario to the future they proposed. Trucano (2005) made the matter worse when he claimed the ‘the impact of ICT use on learning outcomes is unclear and open to much debate’. Wheeler (2000) provided more latitude when he gave reasons as to why the role of the teacher must change, but this still left a research gap of how will the teachers move from the current situation into that future where their roles will have changed.
The secondary schools teacher has therefore no alternative but to embrace the 21st century tools which include; ICT technologies including the computers, the internet and other technologies like audio, video and other multimedia tools. For this to become a reality, the issues raised by Trucano (2005); that “the impact of ICT use on learning outcomes is unclear and open to much debate” and the fears expressed Khalid (2008) when he identified the chief / key barrier to ICT integration in teaching and learning as ‘teachers have a negative attitude towards new technology and an inherent resistance to change’ must be addressed. This research attempts to do this by giving the ICT adoption and integration in the teaching learning process an optimistic angle by considering the influence of ICT on the service delivery of teachers. The finding may influence the teachers positively and hence change their perception and beliefs towards ICT use in their classrooms.
2.6 CONCEPTUAL FRAMEWORK

Independent Variables

Teachers' ICT Use Penetration
- Computers PCs and Laptops
- Internet Connectivity and Access
- Software Acquisition and Development
- ICT Programmes in schools
- Existence of Teachers forums
- Presence of E-content
- Presence of a Digital Syllabus from KIE
- Networks LANs
- Teachers web 2.0

ICT in the Teaching/Learning Process
- Use of Computers PCs and Laptops in Class Lessons preparation
- Learner 'centric' Pedagogy Practices
- Use of E-Content
- Software Acquisition and Development
- Use of simulations, virtue labs
- Networks LANs and Collaborations

ICT in the School Administration
- Collection of fees
- Time Tabling
- Follow up discipline of Students
- Report Forms Compiling and Analysis
- Storage of important school Data
- Communication with Parents SMS, Website
- Registration of Exams
- Access to professional Information:- TSC, mwalimu portal, KIE etc

Dependent Variables

Service Delivery
- Improved Quality of Education
- Technology Integrated Lessons
- More effective teaching/learning
- More efficient teaching/learning
- More interesting teaching/learning

Enabling Environment
- Teachers' change in Attitude
- ICT Policies at Government and School Levels
- ICT Infrastructure and Access
- School Management and Technical Support
- Shifting Pedagogies

Intervening Variables

Table 1: Source: Researcher (2011)
2.6 Conceptual Framework

The influence of ICT in education is based on the premise that ICT will improve quality in teaching and learning. The secondary schools teacher has therefore no alternative but to embrace the 21st century tools and skills. This research considers the influence of ICT on three different levels; - Establishing ICT penetration in secondary schools; Influence of ICT in the Classrooms and Influence of ICT on school administration

In establishing the actual “ICT Use” penetration in Nyeri County, the following indicators are to be considered; increase in number Computers PCs & Laptops; Internet Connectivity & Access; Software Acquisition & Development; ICT Programmes in schools; Existence of Teachers forums; Presence of E-content and Presence of a Digital Syllabus from KIE

ICT influence in the teaching and learning process will be measured in terms of use of Computers PCs & Laptops in Class Lessons preparation and even in delivery of lessons; a paradigm shift in Pedagogy Practices, where lessons become Learner ‘centered’; Use of e-Content by both teachers and their students; Easy acquisition and development of Software; Use of simulations, virtue labs, etc and finally in terms of improved networking of teachers and the presence of teachers’ forums.

The biggest beneficiary of ICT in secondary schools is the school administration. ICT influence will be felt in almost all areas of school administration; fees collection, Time Tabling, Follow-up of disciplinary cases of both students and teachers, communication with parents via SMS and school’s website and storage of important school data. Even for those administrators that are technology laggards, the influence of ICT is been felt at levels of KNEC examination registration and down loading of important professional documents of TSC, KNEC and MOE websites.

The above factors are intervened by an enabling environment which will be include; existence of sound ICT policies at both government and school; A change in attitude by teachers towards technology and a willingness to integrate ICT in service delivery.
With all these independent variables in place, then the future classes referred to by Gillian (2000) will be a reality where there will be effective use of ICT resources. This will lead to reduction of the digital divide, improved quality of education and promotion of information literacy and research methods. Technology integrated lessons will be the order of the day with a major change in pedagogical practices. Teachers and students will finally experience the classes without borders concept due to the higher interactions with peers from all over the world.
3.1 Study Design

The type of research design to be adopted in conducting this study will be the Descriptive Survey Design. Descriptive research design is a scientific method which involves observing and describing the behavior of a subject without influencing it in any way. It will be appropriate because it will involve collecting data in order to answer questions on the current status of the subjects of the study. Kothari (2003) recommends descriptive survey design as it allows the researcher to describe, record, analyze and report conditions that exist or existed. This survey design is considered particularly well suited to researches which study the individual as a unit of analysis as an excellent vehicle in measuring generalization.

The descriptive design also allows the researcher to generate both numerical and descriptive data that will be used in measuring relationships between variables. Further more this type of study design will describe in degree to which the variables will relate and it will be expected to determine the influence of ICT on the service delivery of teachers in Nyeri County. That is why the researcher will use it.

3.2 Target Population

<table>
<thead>
<tr>
<th>S No.</th>
<th>Constituency</th>
<th>Provincial Schools</th>
<th>District Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nyeri Town</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Mathira</td>
<td>4</td>
<td>37</td>
</tr>
<tr>
<td>3</td>
<td>Kieni</td>
<td>4</td>
<td>34</td>
</tr>
<tr>
<td>4</td>
<td>Mukurweini</td>
<td>3</td>
<td>28</td>
</tr>
<tr>
<td>5</td>
<td>Tetu</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>6</td>
<td>Othaya</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td>Totals</td>
<td>Nyeri County</td>
<td>26</td>
<td>181</td>
</tr>
</tbody>
</table>

Table 2: Parent population as per the 2010 provincial examination analysis records

Kombo and Tromp (2006) define a population as a group of individual objects or items from which samples are taken for measurement. The target population (parent population) of the study
will therefore consist of all the teachers from all the secondary schools in Nyeri County. Given an average of eighteen (18) teachers per schools, this gives the total parent population as three thousand seven hundred and twenty six (3,726) secondary school teachers from two hundred and seven (207) Secondary schools.

3.3 Sampling Design

To ensure that all the teachers are represented, a stratified random sampling design will be used since the teachers fall under different category of schools. According to Mugenda and Mugenda (1998), for descriptive study 10% of accessible population is enough. (10% of 207 schools = 20.7 schools) that is approximately twenty one (21) schools.

Nine of these schools are beneficiaries of the Computer for Schools Kenya (CFSK) initiative. These schools namely: Dr Kamundia Girls, Gathuthi Secondary, Gathera Secondary, Kaheti High, Karima High, Munyu Secondary, Ndia-ini Secondary, South Tetu Girls and Tambaya Secondary will therefore be purposefully selected to form part of the sample population because of the infrastructure already in place.

This study shall therefore consider a sample total of twenty-one (21) schools, selected as follows; nine schools as the list above indicates and twelve (12) other schools selected as shown in the table below.

The researcher believes that there exists a correlation between ICT infrastructure available in schools and performance; - measured as the KSCE schools mean score.

<table>
<thead>
<tr>
<th>Mean Score</th>
<th>Provincial Schools</th>
<th>District Schools</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-11.9</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7-9.9</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>4-6.9</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>1-3.9</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Totals</td>
<td>6</td>
<td>6</td>
<td>12</td>
</tr>
</tbody>
</table>

Table 3: Sampling by average academic mean score recorded in the last three years.
The researcher is of the view that population is normally distributed and therefore due to resources and time constraint, sampling will be done with an assumption that it will be a representation of the population under study.

The study will limit itself to 84 teachers from the 21 secondary schools, arrived at as follows:-

\[(\text{Principal} + \text{Dean of Studies} + \text{two (2) other teachers}) \times \text{(Number of Sample Schools)}\]

\[(1+1+2) \times 21 = 84 \text{ (taken to be approximately 85)}\]

The eighty five (85) teachers will be selected through a random sampling method to ensure that all teachers have equal chances of being selected to be in the study.

### 3.4 Research Instruments

In this study, the researcher will use questionnaires, a structured interview guide and check list to measure variables. The questionnaire will have both open-ended questions and the closed questions. Open-ended questions will seek in-depth information while the closed ones can be easily analyzed and understood. Questionnaires will be generally preferred for this study because they ensure a wide range of respondents' perception. The researcher will also use a guide to enrich the responses and fill in the information gaps. Check list will be used to score the mean performance of the selected schools in the past three (3) years. Both primary and secondary data will be used for the purpose of this study; primary data collected through questionnaires and secondary data collected through journals, performance analysis books, magazines and the internet.

### 3.5 Validity and Reliability

#### 3.5.1 Validity

The questionnaires will be first tested on a selected sample of three (3) schools which are similar to the actual sample to be used in the study the procedure used in pre-testing will be identical to the ones to be used in the actual study or data collection. Comments made by the pre-testing respondents will be used to adjust and improve the instrument.
According to Mugenda and Mugenda (1999), Validity is the accuracy and meaningfulness of inferences which are based on the research results. In order to improve validity, the supervisor will validate the value content of the instrument then modifications will be made where necessary. Information gathered will also be cross-checked with other secondary sources to ensure authenticity and accuracy. The researcher shall also use triangulation which is the use of different data collection methods to gather the same information. In this case the researcher hopes to use both the questionnaire and the face-to-face interviews to fill the information gaps.

3.5.2 Reliability
Reliability enhances dependability, accuracy and adequacy of the instrument through piloting. Mugenda and Mugenda (1999) argue that reliability is a measure of the degree to which a researchers' instrument yields consistent results or data after repeated trials. Nachmials and Nachmials (1996) states that; an instrument is reliable when it can measure a variable accurately and consistently and obtain the same results under the same conditions over time. To ensure reliability, Test-re-Test method will be used. This will involve administering the questionnaire at an interval of one week to the same group and then comparing the two scores. The reliability index for the instrument shall be calculated using coefficient alpha (α).

$$\alpha = (k/(k-1)) \times [1 - \frac{\sum(s_i^2)}{s_{\text{sum}}^2}]$$

Where
k is the number of individual items
$s_i^2$'s denote the variances for the k individual items
$s_{\text{sum}}^2$ denotes the variance for the sum of all items
If there is no true score but only error in the items (which is esoteric and unique, and, therefore, uncorrelated across subjects), then the variance of the sum will be the same as the sum of variances of the individual items. Therefore, coefficient alpha will be equal to zero. If all items are perfectly reliable and measure the same thing (true score), then coefficient alpha is equal to 1. (Specifically, $1 - \frac{\sum(s_i^2)}{s_{\text{sum}}^2}$ will become equal to $(k-1)/k$; if we multiply this by $k/(k-1)$ we obtain 1.)
3.6 **Data Collection Procedure**

The researcher plans to physically visit the sampled schools. He will administer the questionnaires personally so as to be in a position to schedule a face-to-face interview with the Principal or his Deputy and the dean of studies as the teachers fill their questionnaires. Assuming that he covers two (2) schools a day then the exercise will take two weeks. A copy of the findings will be made available to the institutions on request.

3.7 **Data Analysis**

The data obtained from the questionnaires and the interviews shall be compared and interpreted. The data will be checked for extremes such as consensus responses to disagree or agree with them. The data will then be coded so as to allow for statistical analysis. Descriptive statistics will be used to answer the research questions and objectives in relation to the research questions. Qualitative and quantitative methods will be used for data analysis; Qualitative generated from questions will be organized into themes, categories and pertinent to the study. This will also help identify information that shall be relevant to the research questions and objectives. The quantitative approach on the other hand will be used on aspects that can be qualified by measures of central tendencies like mean, standard deviation, variance and ranges.

Parametric tests (like Pearson correlation coefficient tests) shall also be used. Parametric tests are designed to represent the wide population—e.g. of a country or age group. They make assumptions about the parent population and the characteristics of that parent population, i.e. the parameters of abilities are known. They assume (Morrison, 1993): that there is a normal curve of distribution of scores in the population (the bell-shaped symmetry of the Gaussian curves of distribution).

The researcher plans to use a statistical software (SPSS statistical package for social sciences) to assist in generating data analysis.

3.8 **Presentations**

The results from the data analysis will then interpreted, inferences made and presented. The presentation will be concerned with description analysis of data collected from the field. Data will be presented in Pie Charts, Frequency Distribution Tables, Tables, Percentages and Words.
CHAPTER FOUR

DATA ANALYSIS, RESULTS AND PRESENTATION

4.1 INTRODUCTION

The findings of the study were analyzed and presented in this chapter with respect to respondents' profile and demographics (age, gender and education qualification, ICT USE penetration by teachers in secondary schools, ICT influence in the actual teaching learning process and ICT influence in the school administration.

4.2 RESPONSES AND GENERAL FINDINGS

4.2.1 Questionnaire Return Rate by Age and Gender

The questionnaires were given to eighty five (85) teachers. Table 4.1 below indicate questionnaire completion rate. The researcher set out to give questionnaires to four teachers per school in all the schools under study. Completed questionnaires were received from eighty five (85) respondents of whom 51 were male and 34 female. This represents a response rate of 100%.

<table>
<thead>
<tr>
<th>Age</th>
<th>Gender</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Less than 30yrs</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>31-40yrs</td>
<td>18</td>
<td>17</td>
</tr>
<tr>
<td>41-50yrs</td>
<td>18</td>
<td>13</td>
</tr>
<tr>
<td>More than 50yrs</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>TOTALS</td>
<td>51</td>
<td>34</td>
</tr>
</tbody>
</table>

Source: Research Data, 2011

It was also the finding of this study that majority of the teachers in public secondary schools were in the bracket of 31 – 40 years (41.2%) and that of 41 – 50 years (36.4%) of age.

From each school, the Principal or Deputy Principal, Dean of studies and two other teachers were issued with the questionnaire. This was based on the principle that teachers have different perspectives of Information Communication and Technology integration. Their attitudes and
beliefs towards technology integration are bent by knowledge and skills acquired during pre-service and in-service training and also experiences they have undergone during professional practices.

4.2.2 Respondents' Profile

Nyeri County has a population of three thousand seven hundred and twenty six (3,726) secondary school teachers from two hundred and seven (207) Secondary schools. This study has considered a sample total of twenty-one (21) schools and eighty five teachers there in. Table 4.2 below shows the respondents' profiles by education qualification and whether or not they had done a unit in ICT in college / university.

Table 4.2 Education Qualification in relation to ICT Units done in College / University

<table>
<thead>
<tr>
<th>Education Qualification</th>
<th>Those who did a Computer/ICT unit in College/University</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Diploma</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Graduate</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>Post Graduate</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>TOTAL</td>
<td>39</td>
<td>46</td>
</tr>
</tbody>
</table>

Source: Research Data, 2011

Among the eighty five respondents, 24.7% were diploma teachers, 63.4% were graduates and 12.9% had post graduate qualifications. The key finding was that of all the respondents, more than half (54.1%) had not done any computer or ICT unit in their pre-service training in the Colleges and universities. The graduate teachers account for 63.4% where 42.4% are male teachers and 20.0% female teachers. Teachers who undertook a computer/ICT unit while in university/college stand at 47.1% for male teachers, and 44.1% for female teachers. Further, we learn that besides taking a unit in university/college, 64.3% trained in computer packages, 26.2% did ICT and 9.5% in-service training as outlined in Table 4.3. It was further established that
more male teachers were computer literate 47.1% as compared to the female computer literate
teachers who were found to be only 44.1%.

Table 4.3: Further Training in ICT / Computer Studies

<table>
<thead>
<tr>
<th>Specific Training</th>
<th>Further ICT/Computer training</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owns a Computer</td>
<td>yes</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>no</td>
<td>11</td>
</tr>
<tr>
<td>Percent</td>
<td></td>
<td>27</td>
</tr>
<tr>
<td>Owns a Computer</td>
<td>yes</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>no</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>Owns a Computer</td>
<td>yes</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>no</td>
<td>2</td>
</tr>
<tr>
<td>Percent</td>
<td></td>
<td>9.5</td>
</tr>
</tbody>
</table>

Source: Research Data, 2011

The relationship between further training and owning a personal computer revealed those who
have done a unit in ICT showed a tendency buying personal laptops or PC 90.9% however those
that had undergone an in-service training in ICT showed lack of commitment in a acquiring their
own machines.

4.2.3 School Performance (KSCE) in Nyeri County

Graph 4.1 below, gives the responses of average mean score by the various schools where 32%
had an average mean score of between 1 and 3.99, 49% of the schools had a mean score of
between 4.0 and 6.9, 19% of the schools had an average mean score of between 7 and 9.9 and
finally it was established that none (0%) of the schools in Nyeri County had an average mean
score of between 10 and 12 in the last three years.
Graph 4.1: Average School Mean Score for the last 3 Years

Source: Research Data, 2011

4.3 "ICT USE" PENETRATION BY TEACHERS IN SECONDARY SCHOOLS

This study sought to establish the influence of information and communication technology (ICT) on the service delivery of teachers in public secondary schools, this was to be measured through establishing the actual penetration of "ICT USE" by teachers in public secondary schools from Nyeri County. Graph 4.2 below illustrates the responses to this specific objective.

Graph 4.2: Average Percentage (%) of "ICT USE" Penetration by Teachers in Secondary Schools

Source: Research Data, 2011
The findings show that there is a sizable penetration of “ICT USE” in public secondary schools which were found to stand at 54.05%, this is interpreted to mean that the respondents agree with the view that there has been tremendous ICT USE by teachers in secondary schools. Respondents gave a score of more than 50% to all the parameters used to measure penetration namely: that the access to computers PCs and laptops had improved in schools 57.23%, that there was an increased presence of e-content in schools like past papers, e-books etc 50%. That there was improved software acquisition & development; e.g. report forms, registration, timetabling etc 59.05%. That there was tangible existence of ICT policies at both government and school levels 52.96% and finally that there was an increase in the number of computer literate teachers in the public secondary schools 59.65%. However, respondents appeared to be unfamiliar with the presence of e-resources from KIE and other publishers e.g. a digital syllabus, virtue labs etc and gave this parameter a minimal score of 45.42%.

This could have been as a result of several factors including: Increase in the number of computers in schools established to be at five (5) computers per school (this is lower than Karimi’s (2010) assertion of 14 computers per school) resulting from donations and direct school purchases which correlates with Menjo et al (2004). Improved policy structuring and implementation at both school and ministry level which is in line with the government of Kenya’s (2007) Vision 2030, An increase in the number of computer literate teachers who have gone ahead to invest in laptops and personal desktop computers, an introduction of the Economic Stimulus Programme (ESP) ICT grant to one thousand and fifty (1050) selected secondary...
schools where five (5) schools per constituency were given ICT equipment worth over six
million shillings and that there is a global increase in interest in ICT use by educators.

An ICT USE penetration of 54.05% is still not high enough, A higher penetration usage rate
could have been achieved if teachers used ICT in areas that scored the lowest that is; Increased
presence of e-content in schools; past papers, e-books etc (50%); Increased presence of e-
resources from KIE & publishers e.g. a digital syllabus, virtue labs etc (45.42%) and if there was
prove of existence of clearer ICT policies at both government and school levels (52.96%)

4.4 ICT INFLUENCE IN THE TEACHING AND LEARNING PROCESS

From what this research sought to find out on ICT influence in the teaching and learning process,
the respondents 57.11% agree there is influence. However of the six key areas measuring this
influence, preparation of mark sheets & marks analysis received 64.64% while storage and
retrieval of past paper mocks and KNEC examinations and other revision materials received
64.59% which were among the most influenced areas. On the other extreme, Preparation of
lesson notes 50.72% and Technology based class presentations e.g. Power point 51.33% received
the lowest score. This is illustrated in Graph 4.3 below.

Graph 4.3: ICT Influence in the Teaching and Learning Process

Source: Research Data, 2011
KEY
q). Preparation of lesson notes
w). Preparation of mark sheets & marks analysis
e). Research for subject content
r). Technology based class presentations e.g. power point
t). Storage and retrieval of past paper mocks and KNEC examinations and other revision materials
y). To illustrate abstract concepts

Gillian's (2000) proposed future schools had characteristic key features like increase in collaborative endeavors which were to become more common among schools and districts; there was to be a greater emphasis on communication; that simulations and virtual field trips would become more common more so in illustration of abstract concepts and finally, that the learning process would become dynamic, exciting and fun using technology to learn in ways never before possible.

However, this study established that teachers have only used ICT to avoid or reduce the repetitive "busy work" and unreal, contrived exercises that are no longer relevant in an environment that allows for use of ICTs, that is why preparation of mark sheets & marks analysis received 64.64% while storage and retrieval of past paper mocks and KNEC examinations and other revision materials received 64.59% which were among the most influenced areas. A higher penetration usage rate could be achieved if teachers used ICT in areas that scored the lowest that is; in Preparation of lesson notes (50.72%), Research for subject content (58.52%), To illustrate abstract concepts (52.86%) and Technology based class presentations e.g. power point (51.33%) for these are the key reasons advanced by scholars like Gillian (2000) who advocate for ICT integration in the teaching and learning process.

4.5 **ICT INFLUENCE IN SCHOOL ADMINISTRATION**

The study found out that the greatest influence of ICT in schools was in the field of School Administration which was scored at 63.29%. ICT influence on school administration had more impact on On-line registration of KCSE candidates by KNEC which was given a score of
73.45% and storage of important school data and information at 70%. Follow up on discipline was given the least score of 51.3% followed by Collection of fees and receipting (M-PESA, YU-CASH, ZAP, etc) was given a score of 55.6%. Graph 4.4 below show how the different areas as recognized by the researcher scored from the respondents' points of view.

Graph 4.4: ICT Influence in School Administration

![Graph 4.4: ICT Influence in School Administration](image)

Source: Research Data, 2011

KEY

f) Collection of fees and receipting (M-PESA, YU-CASH, ZAP, etc)
g) Time tabling
h) Follow up discipline of students
j) Report forms generation, compiling and analysis of marks
k) Storage of important school data and information
l) Communication with parents through SMS and school website
p) On-line registration of KCSE candidates by KNEC
Most of the schools store their computers either in the computer lab, classroom, staffroom, departmental offices and offices of the principal or deputy principal. However, the respondents feel that they should be located in the computer lab as this received a highest score of 69.38%. Computers located in classrooms received the lowest score of 27.57%. This is demonstrated in Graph 4.5 above.

The study found out that that the greatest influence of ICT in schools was in the field of School Administration which was scored at 63.29%. This must have been as a result of where the computers are kept in public secondary schools, Table 4.5 clearly showed that computers in secondary schools are kept in computer lab 69.38% (presumably under lock and key) and offices of the principal 66.67%. This led to a very high score of 70% to Storage of important school data and information, however, On-line registration of KCSE candidates by Kenya National
examination Council (KNEC) scored the highest 73.45% mainly because of the change in KNEC 2010 policy where it is now mandatory for candidates to be registered on line.

Software programmes on; Time tabling (64.57%), Report forms generation, compiling and analysis of marks (66.3%) and Communication with parents through SMS and school website (61.85%) , were found to be on the ground and the difference in usage was mainly attributed to the head of school (Principal). In areas where Principals had an interest in technology, then these programmes were found to be in their schools and vice versa.

It is believed that the area of Collection of fees and receipting (M-PESA, YU-CASH, ZAP, etc) 55.6% and Follow up on discipline of students 51.3% scored the lowest for the simple reason of 'fear of the unknown". School administrators do not trust the new technology that much, what Chalid (2008) identified as the key barrier to ICT integration in teaching and learning as teachers' negative attitude and an inherent resistance to change.

Graph 4.6  The Number of Computers in Studied Secondary Schools

![Graph showing the number of computers in studied secondary schools.]

Source: Research Data, 2011
Through Graph 4.6 above on the number of computers found in the studied schools and Graph 4.1 on the average school (three years) mean of schools studied, a Pearson correlation coefficient can be drawn as follows:

\[
R(\text{xy}) = \frac{\sum xy - (\sum x)(\sum y)}{\sqrt{[\sum (x^2) - (\sum x)^2][\sum (y^2) - (\sum y)^2]}}
\]

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
<th>x^2</th>
<th>y^2</th>
<th>xy</th>
</tr>
</thead>
<tbody>
<tr>
<td>56</td>
<td>32</td>
<td>3136</td>
<td>1024</td>
<td>1792</td>
</tr>
<tr>
<td>33</td>
<td>49.33</td>
<td>1089</td>
<td>2433.45</td>
<td>1627.89</td>
</tr>
<tr>
<td>4</td>
<td>18.67</td>
<td>16</td>
<td>348.57</td>
<td>74.68</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>49</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

\[\Sigma x = 100\]
\[ \Sigma y = 100 \]
\[ N\Sigma x^2 = 17160 \]
\[ N\Sigma y^2 = 15224.08 \]
\[ \Sigma xy = 3494.57 \]
\[ N = 4 \]
\[ R_{xy} = \frac{4 \times 3494.57 - 100 \times 100}{\sqrt{((17160 - 100^2)(15224.08 - 100^2))}} \]
\[ = 0.650479966 \]

This study shows that a strong positive relationship of \[ +0.650479966 \] \textit{Person correlation coefficient}, exists between those schools that have a high average mean score in the last three years and those that have a high number of computers at their disposal. One of the leading conclusions in this regard therefore is that there is need to increase the number of computers in the public secondary schools. This correlates with Romina et al (2006) who researched on the \textit{ICT integration and teachers confidence in using ICT for teaching and learning in Queensland state schools} in Australia. Romina et al (2006) declared that the Australian governments had clearly taken up the challenge of transforming schools to meet the challenges of the information age, he cites the launching of the three-year ICT for learning strategy of 2002 which played an important role in connecting teachers and students with the new technologies by developing a sustainable technology infrastructure in schools and providing more funds for ICT in Queensland schools, including teachers professional development.
CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

As was clearly expected, the key research finding was that computers and more specifically Information and Communication Technologies (ICTs) have penetrated the public secondary schools. The use of ICT in teaching and learning and also in school administration can no longer be dismissed as a foreign ideology or one that has been left to just the business world. This research established that there were some computers in all the schools that were studied. However, the numbers of computers were not as many as would have been expected: 33% of the schools studied had between 6 and 15 computers while the majority of schools 56% had less than 5 computers.

5.2 SUMMARY OF FINDINGS

The findings show that penetration of "ICT USE" by teachers in Nyeri County stands at 54.05%, which is interpreted to mean that the respondents agree with the view that there has been tremendous "ICT USE" penetration by teachers in public secondary schools. Respondents gave the key indicators of ICT USE penetration as: - that the access to computers PCs and laptops has improved in public secondary schools, that there is an increased presence of e-content in schools like past papers, e-books etc, that there is improved software acquisition & development; e.g. report forms, registration, timetabling etc, that there is tangible evidence of existence of ICT policies at government & school levels and finally that there is an increase in the number of computer literate teachers in the public secondary schools.

From what this research sought to find out on ICT-influence in the teaching and learning process, the respondents 57.11% agree there is influence. However of the six key areas measuring this influence, preparation of mark sheets & marks analysis received 64.64% while storage and retrieval of past paper mocks and KNEC examinations and other revision materials received
64.59% which were among the most influenced areas. On the other extreme, Preparation of lesson notes 50.72% and Technology based class presentations e.g. Power point 51.33% received the lowest score.

The study found out that that the greatest influence of ICT in schools was in the field of School Administration which was scored at 63.29%. ICT influence on school administration had more impact on On-line registration of KCSE candidates by KNEC which was given a score of 73.45% and storage of important school data and information at 70%. Follow up on discipline was given the least score of 51.3% followed by Collection of fees and receipting (M-PESA, YUCASH, ZAP, etc) was given a score of 55.6%.

The study showed that computers in secondary schools are kept in computer lab 69.38% (presumably under lock and key) and offices of the principal 66.67%. This led to a very high score of 70% to Storage of important school data and information, however, On-line registration of KCSE candidates by Kenya National examination Council (KNEC) scored the highest 73.45% mainly because of the change in KNEC 2010 policy where it is now mandatory for candidates to be registered on line.

This study shows that a strong positive relationship of +0.650479966 Person correlation coefficient, exists between those schools that have a high average mean score in the last three years and those that have a high number of computers at their disposal.

5.3 CONCLUSION FROM THE FINDINGS

The relationship between further training and owning a personal computer revealed those who have done a unit in ICT showed a tendency buying personal laptops or PC 90.9% however those that had undergone an in-service training in ICT showed lack of commitment in a acquiring their own machines. It was further established that more male teachers were computer literate 47.1% as compared to the female computer literate teachers who were found to be only 44.1%. This was in line with the findings by Romina et al (2006) who had observed that male teachers
reported significantly higher levels of confidence in ICT use in the teaching and learning process.

This study established that teachers have only used ICT to avoid or reduce the repetitive “busy work” and unreal, contrived exercises that are no longer relevant in an environment that allows for use of ICTs, that is why preparation of mark sheets & marks analysis received 64.64% while storage and retrieve of past paper mocks and KNEC examinations and other revision materials received 64.59% which were among the most influenced areas. A higher penetration usage rate could be achieved if teachers used ICT in areas that scored the lowest that is; in Preparation of lesson notes (50.72%), Research for subject content (58.52%), To illustrate abstract concepts (52.86%) and Technology based class presentations e.g. power point (51.33%) for these are the key reasons advanced by scholars like Gillian (2000) who advocate for ICT integration in the teaching and learning process.

Software programmes on; Time tabling (64.57%), Report forms generation, compiling and analysis of marks (66.3%) and Communication with parents through SMS and school website (61.85%) , were found to be on the ground and the difference in usage was mainly attributed to the heads of school (Principals). In areas where Principals had an interest in technology, then these programmes were found to be in their respective schools and vice versa.

It is believed that the area of Collection of fees and receipting (M-PESA, YU-CASH, ZAP, etc) 55.6% and Follow up on discipline of students 51.3% scored the lowest for the simple reason of “fear of the unknown”. School administrators do-not trust the new technology that much, what Khalid (2008) identified as the key barrier to ICT integration in teaching and learning as teachers’ negative attitude and an inherent resistance to change.

According to Empirica (2006), teachers who do not use new technology are still of the opinion that the use of ICT has no benefits or has unclear benefits. This view is supported by Trucano (2005) when he claimed that the impact of ICT use on learning outcomes is unclear and open to much debate. This research attempted to bridge this glaring gap by answering the question “What influence does ICT have on the service delivery of teacher in public secondary schools?
This study answers these concerns by among other things showing that a strong positive relationship of $+0.650479966$ Person correlation coefficient, exists between those schools that have a high average mean score in the last three years and those that have a high number of computers at their disposal.

5.4 RECOMMENDATIONS

This study sort to find out if a relationship between ICT use and improved service delivery by teachers in public secondary schools exists, further the study sort to confirm whether or not the use of ICT has “no benefits or has unclear benefits” as claimed by Empirica (2006).

5.4.1 RECOMMENDATIONS FOR PRACTICE

- Since this study has shown that a strong positive relationship of $+0.668948051$ Person correlation coefficient, exists between those schools that have a high average mean score in the last three years and those that have a high number of computers at their disposal, one of the leading recommendations in this regard therefore is to increase the number of computers in the public secondary schools.

- The importance of ICT infrastructure in schools to influence service delivery of teachers cannot be taken for granted therefore the Kenyan Government has to rejuvenating the existing ESP-ICT project that aims at equipping 1050 selected schools (5 schools per constituency) with ICT infrastructure and most importantly, capacity building of teachers in the area of ICT integration. It should aim at increasing the average number of computers per school in our secondary schools from five (5) to Fourteen (14) as recommended by Karimi (2010)

- Though an impressive ICT USE penetration of 54.05% was witnessed, this is still not high enough, A higher penetration usage rate could achieved if teachers used ICT in areas that scored the lowest in this study namely; Increased presence of e-content in schools; past
papers, e-books etc; Increased presence of e-resources from KIE and publishers e.g. a digital syllabus, virtue labs etc and if there was prove of existence of clearer ICT policies at both government and school levels, in addition, schools and teachers should be made aware about the availability of such resources from KIE and other publishers.

The researcher sees this as an opportunity for the education sector to outline clearer policy guidelines that will drive public secondary schools towards Gillian’s (2000) future schools. It is expected that the ministry of education (MOE) will, with the help of ICT related companies and Non-governmental organizations put the necessary interventions that will inject the much needed infrastructure, skills and attitude necessary to spur ICT integration in teaching and learning in our schools. Additionally, teachers are expected to put a deliberate effort to enhance their capacity in the area of ICT integration. Teachers should do everything within their means to acquire the requisite ICT skills. This will not only enhance their efficiency in service delivery but also empower them to play their rightful role in the envisage vision 2030 knowledge economy.

During this study the areas that scored the lowest in the research question ‘How does ICT influence service delivery of teachers in the actual teaching/learning process?’ were; Preparation of lesson notes (50.72%), Research for subject content (58.52%), To illustrate abstract concepts (52.86%) and Technology based class presentations e.g. power point (51.33%). These four key areas require the use of internet. The low score is a clear indication that internet access by teachers is very low. The researcher proposes official recognition of internet by the ministry of education (MOE) as an important teaching resource which teachers and students have to access through the cheapest method possible. The use of mobile phones and subsidized internet rates for schools are avenues that ought to be considered.

This study established that in public secondary schools, the greatest influence of ICT is felt in the School administration, though it is limited by the knowledge and willingness of the Principals to adopt ICT USE in school administration. The areas that were found to be wanting were that of Collection of fees and receipting (M-PESA, YU-CASH, ZAP, etc)
55.6% and Follow up on discipline of students 51.3% which scored the lowest, for the simple reason of “fear of the unknown”

The researcher recommends that a mandatory ICT training be done to all current and future principals of secondary schools. The training should be properly structured so as to include all the areas that may lead to “fear of the unknown”. Principals need to appreciate that ICT use according to Wheeler (2000), is set to change the role of the teacher because of the following three key reasons: role of the teacher must change because ICT will cause certain teaching resources to become obsolete; ICT may also make some assessment methods redundant and finally the role of the teacher must change in the sense that it is no longer sufficient for teachers merely to impart content knowledge.

- The researcher proposes a change in organizational structure (in the Ministry of Education) that will lead to an introduction of ICT application implementers at all levels of education that is; secondary school level, District level, County level and at National levels (for example, a duplication of the human resources officers’ structure in the ministry of education).

5.4.2 RECOMMENDATIONS FOR FURTHER STUDY

- Further study is thus required because a glaring gap exists between the existing ICT policies and what has been witnessed on the ground. This research paper may play a leading role in this regard.

- Similar studies ought to be conducted at the following levels which were not catered for by this study; in private secondary schools, in primary schools and in post secondary institutions like technical institutions and teachers training colleges.
REFERENCES


Gillian M.E. (2000), The Impact of ICT on Schools: Classroom Design and Curriculum Delivery. A Study of Schools in Australia, USA, England and Hong Kong

ICT for Teacher Education Website http://www.teachersn.com accessed in February 2011


Kenya Institute of Education (KIE 2009), Summative Evaluation Findings on Secondary Education Curriculum


Kenya Education School Support Project (KESSP 2005-2010), Delivering Quality Equitable Education and Training for All Kenyans

Khalid A, B. (2008), Barriers to Successful Integration of ICT in the Teaching and Learning Environment; A Literature Review Eurasian Journal of Mathematics and Science and Technology, 2009


Kothari R. (2003), Research Methodology: Methods and Techniques New Delhi, Age Printers

Macmillian English dictionary (2007)


Mugenda O. and Mugenda (2003), *Research Methods: Qualitative and Quantitative Approaches*, Nairobi: Africa centre for Technology

Murithii P. (2005), *A Frame Work for Integrating ICT In The Teaching and Learning Process In Secondary Schools In Kenya*. University Of Nairobi, School of Computing and Informatics


Omwenga E, I. (2005), *Pedagogical Issues and E-Learning Cases: Integrating ICTs into Teaching and Learning Process* University of Nairobi

Osono (2010), *Application of Computer Based Resources in Geography Education in Secondary Schools*. Maseno University


Trucano M. (2005), *Knowledge Maps: ICTs In Education, What Do We Know About The Effective Use of Information and Communication Technologies in Education in Developing Countries?*

Appendix 1

LETTER OF INTRODUCTION

Wanjohi Timothy Gachara
Po Box 97-10101
Karatina
Tel. No. 0722 214 783
Date:

Dear Sir/ Madam,

RE: LETTER OF INTRODUCTION TO CONDUCT RESEARCH

Greetings

I am a masters student from Kenyatta University currently undertaking research on 'the influence of ICT on the service delivery of secondary school teachers from Nyeri County'.

The information you will provide will be treated with a lot of confidentiality and will be used strictly for academic purpose. Please try and give objective and honest answers to the questions.

Thank you and God bless you.

Yours faithfully

Wanjohi TG
Appendix 2

SAMPLE QUESTIONNAIRE

Good morning/afternoon Sir/ Madam

The researcher is carrying out a research on “The influence of ICT on the service delivery of teachers in public secondary schools with reference to Nyeri County”

Instructions: Please answer the questions objectively and truthfully as possible. Do not write your name anywhere on your questionnaire. Provide information as accurately as possible for it to be useful in this study. Use a tick (√) to indicate your response where appropriate.

A BACKGROUND INFORMATION

1. How old are you?
   - Less than 30 years
   - 31 – 40 years
   - 41 – 50 years
   - More than 50 years

2. Gender?
   - Male
   - Female

3. Education qualification?
   - Untrained
   - Diploma
   - Graduate
   - Post Graduate
4. Indicate the average School Mean of your school for the last 3 years
   - 1 - 3.9
   - 4 - 6.9
   - 7 - 9.9
   - 10 - 11.9

5. Did you do any unit involving the use of computers or ICT in the university/college?
   - Yes
   - No

6. Have you had any further training in ICT/Computers?
   - Yes
   - No

   If YES, give specifics of the training you underwent.

7. Do you own a personal computer?
   - Yes
   - No

   If YES, what type?
   - Lap Top
   - PC

8. Does your school have computers?
   - Yes
   - No

   If YES how many?
   - Less than 5
   - Between 6 and 15
   - Between 16 and 30
   - Over 30
9. Identify by ticking (✓), where the school’s computers are placed and your approval rating of where they are placed?

<table>
<thead>
<tr>
<th>Strongly Approve</th>
<th>Approve</th>
<th>Disapprove</th>
<th>Strongly Disapprove</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some are in the Computer lab</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some are in the Classrooms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some are in the Staffroom</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some are in the Departmental Offices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Some are in the Offices of the Principal / Deputy Principal</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other Places (specify) ___________________________________________

10. Do you as a teacher have free access to the computers?  
    [ ] Yes  [ ] No

    If NO, State reasons as to why not.
    __________________________________________
    __________________________________________
    __________________________________________
    __________________________________________

11. Do you have any access to the internet?  [ ] Yes  [ ] No

    If YES, How do you access the internet?
    [ ] The school has free internet services (wire less) at the teachers’ disposal eg Zuku
    [ ] The school uses a Safaricom / Airtel / Orange / YU modem
    [ ] Your Personal Modem
    [ ] Your Personal Mobile Phone
    [ ] Cyber Cafe

    Other Specify ________________________________
B "ICT USE" PENETRATION BY TEACHERS IN SECONDARY SCHOOLS

12. Indicate the extent to which you agree with the belief that ICT USE by teachers has a sizable penetration in Kenyan public secondary schools. – Please tick (√)

Scores: SA= above 80%, A= 60%, UC= 50%, D= 40% & SD=Below 20%

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Uncertain</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to Computers PCs &amp; Laptops has improved in schools</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased Presence of E-content in schools; past papers, e-books etc</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved Software Acquisition &amp; Development: eg Report forms, registration, Time tabling etc</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased Presence of e-resources from KIE &amp; Publishers eg a Digital Syllabus, Virtue labs etc</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existence of ICT policies at govt &amp; School levels.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase of Computer Literate Teachers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other areas, please specify

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________

_________________________________________________________________
### ICT INFLUENCE IN THE TEACHING & LEARNING PROCESS

13. Indicate the extent to which you agree with the following influences of ICT on the actual teaching and learning process. – Please tick (✓)

Scores: SA= above 80%, A= 60%, UC= 50%, D= 40% & SD=Below 20%

<table>
<thead>
<tr>
<th>Influence</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Uncertain</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation of Lesson Notes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation of Mark Sheets &amp; Marks Analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research for Subject Content</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology based Class Presentations eg Power Point</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage and Retrieval past paper mocks &amp; KNEC examinations &amp; Other Revision Materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To illustrate abstract concepts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other areas, please specify

______________________________________________________________

______________________________________________________________

______________________________________________________________

______________________________________________________________
14. Indicate the extent to which you agree with the following influences of ICT on school administration. Please tick (√). Scores: SA= above 80%, A= 60%, UC= 50%, D= 40% & SD=Below 20%

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Uncertain</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection of Fees &amp; Receipting (Mpesa, U-Cash, Zap etc)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time Tabling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Follow up Discipline of Students</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Report Forms Generation, Compiling &amp; Analysis of marks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage of Important school Data and Information</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication with Parents SMS and School Website</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-Line Registration of KSCE candidates by KNEC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other areas, please specify
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

Thank You for Your Assistance and Time