

**DETERMINANTS OF PRINCIPALS' LEVEL OF INTEGRATION OF
INFORMATION COMMUNICATION TECHNOLOGY IN MANAGEMENT
OF PUBLIC SECONDARY SCHOOLS IN NAIROBI COUNTY, KENYA**

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**A Thesis Submitted in partial Fulfillment of the Requirements for the Award
of the Degree of Doctor of Philosophy in Educational Administration of the
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DECLARATION

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

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DEDICATION

I dedicate this thesis to my loving children Brigid Jerono, Martin Kimurgor and Brenda Jerop for being understanding and supportive throughout the study period. They have been my inspiration throughout this study. Most sincerely, I dedicate this thesis to my parents the late Mr. Ezekiel Chepkonga Cherutich and Mrs. Elizabeth Sokome Cherutich who gave me a good start in life.

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LIST OF ABBREVIATIONS AND ACRONYMS

BECTA	British Educational Communications and Technology Agency
BoM	Board of Management
CBT	Computer Based Technology
CEPAK	Computers in Education Project in Kenya
DEO	District Education Office
DQASO	District Quality Assurance and Standard Officer
EFA	Education for All
EMIS	Education Management Information System
f	Frequency
GeSCI	Global eSchool and Community Initiative
ICT	Information Communication Technology
KESI	Kenya Education Staff Institute
KESSP	Kenya Educational Sector Support Programme
KEMI	Kenya Education Staff Institute
KNEC	Kenya National Examinations Council
MDGs	Millennium Development Goals
NEPAD	New Partnership for African Development
NDP	Net Domestic Project
PDE	Provincial Director of Education
PTA	Parent Teachers' Association
UNESCO	United Nations Educational, Scientific and Cultural Organization

VAT	Value Added Tax
WB	World Bank
www	World Wide Web

ABSTRACT

This study investigated the determinants of Principals' level of integration of Information Communication Technology (ICT) in management of public secondary schools in Nairobi County. The objectives, research questions and hypotheses of the study were based on the following variables: whether the Principals' gender, age, educational level, level of training in ICT, access to ICT facilities, attitudes and challenges and their level of integration of ICT in the management of public secondary schools in Nairobi County. The study was founded on Roger's Theory of Diffusion. It was conducted using descriptive survey design. The target population was all the 73 principals of public secondary schools of Nairobi County at the time of study. The study was conducted on all the 73 principals in Nairobi County. The research instruments used were the questionnaire, interview schedule and checklist. A pilot study was done among principals of seven (10%) public secondary schools in Nairobi County and Cronbach alpha () was used to test the reliability of the instruments. Ethical considerations were upheld. Data were collected through principals' self-administered questionnaires, interview schedule and observation checklist. Quantitative data were analyzed using the Statistical Package for Social Sciences (SPSS) programme number 20.0. Inferential statistics were used in the analysis of all hypotheses. Chi-square (χ^2) test was used to test the null hypothesis which was accepted or rejected at 0.05 level of significance. Results from the analysis of data revealed that principals' age, their in-service ICT training and access to ICT facilities were significantly related to the level of ICT integration in management of public secondary schools. However, principals' gender and principals' gender and educational level were not significantly related to their level of ICT integration in the management of public secondary schools. It was also revealed that the principals generally held positive attitudes towards ICT use in the management of public secondary schools. The study found that principals needed more tailor-made in-service training and incentives in order to transfer their theoretical enthusiasm into practice. The study revealed the following challenges encountered by principals: financial constraints, lack of ICT infrastructure, negative attitudes toward ICT integration, lack of enough technical support and maintenance. This study found that even though some of the secondary schools have not integrated ICT due to lack of resources and electricity most of them had. The study made several recommendations among them was the necessity for the Ministry of Education to layout ICT infrastructure in schools in order to facilitate the use of ICT in the management of schools and Principals should also be trained on ICT use for management of public secondary schools purpose

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

In contemporary settings, few sectors can thrive without integrating information communication and their associated technologies (ICTs) into their operations (Karanja, 2012). Indeed, Olatokun (2008) asserts that ICT has become a potent force in transforming social, economic and political life globally. According to KESI (2008), the emergence of this new global force has had serious implications as far as the nature and purpose of educational institutions are concerned. The incorporation of Information Communication Technology (ICT) in school management has been promoted as a key step in bridging the digital divide (Han, 2002). Information Communication Technology (ICT) shows the way of distributing information in the school and is being used in management of school affairs to change education outcomes (Asan, 2003).

To keep track with events in the 21st century, it is essential that secondary school principals integrate ICT to bring about effective school management practices (Asan, 2003). The advances of the information age are helping to ensure that ICTs in education become an integrated part of the educational system. For example in Britain, Principals are faced with increasing pressure to integrate ICT effectively in school management practices (British Educational Communications and Technology Agency ICT Research, 2009). It is recommended that secondary

school principals may use ICT to change and enhance some of their existing management practices by preparing for administrative and managerial subsystems of a computer assisted information system (Day & Sachs, 2004). Administrative subsystems include student, personnel, financial, timetable, test, resource and the general school administration. On the other hand management subsystems are capacity planning, educational planning, financial planning and school year application (Maki, 2008).

The main ICT tool to be used in management and administration is likely to be the computer, together with basic software packages especially MS Word, Excel, PowerPoint, or the equivalent open source packages, and access to email and the internet. In addition there are software packages designed specifically for school management and administration, including timetabling, databases for learner records, systems for the recording of school development plans, syllabus completion reports, test data, school based assessment records and financial records.

Makewa, Meremo and Role (2013) provide a model that summarizes the key areas of ICT use in educational administration, namely: student administration, personnel administration, financial administration, communication, library system and general administration and supervision of instruction as shown in Figure 1.1.

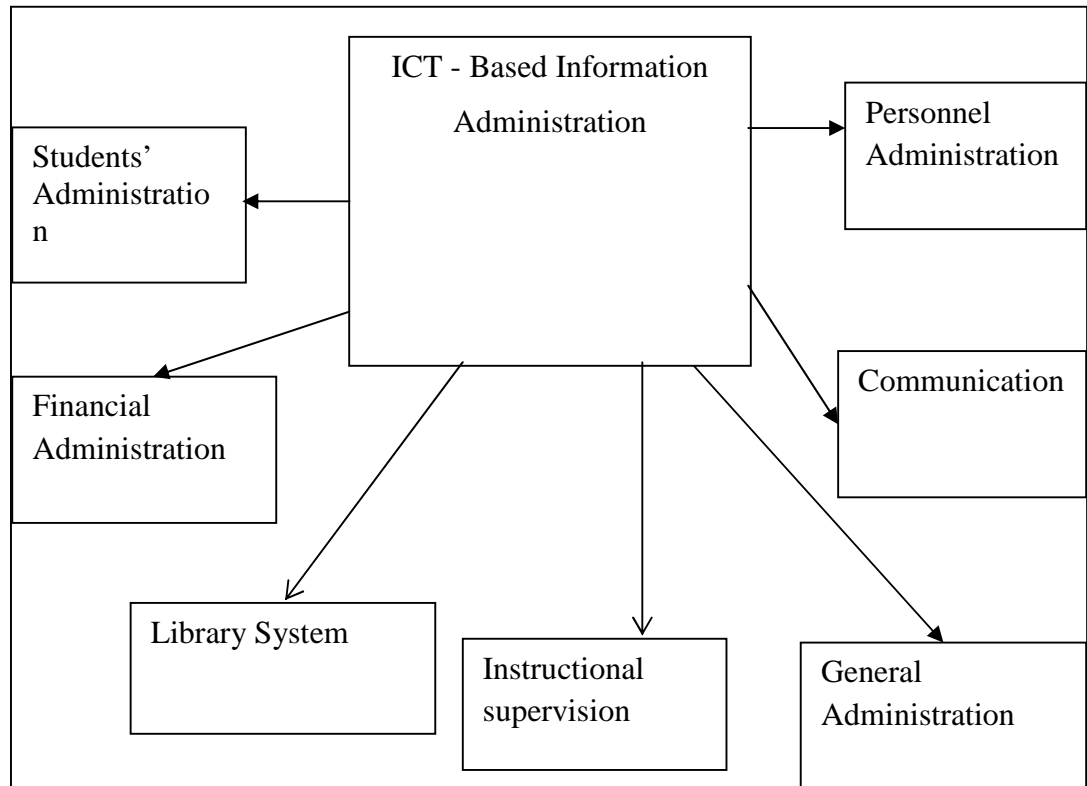


Figure 1. Key areas of ICT Use in educational administration and ICT

Student administration is an important and integral part of educational administration. This involves various activities commencing from the admission process to learning activities till processing of results and performance analysis (Krishnaveni & Meenakumari, 2010). According to World Bank (1999), computers have made it possible for educational administrators to maintain accurate student records, track and analyze performance and use the resulting information to make administrative decisions. Burdensome and tedious record keeping takes time away from more important tasks and inhibits administrators from maintaining records. Simplifying the process by the use of computers has encouraged administrators to keep better records and, more important, making use

of the resulting information. ICT is also useful for managing fee payment records and displaying students' academic progress (Makewa, Meremo & Role, 2013).

Financial management is one area of management that greatly influences school's effectiveness. However, scholars have observed that secondary school principals do not efficiently carry out this task (Chepkonga, 2012; Langat, 2008; DeJaeghere, Williams & Kyeyune, 2008). While literature on use of ICT in financial management in secondary schools appear scarce, available literature from other institutions reveal that schools have enormous benefits in integration of ICT to manage finances and would help in overcoming some of the financial management challenges encountered by secondary schools principals. According to Tavakolian (1995), the traditional financial management systems consisted of paper ledgers, typewriters and calculators. Typewriters were used to type invoices and cheques, and all calculations were performed using calculators. However, with this system it was possible for errors to be introduced into the data since they could go undetected for quite some time. This has since been made more efficient with the evolution of ICT. Pedrom, Enrique, Ernesto and Lucio (2004) rightfully argue that at school level, principals may use spreadsheets, word processors, small databases and special accounting software to organize and store all relevant financial data in a school. Indeed, Amviko (2011) notes that computers are largely used in preparing accounting documents like cash memo, bills, invoices and accounting vouchers. Computers also help in accurate entry of transaction and

therefore all documentation and reports can be generated automatically. In addition, computer softwares are used to prepare and store financial records such as cash book, balance sheet and even prepare trial balance and check for accuracy of records. A computer can also be programmed to prepare the statement of comprehensive income and the statement of financial position. Sani and Tiamiyu (2005) contend that computer softwares are widely used to automate the payroll. This is especially important in payroll administration for support staff in secondary schools. An automated payroll enables automated preparation of bank schedule, program account summary, increment reports, monthly review of nominal roll and monthly pay slips.

School libraries act as information centers for the students and teachers in school (Ismail, Ahmad & Affandy, 2013). The school library is most benefited by the students as the library's main users, since all of the information resources in one particular school are placed in its school library. School libraries are centres that constitute the collection of both printed and non-printed materials including reference books, documents, newspapers, models, charts, diagrams, maps, slide films, projectors, tape recorders, multimedia kits, and others. However, the evolution of ICT has transformed the conduct of activities and even the nature of materials in the school library. The school library environment is therefore in a state of transition in terms of resources and users; many information sources once available only in print are now available in print, CD-ROM, online and other

sources; other sources may only be available in electronic form (Siddike, Munshi & Sayeed, 2011). According to Chauhan (2004), ICT's have also tremendously changed the management of school library resources and housekeeping operations like acquisition, cataloguing, circulation control, serials control as well as the way library services are delivered. Internet has been used extensively as a resource as well as a tool to deliver the Library and Information Services.

Magni (2009) argues that a good communication system should be in place for the overall effectiveness of administration. Information Communication Technology therefore serves as a tool for providing an effective and efficient communication system in educational institutions. It helps in providing timely information to all concerned. Communication could be for internal and external information acquisition and dissemination. According to Pedrom, Enrique, Ernesto and Lucio (2004), ICT have important roles to play in making school administration less burdensome and more effectively integrated to the official information flow about students, curricula, teachers, budgets and activities through the educational system information pipelines. They are also an efficient means for informing community members (parents, politicians, and researchers) about educational news and policies. In addition, ICT facilities such as internet can help link the school with the Ministry of Education offices to make the transfer of documents, new regulations and queries more efficient throughout the system. It can also help in improving the flow of information to the community through web sites and with

regular well-designed information sheets.

According to Blake (2000), ICT has been largely integrated in staff administration including recruitment and work allotment of teaching and administrative staff, monitoring their attendance and managing leave and in performance appraisal. This also includes relevant communication to and from the institutions and among peers. Staff administration through ICT helps in processing of voluminous records in a quick, meticulous, and impeccable manner thereby making data retrieval easier.

According to Yuen, Law and Wong (2003), the introduction of ICT in schools enhances the daily school routine, programme, updating the evaluation of school programmes and solving individuals' or groups' problems. This is also supported by Maki (2008) who specified that ICT has played a major role in reducing operational inefficiency and improving decision-making in many areas of governance in schools and school administrative subsystems. Information Communication Technology has largely been integrated in school management information systems and used to provide information and various reports from the database in order to make decisions in line with the aims of the school and facilitate controlling of the activities to achieve the aims (Christopher, 2003). In infusing ICT in school management information systems, school administrators are able to access, manage and report the information quickly and easily.

Information Communication Technology has also been incorporated in annual activities such as facilitating online registration of Kenya Certificate of Secondary Education candidates as well as in processing and release of examination results to individual candidates. In terms of general classroom management, Pedrom, Enrique, Ernesto and Lucio (2004) advance that teachers can more easily keep student's marks and their personal and academic records permanently up-to-date, as well as produce all required data for school administration and for parents, using preformatted documents. Most importantly, teachers can maintain their subject content (lesson plans, exercises, evaluation) in digital format, making it easy to update, to share with other teachers and to enhance with time. In fact, the many ways tools such as a computer, a handheld device or a portable keyboard (and a network) can help a teacher in administrative tasks.

Studies done in Cyprus show that there is need to develop computer software programmes in order to manage information in secondary schools in relation to students and teachers' data for administrative and managerial purposes such as: student administration (enrollment, absenteeism, grades and end of term examinations); personnel administration (absenteeism); human resources administration; timetable (grouping students into classes , internal exams timetable); financial administration and planning or for school year evaluation; keeping track of school library and home reading books (Maki, 2008). The purpose of all leadership and management activities should be to support effective

decision making in the education system (Berube, 2004; Nolan, Friesen, Maeers, Couros, 2005). For successful integration of ICT in education, there should be specific and clear objectives, guidelines and time-bound targets, required infrastructure, curriculum framework, assessment systems and educational commitment at all levels (Means, 1994).

Principals' involvement in ICT integration of secondary school management is key in determining the use of ICTs. According to BECTA ICT research (2009) leaders are critical in driving change in the use of ICT. School leaders should manage and initiate innovation and change. Strong leadership of schools is the key to the future success of education (Akbulut, Kesim and Odabasi 2007). In this context the principal as a leader has the capacity to influence and inspire teachers, encourage better performance, and encourage innovative changes. In fact the principal is a critical factor in the professional development of teachers and implementation of any innovation (Hezel Associates, 2005-2006).

The scenario in Africa in contrast depict that finding fresh, appropriate and inventive methods for implementing ICT in schools remains a problem for principals of secondary schools as the changing demand and circumstances in schools require a different approach to ICT (Steyn & Van Niekerk, 2005). Without a total commitment over time from the school leadership there is no way that ICT can be integrated into the life of the school. Principals with insufficient

ICT-related knowledge will interpret regulations according to their own views and fail to provide continuous support (Akbaba-Altun, 2006).

In Kenya, Vision 2030 and the National ICT Master Plan ICT policies recognize that efficient, affordable, and accessible ICT is the key to economic growth. In an endeavor to mainstream ICT use in the education sector, Vision 2030 envisages a continuous computer supply program to secondary schools (GoK, 2008). It states that the use of ICT in schools, colleges, universities and other educational institutions in the country improves the quality of management. The Ministry of Education developed the Kenya Education Sector Support Program (KESSP) in 2005 that featured ICT as one of the priority areas that aim at mainstreaming ICT into education management process.

In East Africa, for example, studies in educational institutions confirm the use of ICT in management activities such as finance, student data as well as assessment records (Onguko, 2004). Moreover, Yakoub (2008) found out that schools in Dares Salaam were harnessing ICT in such activities as making timetables, library management and low cost internet based communication such as e-mail.

In Kenya some university students use internet to apply, register, pay fees, send in assignments as well as check their assignment and examination results (Siundu, 2013). The Kenya National Examinations Council (KNEC) enables candidates to

check their grades by sending short messages through a dedicated website. Most secondary schools have some computer equipment; however, this mainly consists of only one computer in the office of the principal. According to Farrell (2007) most of the schools with ICT infrastructure have acquired it through initiatives supported by parents, the government, NGOs, or other development agencies and the private sector, including the NEPAD e-schools programme which is among the most ambitious African initiatives. The programme is on a multi-collaborative partnership strategy between the NEPAD, major ICT companies and ministries/departments of education in different participating African countries. Among the six completed NEPAD programmes none is in Nairobi County. In spite of these developments, Yakoub (2008) still laments that ICT penetration and usage in educational management is still low in East Africa. Yakoub (2008) asserts that ICT usage in Tanzania is mainly clerical in nature due factors such as inadequate funds, lack of ICT professionals and poor ICT infrastructure with regard to the status of ICT in Kenya.

The Millennium Development Goals (MDGs) is a policy document that Kenya is a signatory to. In the millennium development goals, the eighth target of the goal: to develop a global partnership for development states that in cooperation with the private sector, governments should make available the benefits of new technologies especially information and communication technologies (UN, 2000). The New Partnership for African Development (NEPAD) prioritized efforts

towards bridging the digital divide between Africa and the developed world. This led to NEPAD e-schools programme whose objective is integrating ICT into education (Makhanu, 2010).

According to Republic of Kenya, (2005), the MoE has put in place a national ICT policy and e-government to provide guidelines for transforming Kenya into a digital society. As a result of this policy the MoE developed the Sessional Paper No. 1 of 2005, which captures ICT as chapter VIII. The Sessional paper notes that ICT faces several challenges such as: high level of poverty limited electrification and frequent power disruptions, high cost of internet provision, costs associated with ICT equipment, inadequate infrastructure and support. According to RoK, (2006), the MoE operationalised the Sessional Paper No. 1 of 2005 through the development of KESSP which involves Educational Management Information Systems (EMIS). One of the aims of KESSP is to achieve Vision 2030 goals.

The Ministry of Education developed the National ICT strategy for education and training based on the vision that ICT is a universal tool in education and training (Republic of Kenya, 2006). The objective of the National ICT strategy is to ensure that efforts are made towards strengthening integration and use of ICT in the education sector. This strategy is in line with ICT policy of 2006 and Sessional Paper No. 1 of 2005 as earlier stated. The strategy outlines the overall goal of education as to achieve Education for All (EFA) by 2015. The strategy is in line

with MDGs and KESSP and identifies strategic pillars for the educational sector as: digital equipment, connecting and network infrastructure, technical support, harnessing emerging technologies, integration of ICT in education, training and partnerships and resource mobilization, hence the significance of this study on integration of ICT for management of public secondary schools in Kenya (Republic of Kenya, 2006).

1.2 Statement of the Problem

Despite the critical role of ICT in many sectors like banking, transport and communication, it's apparent that the education sector has not fully integrated ICT especially in management of public secondary schools in Kenya. There is considerable a technological lag in Kenyan public secondary schools (RoK, 2006). A great deal of administrative work in secondary schools is still carried out manually despite the ICT policy of 2006 for management of secondary schools. (RoK, 2006). This means that the integration of ICT for secondary school management has not been significantly embraced (KESI, 2008). Research on the use of ICT in the past has focused on integration in learning and other determinants such as social, political and economic issues and not on the determinants of the principals' integration of ICT in school management (Kiarie, 2007). There is little doubt that sub-Saharan Africa's populations are missing out on the boons of information and communication technology (ICT) in educational management (Bigum, 2000).

As a region lagging behind in integration of ICT Kenya is missing out on well managed educational institutions (Kipsoi, 2012). Principals play an important role in creating successful change in schools (Schiller, 2002). The head of the institution is essentially responsible for corporate strategy (Gakuu, 2006). Limited research is noted that documents the determinants of principals' integration of ICT in secondary school management. Review of literature indicates that scholars must embrace current emerging trends in education (Means, 1994). Literature indicates that the problem with technology integration in public schools is that secondary school principals lack necessary training, knowledge and skills (Persaud, 2006). Despite the fact that the role of the principal is significant in secondary school management, little information exist which describes the determinants of the principal as a technology adoption and integration leader (Davies, 2002).

1.3 Purpose of the Study

The purpose of this study was to investigate the determinants of principals' level of integration of information communication technology in secondary schools management in Nairobi County.

1.4 Objectives of the Study

The specific objectives of the study were the following:

- i. to establish whether principals' gender is related to their level of

integration of Information Communication Technology in management of public secondary schools;

- ii. to establish whether principals' age is related to their level of integration of Information Communication Technology in management of public secondary schools;
- iii. to determine the extent to which principals' educational level is related to their level of integration of Information Communication Technology in management of public secondary schools;
- iv. to assess whether the level of training in Information Communication Technology (ICT) is related to their level integration of Information Communication Technology in management of public secondary schools;
- v. to establish whether principals' access to ICT facilities is related to their level integration of Information Communication Technology in management of public secondary schools;
- vi. to assess the principals' attitude towards integration of Information Communication Technology management of public secondary schools.
- vii. to establish the challenges the principals' face in their integration of information communication technology in management of public secondary schools.

1.5 Research Questions

This study seeks to answer the following research questions:

1. What is the attitude of the principals' of public secondary schools towards integration of information communication technology in the management of public secondary schools?
2. What are the challenges faced by principals' in their integration in information communication technology in the management of public secondary schools?

1.6 Hypotheses

The null hypotheses that guided the study were:

Ho₁: There is no significant relationship between the principals' gender and the level of integration of information communication technology in management of public secondary schools.

Ho₂: There is no significant relationship between the principals' age and the level of integration of information communication technology in management of public secondary schools.

Ho₃: There is no significant relationship between the principals' educational level and the level of integration of information communication technology in management of public secondary schools.

Ho₄: There is no significant relationship between the principals' level of training in ICT and their level of integration of information communication technology in management of public secondary schools.

Ho₅: There is no significant relationship between principals' level of access of ICT and their level of integration of information communication technology in the management of public secondary schools.

1.7 Significance of the study

This study is significant for both theoretical and practical reasons. From a theoretical perspective, the study explored the applicability of theories and theoretical frameworks to a culture undergoing rapid technological change. From a practical perspective this study has the potential to make a valuable contribution to the policy and management as it provides an understanding of influence of secondary school principals when integrating ICT. This study is considered timely, as it proposes a strategy for principals of secondary schools to facilitate integration of ICT, coping with increased enrolment due to Free Secondary Education (FSE) and realizing Vision 2030 of increased opportunity and innovation.

Secondly, the study may guide in the formulation of policies by the Ministry of Education to revamp and improve integration of ICT in education management hence enhancing effectiveness and efficiency of administrative duties in secondary schools. The study may lead to an appreciation of the leadership role of principals as technology change agents and could possibly be used to make principals cope with global technological changes in education and improve

networking with other principals in various aspects of school management. In addition, ICT can help improve on the collection, analysis, synthesis, storage, distribution and sharing of information to improve school leadership and governance (Kenney, 2006). Wide use of ICT may increase collaboration with other relevant government ministries to expand networks and connecting infrastructure. Future researchers may use the data to draw knowledge on educational management practice. The world is currently experiencing digital revolution where the economy is increasingly setting based on digital technologies and the education sector has no option other than go digital so as to tap into the benefits of modernization.

This study will provide empirical information on the level of ICT facilities available to principals in public secondary schools in Nairobi. It will also provide information on the level of usage of ICT facilities by principals in the management of public secondary schools. This study therefore, will have implications for teacher educators in colleges of education and universities in incorporating ICT assisted courses in teacher education programmes.

1.8 Limitations of the Study

It is important to recognize that the study may have had some limitations. First, the study was confined to Nairobi County and therefore results may not be generalized beyond Nairobi County. Some of the respondents may not have good

knowledge of ICT. However, ICT concepts and terms were clarified to the respondents during administration of the research instruments. Many principals of public secondary schools were not well versed with ICT skills. Schools were of different categories and sizes and are spread within the entire Nairobi metropolitan area. It was also likely that principals could overrate or underrate themselves when self-reporting.

1.9 Delimitations of the Study

The study was conducted only in public secondary schools in Nairobi County. The study further delimited itself to principals' level of integration of ICT in public school management in Nairobi County. The respondents were principals of public secondary schools only.

1.10 Basic Assumptions

In the course of study the following assumptions were made:- That the principals are leaders of public secondary schools recognized by the MoE and society at large; That ICT is a viable management tool; That principals are aware of and would provide truthful and honest responses about integration of ICT in secondary school management; That there was a relationship between principals demographic characteristics and integration of ICT in the management of public secondary schools; that principals are change agents in secondary school management.

1.11 Definitions of Significant Terms

The following are definitions of significant terms used in the study.

Access to ICT refers to availability and use of hardware and software components of a computer.

Integration refers to principals' level of acceptance to use ICT in educational activities.

Attitude refers to feelings and perceptions of public secondary schools towards integration of ICT.

Awareness refers to the state or ability to perceive, feel and be conscious of the use of computer technology.

Computer refers to a programmable machine which responds to a specific set of instructions in a well-defined manner and it can execute a prerecorded list of instructions.

Computer software refers to the collection of computer programs and related data that provide the instructions telling what to do.

Computer hardware refers to the physical components of a computer.

Determinants refer to an influencing or determining element or factor

Diffusion refers to the process by which an innovation is communicated through channels over time among the member of social system (Rogers, 1995).

e- learning refers to teaching and learning that is facilitated under computer mediated environment.

Gender refers not so much the familiar socio-demographic category for showing

different patterns but to appreciating the cultural dimensions of gender: it is experienced differently in different cultures.

Information and Communications Technology (ICT) refers to an umbrella term for communication devices and applications, such as print media, mobile phone, computer hardware, computer software and network systems used for secondary school management.

Innovation refers to an idea, practice or object that is perceived as new by an individual or a unit of integration.

Internet refers to an effective mechanism to communicate by using applications such as electronic mail (e-mail) as a supplement to teaching in the classroom

Leadership refers to the processes of playing the role of a director, enabling the goals of the school to be achieved through planning, coordinating, controlling and organizing and directing activities done by members of the school.

Management refers to the process of planning, organizing, leading and controlling the efforts of institution members and of using all other school's resources to achieve stated organizational goals.

Management of change refers to defining and implementing procedures and / or technologies to deal with changes in the school environment

Mobilization refers to the making of connections with different organizations, where the focal actor communicates with the broader network through a vision statement; strategic plan and status report.

Principal refers to heads of public secondary schools in Kenya with overall

administrative responsibility of the school.

Private secondary school refers to schools owned by individuals, non-government organizations and/ or religious groups.

Public secondary school refers to schools managed and financed by government and parents and other public stakeholders. Teachers are employed by the Teachers Service Commission on permanent and pensionable terms while teachers on part time basis are employed by the school board of governors.

Software refers to set of instructions and data used by computers, sometimes referred to as computer programs.

Training level of ICT refers to the acquisition of knowledge, skills and competencies by using computers for educational management.

1.12 Organization of the study

In this research report there are five chapters, as outlined below:

Chapter one, provides the introductory chapter. It contains the background information to the study, the statement of the problem, purpose of the study, objective of the study, research hypotheses, significance of the study, limitations, delimitations of the study, basic assumption and definition of significant terms.

Chapter two presents review of literature on ICT integration, an exploration of integration of ICT in public secondary school management, level of integration of ICT by principals in secondary school management, gender of principals, age of principals, level of education of principals, level of ICT training of principals, period of experience of computer use

of principals, access of ICT by principals, principals attitude towards integration of ICT, challenges facing use of ICT in secondary schools, a brief description of the theoretical perspective and conceptual framework.

Chapter three outlines the research methodology. It includes the design of the study, target population, sample size and sampling procedures, research instruments, pilot study, instrument validity, instrument reliability, data collection procedures and data analysis techniques and ethical considerations. Chapter four presents data analysis, interpretation and discussion of the study findings. Chapter five presents summary of the findings, conclusions, recommendations and suggestions for further research.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter presents a review of literature of the related studies. In particular, the chapter presents literature on the level of integration of ICT in the management secondary schools and independent variables of determinants of ICT integration of principals in secondary schools management. The variables focused on were: principals' gender, age, educational level of principals and level of ICT training of principals. It also reviewed literature on access of ICT and period of experience of computer use of principals, attitudes of principals towards ICT integration and challenges faced by principals. A summary of literature reviewed, theoretical perspective and conceptual framework.

2.2 Integration of ICT in Management of Public Secondary Schools'

A change agent is a person whose role includes the responsibility of initiating and facilitating change or a professional whose major function is the advocacy of innovations into practice (Fullan & Hargreaves, 1998; Adam, 2005). Effective implementation of an innovation is dependent to a considerable degree upon the active intervention of key personnel in change agent roles; their roles are crucial because school improvement programmes require time and effort for effective change (Miles, Saxl & Lieberman 1998; Darling-Hammond, 2000; Fullan, 2000). Wango (2009) explains that there is a considerable increase in knowledge and

innovations which have had an impact on education. Wango (2009) elaborates that education policy makers will have to combine the knowledge of individual schools with an understanding of administrative and managerial factors and skills so as to influence the process of change.

According to Wango (2009), computers integrated in secondary school management have legible and presentable work. For example, class lists, schemes of work and classroom tests; allows more copies to be made available. For example, making report cards and newsletters; Documents can easily be redrafted to improve structure, expression and accuracy using the cut and paste facility; Massive amounts of data concerning students, workers, examination results, schemes of work, photographs of school functions and letters can be easily stored on a computer; A simple programme can do a large amount of work like typing, editing a document, accounting, analysis of examination results and grouping students by type of class or hostel; This is the fastest form of communication worldwide where the school community can access information ranging from culture, history, and definition of terms. Information and communication technology (ICT) plays a vital role in supporting powerful school leadership and efficient management and administration in education sector. It is specified that technology can be used right from student administration to various resource administration in an education institution (Maki, 2008). The various ways of introducing technology in education institution administration are the following

(Salerno, 2009): Sending e-mail notices and agendas to staff, rather than printing and distributing them; Submission of lesson plans through e-mail; Foster technology growth by asking parents to write e-mail addresses on medical forms; Insist that all teachers create a class Web page; Attend technology conferences to see what other schools are doing, what other teachers are doing to integrate technology, and what principals are doing to encourage the use of technology in their schools and classrooms; All day-to-day activities of the institution and Staff administration. Figure 2 show how ICT could impact school leadership and administration.

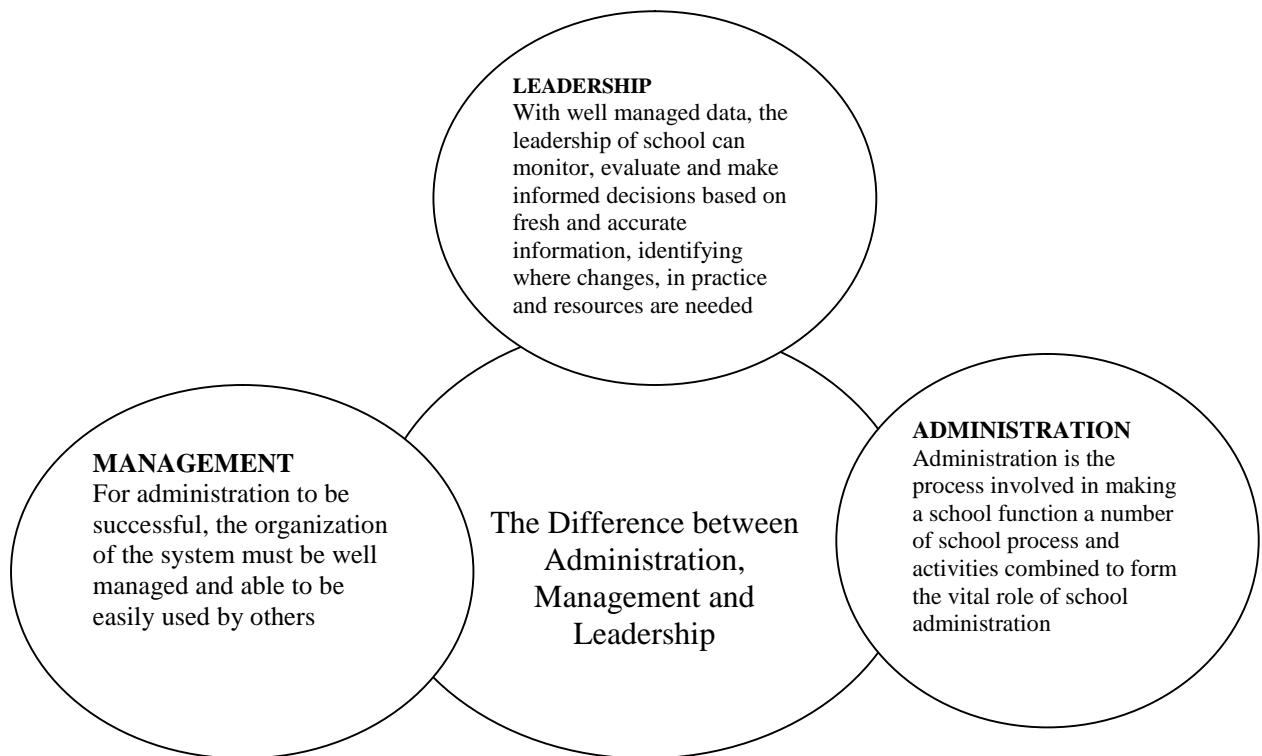


Figure 2. Impact of ICT on school leadership and administration.

Maki (2008) specified that ICT has played a major role in reducing operational inefficiency and improving decision-making in many areas of governance in schools and school administrative subsystems. Administrative subsystems include: Personnel administration, student administration, resource administration, financial administration and general administration. If well applied in Kenya by the principals there is no doubt it will do the same.

According to Krishnaveni and Meenakumari (2010) ICT provides several facilities and possibilities for educational administrators to do their tasks and communication and information systems could change the very nature of higher education, allowing information to be transferred, stored, retrieved, and processed by almost all who work, study or interact with a given institution. There is an increase in managerial effectiveness and efficiency through usage of Information and Communication technologies. They also have it that enhancing the usage of ICT on these functional areas and especially for general administration will enable enhancement of overall information administration in higher education institutions in the realm of global competitive environment. One will benefit from ICT if the individual is ready to use ICT. The individual is ready if he/she has the knowledge, skills, and the facilities for ICT. According to So and Swatman (2006) readiness is defined as being prepared mentally or physically for some experience or action. In terms of e-Learning, Borotis and Poulymenakou (2004) defined e-Learning

readiness as “the mental or physical readiness of an organization for some e-Learning experience or action”. Trinidad (2002) proposes an initial assessment of the Philippines’ preparedness for e-Learning which consisted of several technological factors such as computer, internet, and telephone line readiness; educational factors such as network learning, network society, network economy and network policy; English proficiency and computer/internet literacy. Some prior studies have demonstrated that demographic and characteristic background such as age, gender, ethnicity, marital status, level of education, prior and the Internet influence on ICT and or e-Learning integration (Muilenberg & Berge 2005; Ong & Lay 2006).

Therefore, this study examined some key demographic variables which could influence the readiness towards ICT programmes implementation in school administration for principals. ICT programme implementation in a developing country relies on various facets such as infrastructure, government policy, cultural factors, organizational and human resources. Human resources are one of the crucial factors that help diffuse the ICT programme. Hence, this study focuses on the determinants of principals’ level of integration of ICT in management public secondary school in Nairobi County.

2.3 ICT Level of Integration by Principals in Management of Public

Secondary Schools

The report by Veenhof, Clemont & Sciadas (2005) revealed that many other factors were strongly associated with an individual's ICT use: age, gender, educational attainment and level of literacy proficiency which help to predict a respondent who is a "high-intensity" computer user. In this study, the ICT integration level is considered to be influenced by socio-demographic factors, which include age, gender, education levels, level of ICT training, period of experience in using ICT and perception of usefulness. These demographic factors are discussed in this chapter.

2.4 Gender of Principals and Level of Integration of ICT Integration in Management of Public Secondary Schools

While this study does not seek to describe in detail the sociological definition of gender, it seeks to contextualise the definition of gender in relation to development and the impact thereof. According to the World Bank (2009), gender refers to the socially constructed roles and socially learned behaviours and expectations of women and men in a particular society. There is a cultural connotation to the definition in that female and male in the African context (and worldwide) have always had different roles associated with day-to-day activities. Societies define roles, value systems and attitudes to determine levels of participation by its members based on sexual orientation (Venter & Marias,

2006). Therefore gender is associated to social and cultural constructs (Venter. et.al, 2006). Gender is a socio-cultural construct of the society that determines the identity, roles or functions, entitlements and deprivation women and men in the society (Mikalista, 2010).

The introduction of ICT into the educational sector created new social stereotypes and gender inequalities (Markauskaite, 2005). According to Markauskaite (2005), the invention of the computer has been viewed as a male domain. Volman and Eck (2001) argue that old stereotypic gender differences in attitudes and achievements that previously existed in mathematics and technological disciplines were extrapolated to the area of ICT. Several research reviews state that males are more interested in ICT than females, are more frequent users of computers and have more positive attitudes about computers and consequently outperform females in ICT literacy (Shapka & Ferrari, 2003). They further admit that a number of recent studies revealed that ICT-related differences between females and males reduced mainly in the access to ICT and basic computer skills.

With respect to gender, a number of studies have investigated the role of gender in the integration and usage of ICTs (Harris, 1996; Gefen and Straub, 1997; Morris and Venkatesh, 2000; Leonard and Cronan, 2005, Venkatesh et al., 2003; Choudrie and Lee, 2004, Haines and Leonard, 2007). The findings of the previous studies revealed that gender has an important role when nsidering technology

integration and usage in both the organizational and household contexts. Morris and Venkatesh (2000) illustrated that male users used a computer more than females, and suggested the male gender to be one of the most important variables when examining PC integration in the household. Choudrie and Lee (2004) also found that differences in gender were not important in determining integration of broadband. Carveth and Kretchmer (2002) concurs with Choudrie and Lee (2004) that for internet users in the USA, there are approximately equal numbers of men and women using the internet. This study sought to establish if gender of principals of public secondary schools in Kenya had any relationship with ICT integration in management.

Information Communication Technologies (ICTs) are widely seen as having the potential to contribute positively to educational growth and development and to improve the livelihoods and quality of life of individuals and schools. Several studies have sought to demonstrate the relationship between education and the integration of ICT. Although this is acknowledged to be something that starts in the high end of the market, the speed with which new, rapidly deployable wireless technologies have diffused across even developing countries, has been their most distinguishing characteristic. What is clear from various studies (Okewa 2011; Maleka 2012) is that the diffusion of ICT is highly uneven concentrating in urban areas and leaving some rural areas almost untouched. Access to these technologies is constrained by income as is usage, and as they become more

complex, they are increasingly constrained by literacy and education. This study investigates the integration of ICT by secondary school principals further, by viewing them through a gender lens.

Of the limited data on Africa that exists, very little is disaggregated on gender lines. This study provides a descriptive statistical overview of integration of ICTs by principals of secondary schools in Nairobi County. Literature review indicated that in a study that were undertaken in five of the 17 countries surveyed in East, Central, South and West Africa, it revealed that there were instances where more women had greater knowledge of the Internet than men such as in Cameroon. More generally however, the study confirms the differences in access by men and women to ICTs especially where they depend on public access. (Maleka 2012) also found out that although men spend more on ICT accessories and computers in absolute terms, women spend a greater share of their monthly income on internet usage. The data highlight some issues pertinent to gender differences in ICT access and usage that are similar to findings in early studies and literature. It is clear from the evidence that although there is gender inequity, male and female principals may have more in common when it comes to ICT integration in secondary schools in Nairobi County.

This study highlights once more the necessity of ICT irrespective of one's gender. Females in general have been the subjects of discrimination for many decades.

Differences in male and female interaction with the world at socio-economical, political and cultural levels have been studied globally for many years and continue to be relevant even today. It is also well documented that females in Kenya are exposed to greater magnitudes of gender-based challenges across all areas of their lives. Cultural practices have often favoured males and systematically perpetuated their dominance over females. It could be that this deeply entrenched discriminatory pattern against women has transgressed to impact integration of Information and Communication Technologies (ICT's).

Biologically, sex (being male or female) refers to anatomy and physiology, (Kennedy, Wellmen & Klement, 2003) and is not easily altered. Therefore gender is a social identity that changes over time (historically) and space (geographically) and is influenced by media, family, religion, and education in order to frame actions and shape behaviours. Gender is a means to understand the differences between males and females and hence refers to both sexes (World Bank, 2009; Kennedy et al, 2003).

It is important for countries in general to understand women's political, social and cultural perspectives based on their positions in society and the roles they assume in family development, hence the term gender sensitivity (Venter et al., 2006). Gender is a tool is used to measure female and male different relationship in this study in order to understand integration patterns of ICT's by females in secondary

schools management in Kenya. Further, little literature exists that investigates gender in ICT Integration by secondary school principals in Kenya. Although in some countries females dominate some areas of ICT's as was evidenced in a research study by Markauskaite (2006), there is a common trend of male dominance of ICT's across the globe (Awoleye, Siyanbola, & Oladipo, 2008 ; NDP, 2007; e-Living Consortium, 2003; Norman, 2002 & Hafkin, 2003) particularly in developing countries. More often than not technology is seen as gender-neutral, therefore there is a lack of coherent research practice to analyze gender disparities in ICT's across human levels of interaction (Fialova, 2006). There has been a slow but steady uptake of the technologies by females in new technologies such as telephones, mobiles or computers (Gupta, 2008). Dholakia, and Kshetri, (2004) in a *Gender and Internet Usage* study state that in Africa, women's participation in internet usage continues to be low, ranging from 12% in Senegal to 38% in Zambia (Dholakia et al, 2004).

Similarly, Markauskaite (2006), investigated gender differences in self reported ICT experience and ICT literacy among first year graduate trainee teachers. The study revealed significant differences between males and females in technical ICT capabilities, and situational and longitudinal sustainability. Males' scores were higher. Jamieson-Proctor, Burnett, Finger and Watson (2006) conducted a study on teachers' integration of ICT in schools in Queensland State. Results from 929 teachers indicated that female teachers were integrating technology into their

teaching less than the male teachers. But the situation was different in mid-western US basic schools where Breisser (2006) found that females' self-perceptions about technology competence improved while males' self-perceptions about technological dominance remained unchanged. The study was in agreement with (Adams, 2002) that female teachers applied ICT more than the male teachers. This study confirms report by Yukselturk and Bulut (2009) that gender gap has reduced over the past years, presently, a greater number of females than males have used internet and web 2.0 technologies.

However, some studies revealed that gender variable was not a predictor of ICT integration into teaching (Norris, Sullivan, Poirot & Soloway, 2003). In a research conducted by Kay (2006), he found that male teachers had relatively higher levels of computer attitude and ability before computer implementation, but there was no difference between males and females regarding computer attitude and ability after the implementation of the technology. He claims that quality preparation on technology can help lessen gender inequalities.

2.5 Age of Principals and Level of Integration of ICT Integration in

Management of Public Secondary Schools

Studies carried in Australia show that, the older age profile of principals in the region may have particular implications for professional development in ICT (Schiller 2002). According to Kabbar and Crump (2006) young, male participants

with a relatively higher educational background were more likely to be integrators than older female participants with little or no education. Van Belle , Miller , Naidoo , Chigona (2006) explain that the relatively young age of high integrators of ICT is due to the perception of the older teachers that they are almost retiring from teaching. In a study by Jeanings and Onwuegbuzie (2001), found that younger teaching staff had more positive attitudes towards the use of ICT than older teaching staff. In the same context, Yamani, Salehi, Mostafavi, & Shakour (2014) in a divergent view found out that age has a positive relationship between attitude and use of technologies, where older teaching staff were more likely to integrate than younger teaching staff. Kumar (2008) revealed that there is a moderate and positive relationship between teaching staff age and their attitude towards ICT hence this study set out to investigate the relationship between age of principals and integration of ICT in public secondary schools in Nairobi County.

2.6 Educational Level of Principals and Level of Integration of ICT in

Management of Public Secondary Schools

Veenhof et al (2005) observes that individuals with less than upper-secondary education are significantly less likely to use computers for a range of purposes and this pattern is most pronounced in Italy and Bermuda. In addition, scales that measure individuals' use of computers and the Internet and attitudes toward computers, tend to increase with the literacy proficiency of individuals (Borghans & Ter Weel, 2004). At the same time, the role of formal education in building a

workforce equipped with ICT skills is currently the subject of debate (Veenhof et al, 2005).

While formal education such as training at colleges and universities may be an effective means to reach the future workforce, the rapid nature of technological change and developments in the world of ICTs emphasize the need for lifelong learning (Kirsch and Lennon, 2005). Nonetheless, education can be an important means to develop at least basic ICT skills and the relatively recent introduction of ICT in schools may mean that as time goes by, more people are likely to use ICT (Veenhof et, al, 2005; Mioduser, Nachmias, Tubin, & Forkosh-Baruch, 2003). According to the BECTA, (2009) one study in Britain found that people with more education have higher ICT skills, but suggests that more educated people tend to work with computers, making it difficult to differentiate whether education or employment has the biggest impact on ICT skill levels.

2.7 Level of ICT Training of Principals and Level of Integration of ICT in Management of Public Secondary Schools

Knowledge in ICT includes the training one receives to use available ICT facilities (Chemwa & Mburu, 2007). ICT literacy requires formal or informal training in basic skills such as the use of hardware and the application software (Ferrigan, 2007). On the other hand, knowledge is a feature of the interaction between the information supplied through ICT and the user of such information

(Pernia, 2008; Amara, 2006).

Developing foundational knowledge should be essentially be about creating awareness of ICT and its nature (Pernia, 2008). Pernia (2008) outlines the key competencies that can be expected of individuals who have completed a foundational knowledge course on ICT as follows: Familiarity with hardware like mobile phones, computers, Internet and other ICTs, ability to identify ICTs, appreciation of actual and potential functions of these technologies in everyday life, understanding basic features and uses of ICT (for instance, mobile phones; voice calls and SMS; computers: word processing, spreadsheet, database, information storage; Internet: web browsing, e-mail and instant messaging).

In this study, the knowledge dimension is considered by investigating the principals' ability to use ICT facilities in various administrative tasks and the frequency of use of ICT facilities. The ability to use ICT facilities involves investigating the skills dimension of principals and often results from experience with the technologies (Amara, 2006). For many, the abilities "to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in networks via the Internet" are hallmarks of an ICT-literate individual (Pernia, 2008).

Due to the expansion of systems and increased diversification of the educational structures, there arises the need to create suitable training and re-training of administrative personnel to meet the requirements of such increased complexity in administration (Chepkonga, 2012). Technical skills training ensures that an individual is proficient in the various applications of ICT, which include searching and accessing information; collecting and organising data, integrating and interpreting information from multiple sources, assessing validity and reliability of information; and generating new information. Pernia (2008) adds that such technical skills include: -ability to use ICT features and applications of mobile phones, cameras, video recorders and players, voice recorders, music players, multi-media services, word processing, spreadsheets, infrared, presentation software, Bluetooth and internet connectivity; applications for computers include: word processing, spreadsheet, database, information storage; for Internet: web browsing, e-mail, and instant messaging; ability to access and search a website for example, log on to the Internet, use search engines, and refine search using keywords

The ability to use Internet-based services by being able to create an account, compose e-mail, attach and download files, participate in discussion for social networking sites and create blogs is important; ability to collect and process electronic data for immediate or later use by being able to create a database, organize, store and filter out irrelevant data; ability to convert data into graphic

presentation and other visual formats; using ICT to support critical thinking, creativity and innovation for educational, work-related and leisure purposes. For example, one should be able to make the most of multi-media information and cross-reference information across websites; frequency of use of ICT hardware and software and period of experience with ICT facilities. The confidence and competence of principals in the use of ICT are key determinants of the effective use of ICT in administrative duties (Amara, 2006).

Markauskaite (2005) reveals that many school principals have low levels of confidence and competence for effective use of ICT in school leadership. School principals not only need formal training, but also sustained and ongoing support from their colleagues to help them learn how best to integrate technology into their administrative duties (Amara, 2006). The level of ICT training measured low among secondary school staff in schools of West England.

Information communication technology foundation skills for school administrators should include file management, word processing, spreadsheets, e-mail and Internet skills (Selwood, Fung & Mahony 2003). The continued application of ICT increases and deepens the user's critical reading of information and knowledge that is accessed, managed, integrated, created, and communication through ICT (Pernia,2008). In this study, ICT integration is determined by investigating how principals apply ICT in their school leadership functions. These

leadership functions are the administrative roles they play in schools as stipulated by the ministry of education in Kenya, including monitoring the organisation of the approved school curriculum, control of school finance and stores, management of human resources and correspondence with stakeholders.

Principal agency is a competency added to the role of the principal when incorporating ICT (Creighton, 2003). This is a necessary leadership skill that helps the principal to develop a better understanding of why and how they will use the new technology (Hughes, 2005). Three subcomponents are incorporated within principal agency namely: principal ICT competencies, providing guidance for linking ICT to pedagogy and sustaining ICT change.

A principal's ICT competence subcomponent is significant characteristic of a leader during the ICT integration process. According to the investigation carried out on the relationship carried out between skills and using of ICT and attitude. Jegege, Dibu-Ojerinde and Ilori (2007) found a significant link between the changes related to ICT in attitude and practices and the ICT integration was found (Mohammad, 2012). Their findings revealed that, as self skills improve and personal ICT competencies reach a high level, interest in ICT is increased. Other findings, Otto and Albion (2002) maintain that a principal's ICT competencies are fundamental in creating a positive environment for ICT integration

2.8 Access of ICT by Principals and Level of Integration of ICT in Management of Public Secondary Schools

Pernia (2008) reported that the access dimension of ICT is characterized by a user's awareness of ICT and availability and the relevance of these ICT in both their personal and professional life. Access to digital content includes user accounts, personal file storage and communication tools such as e-mail and discussion forums. It is explained further that these services include network accounts, network-based file storage, access to e-mail, shared folders for learning and teaching materials. In this study, ICT access means awareness and availability in terms of acquisition of hardware and software. Awareness and acquisition state is that condition wherein the person becomes aware and conscious of the technology, analyses its significance, reflects on its value and subsequently, desires and decides on skills. She adds that, in the case of developing countries, the levels of ICT literacy are not all applicable because the levels of ICT availability in these countries vary.

According to Albirini (2006), access to computer resources has often been one of the barriers for technology integration in both developed and developing countries. Kirsch and Lennon (2005) show that there is no statistically direct relationship between the ICT skills of more experienced workers and the less experienced workers. In Spain, familiarity with computers and years of experience with ICT correlate positively with levels of institutional management

(Selwood, Fung & Mahony, 2003). This result suggests that principals who had access to computers and the Internet were more likely to use them than those who did not have adequate access to equipment and network connections. Therefore, access to hardware and software is factor related to computer use. The ICT facilities considered in this research are similar to those in a study done in a West England school where access to word-processing, spreadsheets, and databases, Internet/e-mail and PowerPoint among teachers was considered (Selwood et al., 2003). Similarly the current study considers the following hardware and software equipment. The hardware equipment is as follows: Electricity infrastructure, Computer, Printer, Scanner, Internet/e-mail infrastructure, School telephone, Digital/video camera, Fax machine, Copier, Surveillance camera, Projector. The softwares are: Word processing, Spreadsheets, Databases, Power Point and Internet/e-mail

2.9 Principals' Attitudes towards Integration of ICT in Management of Public Secondary Schools

Attitude is a predisposition to act, but it is no guarantee of actual behaviour. On the other hand, people rarely behave in a manner inconsistent with their attitudes/beliefs, as this would create internal tension or dissonance so that, favorable or unfavorable attitudes provide the decision maker with valuable information for planning the most effective course of action (Baker, 1991). In his study, Gakuu (2006) points out that principals' attitude towards the integration of e-Learning

(ICT) in secondary schools is a critical issue that needs consideration and investigation for successful implementation of the new e-Learning (ICT) initiative. Gakuu (2006) maintains that as the head of the institution, the principal holds a very strategic position in influencing the decisions and the actions of other members of the school community. For example, the attitude that the principals hold towards ICT(e-Learning) integration in secondary schools will greatly affect the teachers and by extension, students' attitudes, decision and actions towards e-Learning initiatives. It is therefore imperative to assess the principals' attitude towards the integration of e-learning in secondary schools and establish the role played by their attitude towards e-Learning in determining the readiness to integrate e-Learning.

Consideration on usefulness of ICT shows that people will consider a system to be useful when it enhances their job performance. A system high in perceived usefulness, in turn, is one for which a user believes in the existence of a positive user-performance relationship (Davis, 1989). Within an organizational context, people are generally reinforced for good performance by pay raises, promotions, bonuses, and other rewards (Pfeffer, 1982). The rationale behind this is that if the system or service will enhance person's job performance it will be considered as useful and thus a person will have higher incentive to integrate or even recommend others to use the system or service as it helps to gain positive user-performance relationship. Kumar (2008) found out that secondary school teachers

were more willing to use the computer if they perceive it to be easy to use. This is an important factor that needs to be taken into serious consideration. When something is perceived to be ease of- use, then it is of certain that it would be used successfully.

2.10 Challenges Facing Use of ICT in Public Secondary Schools

In order to increase and improve the use of ICT in the schools, a range of obstacles that prevent school managers and teachers from using ICT effectively need to be overcome. The BECTA Report (2003) identifies the key barriers to using computers as: - Lack of access to appropriate ICT equipment; lack of enough school resources; Lack of time for training; poor quality and quantity of ICT training; Lack of models of good practice in ICT; Negative attitude toward ICTs in education; Computer anxiety and a lack of confidence; Fear of change and a lack of personal change management skills; Unreliable equipment and Lack of technical, administrative and institutional support.

The BECTA (2003) report further classifies the barriers into the four factors namely : - a) resource-related factors b) factors associated with training, skills, knowledge and computer experience c) attitudinal and personality factors, and d) institutional and cultural factors. According to the BECTA (2004) report, barriers identified in the literature can be broadly grouped into two levels: those relating to the institutions (school-level barriers) which are

first order barriers and those relating to the individual (manager-level barriers) or second order barriers (Siegel, 1999). Although this may be a useful distinction to make in beginning to address the subject, the literature points to a complex interrelationship between school-level and teacher-level barriers, and between the barriers within those levels (Siegel, 1999). In a study done in West England, staff challenges included lack of time, lack of enough school resources, poor quality and quantity of ICT training. In this study, such challenges are outlined in the sub-sections that follow.

Financial constraints. Waema (2002) points out that duties and taxes are levied on ICT products while value-added tax (VAT) is levied on ICT services, making ICT products and services expensive. Although many governments raise revenue through taxes, the investment in ICT literacy of school leaders in Kenya is minimal. He adds that at the same time, many public tertiary institutions charge market rates for all forms of training, including ICT, thus making the training unaffordable to most people. He also observes that the Kenya government is still one of the key agencies that funds ICT human resource development, making ICT literacy training a difficult task.

Waibodhi (2002) supports these views that in public sectors of most countries, lack of funding for ICT training has led to over-reliance on external donor funding. At the secondary school level there is inadequate government funding for

ICT training of education administrators like principals. He further notes that non-competitive telecommunications infrastructure, policies and regulations impede connectivity and sustainability. While there are computers in schools, ICT use is in its infancy stage due to the high cost of technology, uneven access to such facilities and limited connectivity (Pernia, 2008). She adds that in China for instance, the government has been giving much attention to the introduction and integration of ICT application in the education system. However, the efforts face challenges due to financial difficulties of providing ICT facilities. Selwood et al (2003) found out that expenditure on ICT resources should be significant and continuous.

Lack of ICT infrastructure. The ICT options paper in Kenya indicates that one of the main challenges facing ICT literacy development is limited access and the degree of disparity in infrastructure, especially electricity and telecommunications that exists between rural and urban areas in Kenya (MoE, 2005). The report continues that getting computers into schools is relatively easy; keeping them working is a greater challenge. A myriad of problems ranging from electrical spikes, to viruses, dust, heat, and normal wear and tear can bring activity in a developing country computer lab to a screeching halt. Pernia (2008) reports that South Korea's problems in ICT literacy development revolve around issues of ICT infrastructure maintenance and best usage of ICT facilities like selection of what should be transmitted on the information superhighway.

Globally many countries lack adequate human capacity in ICT and this is even more critical in African countries (Waibodhi, 2002) and in China where there is a shortage of ICT-skilled people (Pernia (2008). Waema (2002) raises doubts about the skills of personnel in ICT literacy training in the education sector, where, for example in Kenya, schools employ poorly trained ICT staff. He further observes that in Kenya, for example, most of the high-end ICT training takes place in public institutions, but these institutions loose staff to the private sector who offers better salaries. The consequence of the high staff turnover is over-reliance on part-time and less qualified lecturers with its attendant quality implications.

Schools are more prepared to recruit staff that are already trained rather than less qualified persons who can be trained, possibly due to inadequate funds or lack of awareness on the strategic importance of well-trained manpower.

Negative attitude toward ICTs in education -Markauskaite (2005) observed that the intensity of ICT appreciation and use is directly influenced by individuals' attitudes. Reflecting a higher level of ICT literacy than the knowledge or skills dimensions, the attitude dimension represents the product and process of a person's critical assessment of the use of ICT for information and knowledge (Pernia, 2008). In order to consider the attitude dimension towards ICT, opinion on, interest in, the challenges and strategies of ICT literacy development should be considered, (Selwood et al., 2003).

Waibodhi (2002) argues that administrators may sometimes show resistance to technological change. In this study, this attitude dimension is considered by investigating principals' attitude towards ICT as a challenge they face in an attempt to be ICT literate. Lack of interest in ICT is also a major challenge. De Feo and Barnard (2005) agree that lack of interest may be due factors such as: Bureaucracy that includes organizational rules and red tape in applications of technology in administrative duties; Organizational mindsets which are the diverse value systems and conflicting beliefs about changes in technology; Organizational structure that involves rigid boundaries between stakeholders' functions and disciplines where there are no budgetary allocations for ICT development; Lack of required competencies in ICT and capabilities like project management of an ICT literacy program; Lack of adequate resources and rewards for being ICT literate.

Lack of enough technical support and maintenance. The level and quality of technical support is very important in maintaining the confidence of educators in the reliability of access to equipment and software (Towers & Oliver, 2000). They also observe that the level of ICT literacy of an individual is consequently affected because it is assumed that the availability of qualified technical staff impacts on ICT appreciation of administrators of educational institutions. The managerial-level barriers are as follows:- Lack of time — for both formal training and self-directed exploration (Higgs, 2007) and for preparing ICT resources for

lessons, Lack of self-confidence in using ICT (Farris, 2001), Negative experiences with ICT in the past (Siegel, 2007), Fear of embarrassment in front of pupils and colleagues, loss of status and an effective degrading of professional skills (Zhao and Frank, 2003), Lack of the knowledge necessary to enable managers to resolve technical problems when they occur (Tee, 2003), Lack of personal change management skills (Venkatesh and David, 2000), Lack of motivation to change long-standing pedagogical practices (Campbell and Sellbum, 2002), Perception of ICTs as complicated and difficult to use (Yang, 2003).

2.11 Summary of Literature Review

Information Communication Technology is envisaged will help secondary school principals to solve problems due to the fact that computer and its systems provide accurate information relevant to the problem encountered that needs to be solved. Information Communication Technology leads to saving of time and hence more quality time may be spent on school objectives and aims (Empirica, 2006). Finally, ICT may enable secondary school principals update records in school environment, produce documents regarding operational activities, support decision making due to the fact that ICT systems communicate data between school staff and other schools or Ministry of Education (Becta 2009).

2.12 Theoretical Perspective

The theoretical framework is based on the Diffusion of Innovation Model by Rogers (1995) that provides understanding of the integration of ICT. The Diffusion Innovation Model was developed in order to seek an understanding of how individuals change (Newhouse, 2002; Albirini, 2006). According to Rogers (1995), there are four major sub theories that deal with the diffusion of innovation. This Diffusion Innovation model was used as a guide to provide information about how school principals could integrate ICT in schools. The Innovation Model defines innovation as “an idea, practice or object that is perceived as new by an individual or unit of integration” (Rogers, 1995). The model is based on four theories of integration: innovation decision process; individual innovativeness; rate of integration and perceived attributes.

The innovative decision process theory defines diffusion as a process through which an innovation is communicated through certain channels over time among the members of a social system (Rogers, 1995).

Individual innovativeness theory focuses on an individual’s ability to integrate an innovation in the social system. In this Diffusion model innovation is defined as an idea, practice or object that is perceived as new by an individual or unit of integration (Rogers, 1995). The rate of integration theory refers to the rate of integration process which takes place over time, for example some school principals are slow in integrating ICT in their schools and the others are early

integrators (Rogers, 1995). Perceived attributes theory focuses on five attributes which influence an individual to take decisions about whether to integrate or reject an innovation. These attributes are: relative advantage, compatibility, complexity, triability and observability. For example, some school principals take their time to understand what ICT all about and others not (Rogers, 1995). The “idea” or “new practice” in the present study is considered as the integration of ICT in the management of secondary schools. The next subsections describe the diffusion innovation model in detail.

Innovation Decision Process. This is the first theory of the diffusion Innovation Model. Rogers (2003) described the innovation-decision process as an information-seeking and information-processing activity, where an individual is motivated to reduce uncertainty about the advantages and disadvantages of an innovation. According to Rogers (2003), the innovation-decision process involves five steps: (1) knowledge, (2) persuasion, (3) decision, (4) implementation, and (5) confirmation. Knowledge about innovation might come through different communication channels and sources. The type of knowledge Rogers (2003) is referring to is the awareness-knowledge, the how-to knowledge and the principles-knowledge. For example the awareness-knowledge represents the knowledge of the innovation’s existence. Some school principals can be motivated to learn more about the innovation and eventually, to integrate it. The how-to-knowledge contains information about how to use an innovation correctly.

For example, some school principals need to help teachers to use the technology effectively. The principles how -to -knowledge is the last knowledge type. It includes the functioning principles how and why an innovation works. For example, some school principals integrate the innovation without knowledge and the misuse of the innovation can cause its discontinuance. Thus, the attitude of the school principal can shape or reject the integration of the innovation.

Persuasion is affected by feelings which can be a negative or positive attitude towards innovation. The decision-making unit would actively seek information about the innovation of concern before developing an opinion. In this case for example, school principals' opinions or beliefs can be influenced by colleagues or peers and can cause a degree of uncertainty or an innovation can be affected.

The decision to integrate or reject an innovation would be made based on a trial period. This means that some innovations are integrated quickly from individuals who want to try the innovation in their own basis and then come to an integration decision. Integration refers to a full use of an innovation as the best course of action available, while rejection means not to integrate an innovation (Rogers, 2003). There are two types of rejection according to Rogers: active rejection and passive rejection. In active rejection, we find that some school principals for example try an innovation and think about it but later they decide not to integrate the innovation. On the contrary, in passive rejection, some school principals for example do not think about integrating the innovation at all.

Implementation is where the activities shift to real action. An innovation brings the newness in which some degree of uncertainty is involved in diffusion (Rogers, 2003). It also involves behaviour change due to the implementation. Reinvention also happens at the implementation stage. Reinvention is the degree to which an innovation is changed or modified by a user in the process of its integration and implementation (Rogers, 2003). Rogers further discussed that the more reinvention takes place, the more rapidly an innovation is integrated and becomes institutionalized. For example as innovations, computers are the tools that consist of many possible opportunities and applications, thus computer technologies are more open to reinvention.

Confirmation is where the decision to reject or integrate the innovation is reached. In this stage the individual looks for support for his or her decision. According to Rogers (2003), this decision can be reversed if the individual is exposed to conflicting messages about the innovation. However, the individual tends to stay away from these messages and seeks supportive messages that confirm his or her decision for example, some school principals' attitudes become more crucial at the confirmation stage. The Individual Innovativeness Theory is the second theory and focuses on the personality of the individual who is initiating a certain activity. The Individual Innovativeness Theory classifies innovators into five categories: innovators, early integrators, early majority, late majority and laggards. According to Roger (1995) innovators are individuals who take risks

and are willing to take initiative and their time to try something new most of the time. For example, there are some school principals who seek out opportunities for change and try out new ways of doing things. While early integrators are those individuals who manage to adapt and integrate changes in ICT at an early stage. For example, some school principals can cope adequately with changes; some even welcome them as leaders. The ICT policy objectives require some changes to be made and this entirely depends on the school principals to integrate those changes in their secondary schools.

On the other hand, early majority are considered to be those individuals who are careful, like to be in a safe environment, deliberately unwilling individual who are unwilling to risk time for new innovations (Roger, 1995). For example, secondary school principals who are afraid of using the new equipment or who doubt their ability to learn and use computers such secondary school principals might be reluctant to accept the new innovations. This category comprises of individuals who are resistant to change and are referred to as late majority individuals Roger, 1995). In other words, these types of secondary school principals are difficult and seem to refuse to take chances in order to bring change. Secondary school principals who are in this category tend to reject or resist change in whatever form it may arrive.

The laggards are those who are consistent or even adamant in resisting change and mostly, pressure is required to force them in order to bring change in their environment. For example, secondary school principals who are unwilling to try new innovation and might be stuck in their past and the school seem to be left behind when comparing to other schools. The main idea that can be drawn from the model is that any innovation-decision process at an individual level could be influenced by perceptions and attitudes of the person who is responsible for the innovation process. The individual innovativeness theory is based on who integrates the innovation and when. A bell-shaped curve is often used to illustrate the percentage of individuals who integrate an innovation.

Rate of Integration theory is the third theory and focuses on the rate of integration process for an individual. Rogers (2003) defined the rate of integration as the relative speed with which an innovation is integrated by members of a social system. For example, some secondary school principals who integrated the innovation for a period of time can be measured against the rate of integration of the innovation. Rogers (2003) outlines several strategies to help an innovation reach this stage:

1. Have an innovation integrated by a highly respected individual within a social network, creating an instinctive desire for a specific innovation.
2. Inject an innovation into a group of individuals who would readily use an innovation.

3. Provide positive reactions and benefits for early integrators of an innovation.

Thus, the integration process is spread over time monitored by principals, to be integrated successfully in schools.

Perceived Attributes Theory is the fourth theory and identifies the following five characteristics of innovations: relative advantage, compatibility, complexity, triability and observability. An attribute is a quality or characteristic given to a person, group, or some other thing and in this instance the researcher looked at the attributes of ICT. The theory of perceived attributes is based on the decision that individuals will make either to integrate an innovation or reject the innovation. First, the innovation must have some relative advantage over an existing innovation or the status quo. Second, it is important the innovation be compatible with existing values and practices. Third, the innovation is not too complex. Fourth, the innovation must have triability. This means the innovation can be tested for a limited time without integration. Fifth, the innovation must offer observable results (Rogers, 1995).

Rogers (2003) defined relative advantage as the degree to which an innovation is perceived as being better than the idea it supersedes. For example school principals who are innovators, early integrators and early majority are more status-motivated for integrating innovations; the late majority and laggards perceive status as less significant. Rogers also categorized innovations into two

types: preventive and incremental (non-preventive) innovations. A preventive innovation is a new idea that an individual integrates now in order to lower the probability of some unwanted future event (Rogers, 2003). Preventive innovations usually have a slow rate of integration so their relative advantage is highly uncertain. However, incremental innovations provide beneficial outcomes in a short period. For example if some school principals see that technology has value in their instruction, then they will provide help for themselves and their staff through experience. Another perceived attribute in the diffusion process is the compatibility attribute. According to Rogers (2003) compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential integrators. For example, school principals innovation influences board of management and teachers opinions, beliefs, values, and views about ICT teaching. If an innovation is compatible with an individual's needs, then uncertainty will decrease and the rate of integration of the innovation will increase. Thus, school principals should be clear on the meaning of the innovation and the use of it..

Rogers (2003) defined complexity as “the degree to which an innovation is perceived as relatively difficult to understand and use” (p. 15). Therefore, excessive complexity of an innovation is an important obstacle in its integration. For example if school principals are familiar with hardware and software then they might integrated successfully. According to Rogers (2003), trialability is the

degree to which an innovation may be experimented with on a limited basis. Trialability is positively correlated with the rate of integration. The more an innovation is tried, the faster its integration is. For example some school principals in the integration of an innovation might wait for have trial period, which is especially helpful for later integrators. However, Rogers stated that earlier integrators see the trialability attribute of innovations as more important than later integrators.

Rogers (2003) defined observability as the degree to which the results of an innovation are visible to others. Rogers (2003) argued that innovations offering more relative advantage, compatibility, simplicity, trialability, and observability will be integrated faster than other innovations. Rogers (2003) does caution, getting a new idea integrated, even when it has obvious advantages, is difficult, so the availability of all of these variables of innovations speed up the innovation-diffusion process. For example, some school principals with observability attribute show faster progress of integrating a new technology in the management of their schools. The theory has been widely acknowledged as applicable to educational settings (Albiri, 2006; Belium 2003; Newhouse, & Clarkson, 2005; Leung, 2004; Mohammad, 2012). Diffusion theory provides a framework that helps to understand why ICT is integrated by some individuals and not by others.

2.13 Conceptual Framework

The following conceptual framework identifies determinants of principals' level of ICTs integration in secondary schools management. The independent variables such age, gender, academic qualification, training competence, period of experience, usefulness of ICT, external environment of the school and information sharing culture contribute to an understanding of how the participants of this study integrates or not integrates ICTs. Figure 3 shows the relationship between the variables.

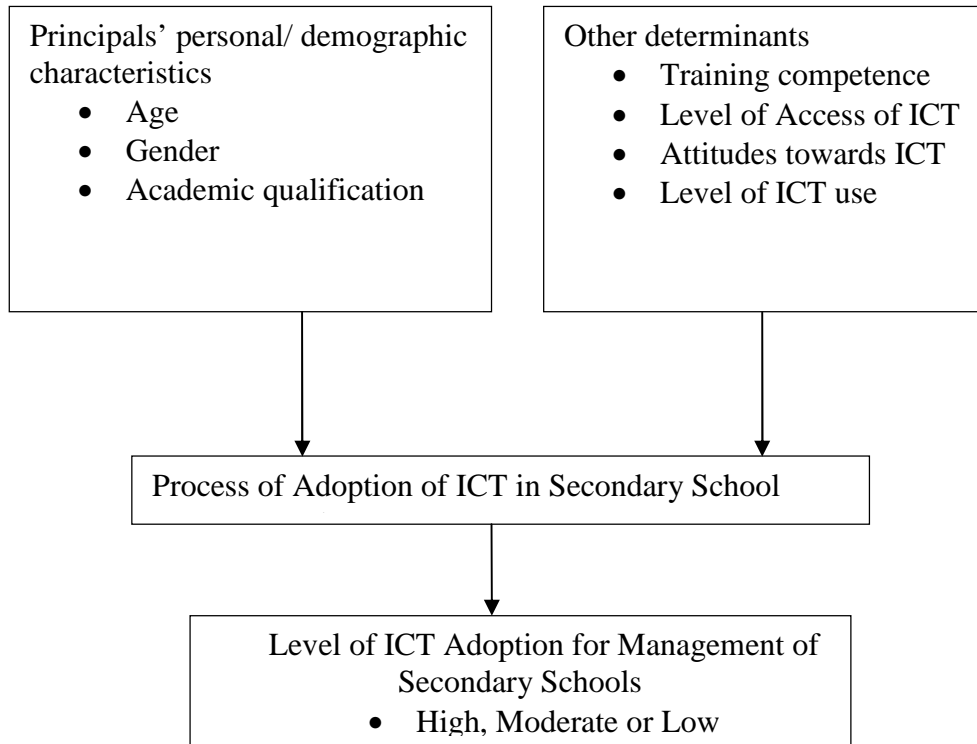


Figure 3. Determinants of Principals' Level of ICTS Integration in Secondary Schools Management.

The basic outline and sequence for ICT integration process indicates that principal's ICT access; ICT skills; attitudes towards change leads to a higher level of integration. The integration of ICT into school management can be considered and studied as an example of what Rogers (1995) called the diffusion of innovation. Innovation can be defined as "an idea, practice, or object that is perceived as new by an individual or other unit of integration. The characteristics of an innovation, as perceived by the members of a social system, determine its

rate of integration” (Rogers 2002). Diffusion is the process through which an innovation is communicated through certain channels over time among the members of a social system (Rogers 1995).

Five stages can be distinguished within the innovation-decision process at individual level: (1) the knowledge of the innovation; (2) the attitude toward the innovation, which can be expressed – for instance – along the continuum from the minimum interest to the maximum interest; (3) the decision to integrate or reject the innovation, based on a previous evaluation of its main attributes; (4) the implementation of the innovation, consisting in the first use of it, and (5) the confirmation of such first use, resulting in the lasting integration of the innovation over time. In this study, the main lesson that can be drawn from the framework proposed by Rogers is that any innovation-decision process at the individual level is influenced by two elements: the perceptions of the characteristics of the innovation and of their relative importance; and the attitudes towards the possibility of integrating such innovation (attitudes deriving from the perceptions previously formed and, at the same time, affecting the successive perceptions formation).

Three considerations can be derived from a review of this literature: perceptions influence attitudes; these attitudes then affect the behavioral intention to use a technological system; such intentions influence actual technology use. In other

words, because integrators' perceptions and attitudes are some of the most important variables for explaining any innovation-decision process, ICT integration plans for schools require their integrators to hold favourable attitudes towards their introduction. Principals represent influential integrators of ICT at school, since through their attitudes and behaviors they are able to introduce innovations both into their way of administration and management.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter deals with the research methodology used in this study. It is organized along the following sections: research design, target population, sample size and sampling techniques and research instruments. A discussion on pilot study, the validity and reliability of the instruments, data collection procedures and data analysis procedures then follow.

3.2 Research Design

The study was conducted using descriptive survey design. This design was suitable for this study because it describes the characteristics or behaviors of a particular population in a systematic and accurate fashion and uses questionnaires and interviews to collect information about people's attitudes, beliefs, feelings, behaviors, and lifestyles. The study was on determinants of principals' level of integration of information communication technology in secondary schools management. This design was appropriate for the study because the researcher wished to establish the degree of relationship between and among the variables such age, gender, educational level, level of training access to ICT, attitude towards ICT and challenges faced by principals in integration of ICT in secondary school management. According to Schreiber and Asner-Self (2011) this research method is capable of collecting background information and also the

researcher has little opportunity to motivate or influence respondents' responses.

Kincheloe (2004) recommends the survey technique for research where attitudes, ideas, comments and public opinion on a problem or issue such as the one under study. The descriptive survey approach was chosen for the present study, because it sought to gain insight into a phenomenon as a means of providing basic information in this area of study (Bless and Higson-Smith, 2006). The strengths of the survey method were also evident in this study because of its ability to study, describe, explore and analyse relationships among the schools included in this study.

3.3 Research Setting

Nairobi City is the capital of Kenya. The city was founded as a railway camp in 1899. The city derived its name from a water hole named Ewaso Nyirobi, which means "cool waters". In 1901, it was the capital of the British protectorate. It became the capital of British East Africa Protectorate in 1905 replacing Mombasa. The city, which developed under the British rule, was declared a municipality in 1919. Kenya became independent in 1963 and Nairobi City was chosen as the capital of the new republic. The city flourished rapidly after independence and has also become the capital of the administrative area of Nairobi City County. The city lies on the Nairobi City River in the south of the nation. Nairobi City is located at 1°16' Latitude South and 36°48' Longitude East. The city occupies a total area of 684 sq. km fully covered by land. It sits 1660m

above sea level. The city is located between the cities of Kampala and Mombasa. Around 2,500,000 people reside in the city. Administratively Nairobi is divided into the following districts Starehe, Kasarani, Westlands, Dagoretti, Embakasi, Langata, Kamkunji, Makadara and Njiru. Education departments in each district is headed by a District Education Officer. Appendix 7 shows Nairobi county administrative boundaries.

3.4 Target Population

A study target population is the totality of person, events, organizations, units or other sampling units which concern the research problem (Mohlokane, 2004). The target population for this study consisted of 75 principals in public secondary schools in Nairobi County at the time of study.

3.5 Sampling Procedures and Sample Size

A survey that covers the entire population of interest is referred to a census. In this study the researcher choose a census survey and all the 75 principals of public secondary schools in Nairobi County were selected for the study because the researcher was interested in both category of schools that have integrated ICT and those that have not. This enabled the researcher to establish the level of ICT integration in Nairobi County (Merriam, 1998). The researcher randomly sampled seven schools for pilot study. Further nine principals, one from each district was randomly chosen for interview. The nine principals who represent the nine

districts were interviewed after they had filled the questionnaires.

Table 1 presents the schools of the principals' who responded to the questionnaire per district in Nairobi County.

Table 1.

Respondents' representations by district

District	f	%
Dagoretti	10	14.7
Embakasi	5	7.4
Kamukunji	7	10.3
Kasarani	6	8.8
Langata	5	7.4
Makadara	9	13.2
Njiru	8	11.7
Starehe	10	14.7
Westlands	8	11.8
Total	68	100.0

3.6 Research Instruments

This section is a summary of the description of the research instruments used for data collection for this study. The research instruments used in this study were

questionnaire, interview and observation schedule; they are discussed in the sections that follow.

3.6.1 The Questionnaire

Questionnaires were used to collect data. Questionnaires were preferred for this study because they generate quantifiable data ready for statistical analysis (Mugenda, 2008). Questionnaires also allow each one of the respondents to read and answer identical questions, thereby ensuring consistency of the demands. (Saunders et al. 2007). Orodho (2005) further explains that questionnaires capture information on people's attitudes, opinions, habits and other varieties of education or social issues. The choice of the questionnaire was based on the fact that: it is a quick method to collect data, it is less time consuming, is able to cover the entire sample within the proposed time frame, and it offers greater assurance of anonymity. It was therefore found fitting for this study.

Data from the principals was collected using a self-administered questionnaire which comprised of both close-ended and open-ended questions. Data pertaining to the determinants of secondary schools principals' integration of ICT in secondary school management in Nairobi County were collected using a questionnaire for principals. The principals' questionnaire consisted of three parts. Section A sought data on the school profile, section B sought information on principals' demographic information such as gender, age, and educational level

and other information and section C sought information on principals' attitude towards ICT and was structured on a Likert scale ranging from 1=Strongly Disagree to 5=Strongly Agree.

3.6.2 The Interview Guide

According to Kombo and Tromp (2006) interview guides provide in-depth information about cases of interest to the researcher. The essence of the qualitative interview is to capture the perspectives of the respondents through verbal interaction between the interviewer and the interviewee (Mugenda & Mugenda 2003; Saunders, Lewis, & Thornhill, 2007). Panneerselvam (2008) points out that when planning an interview schedule, the researcher has to decide which questions to ask. He distinguishes between five categories of questions, namely experience or behaviour questions, opinion or value questions, feelings questions, knowledge questions and demographic questions.

Monyatsi (2002) notes that a major advantage of the interview is its adaptability, where a skillful interviewer can follow up ideas, probe responses and investigate motives and feelings that a questionnaire cannot do. Mugenda and Mugenda (2003) add that in semi-structured interviews. In the current study, one principal from each of the nine divisions was interviewed once during visits to schools using the interview schedule (Appendix 4) to allow opportunity for in-depth probing and clarifying collected data from the questionnaires. The responses were

recorded as notes when the respondents talked; in an attempt to avoid problems caused by note taking in the course of the interview, the interviewer used shorthand notes. However, permission was first sought from the principals before the notes were taken and they were assured that the recorded information would only be used for purposes of the study at hand. Appendix 4 presents the interview questions.

3.6.3 Observation Schedule

Data gathering often includes unobtrusive observation of people's behaviour in order to obtain information about phenomena of interest (Johnson and Christensen, 2004). Observational data is attractive because it is gained directly from "life situations" (Cohen, Manion & Morrison, 2000). They add that observation is important as a means of verifying what people say about themselves and their actions. Researchers should be able to understand the context of programmes, be open-ended and inductive, see things that might otherwise be missed and discover things that participants might not talk freely about in interview situations and access personal knowledge (Hackley, 2003). The researcher is seen as the primary instrument for data collection. Data mediated through this human instrument, the researcher depends upon the researchers' ability to process information hence the researcher is a source to be leveraged rather than a source for unwanted bias (Johnson & Christensen, 2000).

According to Pole and Lampard (2002) observation is a matter of collecting information about the nature of the physical and social world as it unfolds before us directly via the senses rather than indirectly via the accounts of others. In this study, observation was done using the observation schedule during visits. Field notes were taken during the visits to the schools in order to ascertain information asked for in the questionnaire. The checklist in appendix 3 provided information on availability of equipment. The instrument contained open-ended interview questions to enable the researcher to probe the respondents for further information, while questionnaires with closed ended questions helped the researcher to obtain factual information. The questionnaire had twenty items in total.

3.7 Pilot Study

An instrument which gives trustworthy and dependable results is considered reliable (Saunders, Lewis, and Thornhill, 2007). A pilot survey was conducted and used to test the reliability of the research instruments (Bell, 2005). Responses from the pilot study were analysed for accuracy of meaning and objectivity. An instrument which measures accurately what the researcher expects to measure is said to be valid. A pilot survey was used to test instruments against criterion benchmark. There was a need to test the content validity of the research instruments as this ascertains that the items produce the relevant responses from the sample (Mugenda & Mugenda, 2003). The supervisors assessed the relevance

of the content in the instruments developed and their advice was incorporated in the revised data collection instruments. The number of respondents involved in the pilot test was seven public school principals from Nairobi County. The pilot test was carried at the schools with similar characteristics to those sampled through random sampling. All the respondents were seven principals of public secondary schools. After the pilot test the information obtained was used to modify the instruments. The instruments modified were the questionnaire and the interview schedule. The instruments were then used for collection of data from the respondents.

3.8 Instrument Validity

According to Mugenda (2008), validity is the degree to which results obtained from the analysis of the data actually represents the phenomena under study. In essence, validity is the accuracy and meaningfulness of inferences which are based on the research results, or how accurately the data obtained in the study represents the variables of the study. As recommended by Tichapondwa (2013) supervisors who are experts in the area of study may scrutinize items formulated in a questionnaire to check if they match the requested criteria (clarity and intelligibility, neutrality and other. The instruments used for the study were subjected to scrutiny by experts in the areas of educational management. Their corrections on ambiguities, length, structure and wording of the questionnaire and interview schedule were used to modify and restructure the instrument. The

modified version was then used for data collection. Kothari (2008) refers to content validity as the extent to which a measuring instrument provides adequate coverage of the topic under study. The constructs were compiled from the literature (Dlodlo & Sithole, 2001)

3.9 Instrument Reliability

According to Mugenda (2008) reliability is the measure of the degree to which research instrument yield consistent results or data after repeated trials. A pre-test was carried out to test reliability of the study instruments. An instrument cannot be valid if it is not reliable, that is, if it does not measure what it purports to measure consistently. Cronbach alpha (α) is a measure of internal consistency. Cronbach alpha (α) was used for estimating internal consistency. It can also be used for both binary and large scale data. The formula for Cronbach alpha (α) is

$$\alpha = \frac{N \cdot \bar{r}}{1 + (N - 1) \cdot \bar{r}}$$

Where N is equal to the number of items and r-bar is the average inter-item correlation among the items.

Source: <http://www.ats.ucla.edu/stat/spss/faq/alpha.html>

From this formula if one increases the number of items, Cronbach's alpha (α) increases. Additionally, if the average inter-item correlation is low, alpha will be low. As the average inter-item correlation increases, Cronbach's alpha (α)

increases as well. This makes sense intuitively - if the inter-item correlations are high; then there is evidence that the items are measuring the same underlying construct. This is what is meant when someone says they have "high" or "good" reliability. This refers to how well the items measure a single unidimensional latent construct. Cronbach alpha () was computed to ascertain the internal consistency of the questionnaire items. The result from analysis was found to be 0.78 which was statistically considered reliable since this type of study requires a minimum reliability of 0.70 for it to be considered adequate (Sekaran, 2003).

3.10 Data Collection Procedures

The researcher first obtained a research permit from the National Council for Science and Technology (NCST) and the Board of Postgraduate School (BPS) at the University of Nairobi. Once granted a permit the researcher notified the then Provincial Commissioner and the Ministry of Education office (MoE). The MoE gave support and contacts to the researcher of the schools within the county. Before collection of data the researcher contacted the participating schools and scheduled appointments for visits. The research entailed administering of the questionnaire to the principals and ample time was given to the respondents to fill the questionnaires and respond to interview guide. The primary data was collected from the principals who were the respondents through use of questionnaires. The questionnaire was administered personally by the researcher, immediately filled and collected as per agreed dates between the researcher and the respondents. The

respondents were also allowed to ask questions on any item on the questionnaire. They were further asked to respond to the items truthfully.

Respondents were spread all over Nairobi County and the researcher collected data from those selected to participate in the study. The researcher requested the principals to fill in questionnaire (Appendix 2). Observations were made by the researcher both during the pilot study and during the actual research exercise. Field notes about what the researcher heard and saw in the course of the study were also taken.

3.11 Data Analysis Techniques

The data obtained for the study were both qualitative and quantitative. Data was coded by assigning numerals to the answers for each response in the research instrument. The researcher arranged the data in a logical order. For purposes of preliminary data analysis, the researcher read through the field notes. Summative data analysis was conducted using data analysis methods cited by Adam (2005). The steps used were as follows: All the data (observation field notes and open-ended questionnaire documents) were reviewed first in a general manner to obtain a sense of the data and emerging themes. Data was coded to enable a thorough and systematic search for information. Analysis was conducted to provide structure to the gathered data and allowed for triangulation between the various research instruments used. The data was entered into Statistical Package for

Social Sciences (SPSS) programme version 20.0 after arranging and coding. Frequency distribution and percentages were computed for all items. Descriptive statistics used included the frequencies and percentages. Analysis of each of the hypotheses one to five was done using Chi Square test (χ^2). Data for each hypothesis were tested at the 0.05 level of significance. The challenges faced by principals were analysed using percentages.

In section C the questionnaire items were structured on the Likert scale. The items were scored using the following key: Strongly agree (SA) 1; Agree (A) 2; Undecided (U) 3 ; Disagree (DA) 4 and Strongly Disagree (SD) 5, for the positively stated items and Strongly agree (SA) 5; Agree (A) 4; Undecided (U) 3 ; Disagree (DA) 2 and Strongly Disagree (SD) 1, for the negatively stated items. The scores were then used to get the means. Attitudes were analysed by calculation of mean scores. The mean scores above 3.00 showed positive attitudes for positively stated items and those below 3.00 showed negative attitudes. For the questions that elicited qualitative data they were grouped into themes and categories based on objectives. Data was presented in percentages and frequencies. The results of this study were presented in tables and percentages.

3.12 Ethical Considerations

Saunders et al. (2007) assert that research ethics is important when relating to questions about a research topic, research design, research access, data collection

and analysis. In this study, a research permit was obtained from the National Council for Science and Technology. Further permission was sought from the County Director of Education (CDE) of the Nairobi County. The researcher assured the selected respondents about the confidentiality of the collected information. Blumberg, Cooper and Schindler (2005) emphasize that consent to participate in research is not a straightforward matter; hence in this study informed consent was applied.

Informed consent, according to Saunders et al. (2007), presupposes the participant is given full information about participation rights and use of data. The researcher also recognized objectivity as vital during data analysis to ensure that the collected data is interpreted correctly. Saunders et al. (2007) explain that researchers must try to minimize risk to participants and society while attempting to maximize the quality of information they produce. Therefore ethical measures were observed throughout the investigation. Educational researchers need to be sensitive to ethical principles because of their research topic, face-to-face interactive data collection, and emergent design and reciprocity with participants (Adam, 2005). Some pertinent ethical issues are briefly explained in the sections that follow. A letter of information providing details of the study and the appropriate consent letter was distributed to participants and an explanation given for their being included in the study. The respondents were then given a verbal explanation of study objectives. Since participants were fully informed of the

purpose of the present investigation in advance, each participant gave his or her permission to be observed, interviewed or to fill in the questionnaire. Following the clarification, participants were given the option to discontinue participation in the process for whatever reason. The researcher confirmed the willingness of principals to participate during the visits to the schools. Personal data was secured or concealed and made public behind a shield of anonymity (Christians, 2000).

Secondary school principals who took part in this investigation were given assurance of full confidentiality and anonymity. Other than identifying demographic factors for principals such as gender, age, education level or ICT training level, no other personal identifiable information was divulged or specific schools identified by name. Each school principal was assigned a code number (for example, Principal 1 or principal 2). According to Maseko (2002), researchers are ethically obliged to possess a high level of competence and skill in undertaking a study. The researcher maintained a healthy relationship with each participant and shared a high degree of trust throughout the investigation.

CHAPTER FOUR

DATA ANALYSIS INTERPRETATIONS AND DISCUSSIONS

4.1 Introduction

This chapter presents the results of data analysis and discussions. The study investigated the determinants of principals' level of integration of ICT in management of public secondary schools in Nairobi county of Kenya. Data was collected from all the principals of public secondary schools in Nairobi County. Information from the collected data is explained using percentages, tables, and figures. The data gathered was analyzed using descriptive statistics and the Statistical Package for Social Science (SPSS).

The results of the study were presented in the following order: response rate and data on demographic information of principals. Results of hypotheses on age of principals, gender of principals, and academic achievements of principals, level of training of principals and principals' access to ICT were then presented. Data analysis on principals' attitude and challenges faced by principals' were then presented.

4.2 Response Rate

The questionnaires were administered to sixty eight out of seventy five principals of public secondary schools in Nairobi County. The other seven (10%) principals had participated in the pilot study. The statistical results were triangulated with

extensive literature review to draw lessons learnt from other similar studies where research on integration of ICT in school management had been carried out.

4.3 Demographic Variables of the Respondents

This section deals with the demographic variables and other variables of the respondents. Specifically, it presents the gender, age, educational level, highest professional qualification, length from being appointed principal, length of stay in current station as a principal and level of training of the public secondary schools principals

4.4 Gender Distribution of the Principals of Secondary Schools

Schools

From both observation and anecdotal evidence, we "know" that there is gender gaps in the digital divide in several developed and many developing countries, but there are very little data. Without such data, it is difficult, if not impossible to make the case for the inclusion of gender issues in ICT policies, plans and strategies for policymakers. On the research level, the major reason for collecting sex-disaggregated data is to ascertain by measurement if men and women are benefiting differently from ICT interventions and if gender influences the choice of ICT strategies. Garba & Garba (2010) explain that gender influences people's attitudes, social roles and responses to situations.

Table 2 presents the distribution of principals of public secondary school of Nairobi County by Gender.

Table 2.

Distribution of Principals of Public Secondary School of Nairobi County by Gender

Gender	f	%
Male	33	48.5
Female	35	51.5
Total	68	100.0

Although the teaching profession has almost equal distribution of gender, (ratio of male to female), the findings of this study show that the distribution of leadership positions in public secondary schools in Nairobi County which is an urban area is slightly higher for female (51.5%) than for male (48.5%). The presence of more female principals may be attributed to the fact that TSC has a policy of encouraging teachers to work close to where their spouses are and majority of civil servants and other employees work in Nairobi city and may have married female teachers.

4.5 Age Distribution of Secondary Schools Principals' who Participated in the Study

The researcher was interested in establishing the distribution of age of principals

in Nairobi County. Table 3 presents the age distribution of principals who participated in this study.

Table 3.

Distribution of Principals of Secondary Schools by Age

Age	f	%
31-40years	6	8.8
41 -50 years	40	58.8
Over 51 years	22	32.4
Total	68	100.0

Table 3 reveals that majority of the principals of public secondary schools in Nairobi County (58.8%) were between 41-50 years old. Those between 31 -40 years were the least (8.8%) while the elderly persons aged above 50 years accounted for (32.4%). This analysis shows that it takes long for one to move up to leadership positions in public secondary schools in Nairobi County. During this period of growth (before promotion), one moves up the ladder to different positions in the school before one is appointed a principal. According to a study conducted by Mulwa and Kimosop (2013), access and use of internet had been greater among respondents' older principals. Perhaps the older principals have had a longer exposure to the use of computers in management and therefore reflect a higher frequency of use than their younger counterparts.

4.6 Educational level of Secondary Schools Principals' who Participated in the Study

Robbins (2003) notes that the skills needed for effective management can be grouped into three broad categories, namely technical skills, human skills and conceptual skills. Technical skills refer to the category of skills which enable the manager to use resources and scientific knowledge and to apply techniques in order to accomplish the objectives of the organization. Human skills refer to the ability to work well with other people and achieve results through them. Conceptual skills refer to the cognitive capacity to perceive the organization in its totality and the relationship between parts thereof. These skills manifest themselves in educational administrators being able to analyze and diagnose relatively complicated situations whilst at the same time being able to visualize the interrelationships of various units of an organization (Robbins, 2003). Training of school administrators and teachers is essential in enabling them acquire these ICT skills.

Table 4.

Educational Level of Secondary School Principals

Academic Qualification	f	%
Undergraduate degree	29	42.6
Masters degree	39	57.4
Total	68	100.0

Table 4 indicates that 42.6% of principals had an undergraduate degree and 57.4% had masters' degree. This shows that most principals in Nairobi County have master's degree. School administrators and teachers need various skills in order to cope with the demands of their management and teaching tasks. Such skills can be attained through formal training hence Teachers' Service Commission has employed principals with Masters Degrees.

4.7 Level of Training in ICT of Secondary Schools Principals' who

Participated in the Study

For principals to effectively use computer for school administrative tasks, they must first receive training on how to use computers. Principals were asked whether or not they had accessed any ICT based in-service training. Table 5 shows the principals who have participated in ICT in-service training.

Table 5.
Attendance of Principals to ICT in-Service Training

Access to ICT in-service f	f	%
Has attended	63	92.6
Has not attended	5	7.4
Total	68	100.0

Table 5 shows that a very high proportion (92.6%) of the public secondary school principals had received information communication technology in-service training while 7.4% had not. Through the interview of public secondary schools principals it revealed that although most of them were trained, the training was only basic resulting in most of them not possessing adequate skills in technology to enable them be confident and creative in the use of information communication technology for school management. Further responses revealed that, some of them do not even understand the rationale for use of information communication technology in school management. From analysis of the checklist it revealed that only 10 public secondary schools were connected to the internet at the time of study and many schools could therefore not benefit from the advantages of using internet for communication, administration and teaching.

4.8 Principals' Access to ICT and Integration of ICT in Management of Secondary Schools

Most secondary school administrators have moderately embraced the use of ICT to perform administrative tasks.

Table 6 shows the level of access to ICT.

*Table 6.
Extent of Using ICT on School Administration*

	High		Moderate		Low	
	N	%	N	%	N	%
School Administration	25	37.9	34	51.5	7	10.6

School administration: Maki (2008) stated that ICT could play major roles in reducing operational inefficiency and improving decision-making in many areas of governance in schools and school administrative subsystems. The findings of this study show that 51.5% of the principals of secondary schools moderately make use of ICT (computer) for schools management, 37.9% use it highly while 10.6% minimally use it. Administrators use ICT in preparing, administering, and compiling and analyzing students' tests marks and for keeping records. It was revealed that they use ICT for in the Kenya Certificate of Secondary Education (KCSE) registration. However, it was observed that principals need to use ICT in making logical decisions and seeking information on school rules and policies both for teachers and students. The educational management information system

(EMIS) can allow effective management of financial and human resource. Application of ICT shows that data can be stored, retrieved and disseminated online with the use of Management Information Systems (MIS) provided ICT is available and applicable(Oguta,Egesa and Musienga, 2014)

Table 7 shows extent of using ICT to manage curriculum instruction

Table 7.
Extent of Using ICT to Manage Curriculum Instruction

	High		Moderate		Low	
	N	%	N	%	N	%
Curriculum Instruction	28	42.4	32	48.5	6	9.1

Curriculum Instruction: ICT can be an effective tool in supporting teaching and learning. However, it is now firmly established that its introduction into schools does not by itself improve the quality of education or raise attainment (Watson, 2001). Encouragingly, there is growing and widespread awareness that the pedagogical and technical expertise of the teacher is absolutely critical here. Effectively introducing technology into schools is also largely dependent upon the availability and accessibility of ICT resources (e.g. hardware, software and communications infrastructure).

Tella, Toyobo, Adika & Adeyinka (2007) agree that there is universal emphasis on teaching basic skills and research studies indicate that integrating ICT into subject learning is far more effective for students. The skill emphasis is reinforced by the lack of technology located in classrooms and a corresponding concentration on purpose-built computer labs. In this study, results revealed that 48.5% moderately use ICT for Curriculum Implementation, 42.4% are high users while 9.1% were low -users. Principals revealed that they use ICT for posting students' marks, grading their performance and timetabling. Information Communication Technology when used in the classroom becomes a catalyst for change in teaching styles and learning approaches (Watson, 2001).

Table 8 shows the extent of using ICT to manage financial management.

Table 8.

Extent of Using ICT to Manage Financial Management

	High		Moderate		Low	
	N	%	N	%	N	%
Financial management	26	39.4	33	50.0	7	10.6

Financial management: Majority of the principals of secondary schools (50.0%) moderately use ICT to do their financial management, 39.4% highly use it while 10.6% are low-users as indicated in table 8. This shows that though not at a very high level, ICT is playing a great role in financial record keeping of the secondary

schools in Nairobi County. Principals of secondary schools use ICT for fees payment records in computer files, preparing staff salaries and payment processing along with fee analysis.

Table 9 shows the extent of using ICT to manage guidance and counseling.

Table 9

Extent of Using ICT to Manage Guidance and Counseling

	High		Moderate		Low	
	N	%	N	%	N	%
Guidance and Counseling	3	4.6	46	70.8	16	24.6

Guidance and counseling: The importance of guidance and counseling programme in secondary schools, include bringing to the students an increased understanding of the educational, vocational and social information needed to make wise choices (Oye, Obi, Mohd, and Bernice, 2012). In our society there are many influencing forces responsible for the gradual recognition of formal guidance to young people in various educational levels (Lorelei, 2010).

The essence of incorporating guidance and counseling into the public secondary school system in Kenya was to eliminate overwhelming ignorance of many young people on their choices of career prospects and personality maladjustment among adolescents. The role of ICT in guidance can be seen in three ways: as a tool, as

an alternative, or as an agent of change. This study revealed that a high proportion (70.8%) of the secondary schools moderately use ICT facilities for guidance and counseling, 4.6% highly use it while 24.6% are low -users. The principals had a positive attitude towards the use of ICT in guidance and counseling. School guidance can benefit much from ICT in terms of record keeping and communication. Further insight from the interview showed that cost, confidentiality and security were issues that were identified as needing to be addressed since school guidance is an integral component of education that benefits a lot from ICT usage.

Table 10 shows the extent of ICT usage in management of school resources.

Table 10.

Extent of Using ICT to Manage School Resources

	High		Moderate		Low	
	N	%	N	%	N	%
School resources	17	25.8	36	54.5	13	19.7

School resources: The researcher sought to establish use of ICT in management of store ledgers and stores balance in secondary schools. Findings of this study revealed that 54.5% of the public secondary schools principals' moderately use ICT for management of school resources, 25.8% highly uses it while 19.7% low – users. The study revealed that principals use computer applications such as Excel,

Word and Access in managing of school resources. This has an impact in record keeping and retrieval of information whenever needed especially for auditing purposes.

Table 11 shows the principals' level of integration of ICT.

*Table 11,
Principals' Level of Integration of ICT*

Level of integration of ICT	N	%
High	22	33.3
Moderate	39	59.1
Low	5	7.6
Non response	2	3.0
Total	68	100.0

Table 11 indicates the level of principals' level of integration of ICT in management of secondary schools. The table indicates that majority of the principals have moderately (59.1%) integrated ICT in management of secondary schools, However, 33.3% of the principals have highly integrated ICT in the day to day management of their schools. Only a few indicated that they have lowly used or did not respond (9.6%). Generally although many of the principals have indicated that they have integrated ICT in management of secondary schools, their level of use of ICT is still at basic level.

4.9. Testing of Hypotheses

This part presents the testing of all the hypotheses of the study.

4.10 Principals' Gender and the Level of Integration of ICT in the Management of Secondary Schools

H₀₁: *There is no significant relationship between the principals' gender and the level of integration of information communication technology in management of secondary schools*

In order to test whether there was a significant relationship between the gender of principals and level of ICT integration in secondary school management, chi square test (χ^2) was used to test the hypothesis.

Table12 indicates the relationship between the principals' gender and level of integration of ICT in secondary school management.

Table 12: Relationship between the Principals' Gender and Level of Integration of Information Communication Technology Cross Tabulation

	Level of ICT integration							
	High		Moderate		Low		Total	
	N	%	N	%	N	%	N	%
Male	12	17.6	17	25.0	4	5.8	33	48.5
Female	10	14.7	24	35.2	1	1.4	35	55.5
Total	22	32.3	41	60.2	5	7.2	68	100.0

From table 12 it can be observed that 17.6% of the respondents are male against 14.7% of the female respondents who have highly integrated ICT in management of secondary schools. Examining those who have moderately integrated ICT reveals that 25.0% males and 35.2% were female. The result reveals that both genders were up to the task and the gender gap was closing gradually.

Results from Chi square tests were tabulated in Table 13

Table 13 .

Chi Square Tests on Gender of the Principals and ICT Integration.

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1- sided)
Pearson Chi-Square	3.181 ^a	2	.204	.196	
Likelihood Ratio	3.312	2	.191	.196	
Fisher's Exact Test	3.027			.214	
Linear-by-Linear Association	.010 ^b	1	.919	1.000	.543

The Chi square table 13 confirms that there is no relationship between gender and level of integration of ICT in public secondary school management. Table 4.12 indicates the results of testing the hypothesis on relationship between the gender of the principal and level of integration of information communication technology in management of public secondary schools. The null hypothesis (**H₀₁**) was tested using Chi square test (df=2, Pearson Chi square value (2) =3.18 and p= 0.204 at

0.05 level of significance) indicated that the finding was not significant.

The Null hypothesis (H_{01}) *'There is no significant relationship between the principals' gender and the level of integration of information communication technology in management of secondary schools'* was therefore not rejected. It was accepted. The gender of the principal is therefore not significantly related to the level of integration of information communication technology in management of secondary schools. The reason behind these may be that both male and female principals may have equal access to ICT and share related work tasks. This study revealed that the gender gap is closing up gradually. The results from analysis of this study show that there is no significant relationship between the principals' gender and integration of information communication technology in management of secondary schools. The gap of gender disparities in ICT integration among principals in management of secondary schools in Nairobi is insignificant. Both female and male principals of secondary schools in Nairobi have integrated ICT in their schools of an almost equal level.

4.11 Relationship between Principals' Age and the Level of ICT Integration in the Management of Secondary Schools

The researcher was interested in finding out whether age of the principal was related to the level of integration of ICT in the management of secondary schools in Nairobi County.

H0₂ There is no significant relationship between the principals' age and the level of integration of information communication technology in management of secondary schools.

In order to test whether there was a significant relationship between the level of ICT integration and age, Chi square test (χ^2) was used. Table 12 and table 13 indicate the results of testing the hypothesis.

Table 14 shows the principals' age and level of integration of ICT.

Table 14.

Principals' Age and Level of Integration of ICT

Age	Level of ICT Integration							
	High		Moderate		Low		Total	
	N	Percent	N	Percent	N	Percent	N	Percent
31-40	2	2.9	1	1.4	2	2.9	5	7.3
41-50	12	17.6	26	38.2	3	4.4	41	60.2
Over 51	8	11.7	14	20.5	0	0.0	22	32.3
Total	22	32.2	41	57.1	5	7.3	68	100.0

From table 14 it can be observed that 17.6% of the respondents between the age brackets of 41-50 have integrated ICT and 11.7% between the age brackets of over 51 have highly integrated ICT in the management of public secondary

schools. The table shows that 38.2% of the respondents have moderately integrated ICT within the age bracket of 41-50 and 20.5% have integrated ICT within the age bracket of over 51 years. The low level of integration of ICT from the principals aged 50 and above could be due to the fact that they have not been exposed to computers. On the other hand middle aged principals have been exposed to computers as they may have taken computer lessons in school or training colleges. They may have had a positive attitude towards computers.

From table 14 results it can be concluded that there is a significant relationship between age and ICT integration in management of secondary schools. This is in agreement with the researcher's point of view on the section of literature review.

Results from Chi square tests were tabulated in Table 15. The Chi square test also indicated that there is a significant relationship between age and ICT integration in management of public secondary schools.

Table 15.

Chi Square Tests on Age of the Principal and ICT Integration

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.220 ^a	3	.037	.041	
Likelihood Ratio	8.804	3	.066	.079	
Fisher's Exact Test	7.704			.070	
Linear-by-Linear Association	1.666 ^b	1	.197	.216	.133

Table 15 indicates the results of the chi square (χ^2) testing of the hypothesis on relationship between the age of principal and level of integration of information communication technology in management of secondary schools. The null hypothesis (**H0₂**) was tested using Chi square statistic (df =3, Pearson $\chi^2=10.22$, p= 0.03 at 0.05 level of significance). The results indicate that the Chi square value computed is significant and therefore the null hypothesis (**H0₂**) is rejected. The age of principals is therefore significantly related to the level of integration of information communication technology in management of secondary schools.

The result revealed that principals between the age bracket of 31- 40 years who are middle aged principals increased integration of ICT in the management of secondary schools in Nairobi County. This result concurs with that of Lee and Choudrie, (2002), in South Korea who found out that the group that increased the integration of broadband via the PC was also the younger age group. In turn, the younger (30-35) generation's usage of broadband in South Korea exerted a substantial influence on parents' decisions for subscribing to broadband, since parents considered broadband as imperative for educational and entertainment purposes.

Carveth and Kretchmer (2002), found that in many West European countries, the older groups are less likely to use the internet compared to the younger groups. According to their findings, in the UK, 75 percent of those aged 16-24 had

internet access compared to just 15 percent in the 65-74 age range, 6 percent over the age of 75 years, and 4 percent in the 25-63 age range. A study by Anderson et al. (2002) also suggests that the demography of dial-up users is different to that of broadband users. Therefore, significant age differences are expected in terms of the broadband integrators and non-integrators.

The younger and middle aged consumers are expected to be more apathetic to integration, whilst the older age consumers are expected to be more relevant to the non-integrators. A high proportion of principals were appointed to headship when they were over 30 years of age and above. This means they were already middle age bracket. In a similar study, Okewa (2011) found out that age influenced ICT integration among secondary school teachers in Kisumu. In conclusion age influences integration of ICT in management of public secondary schools.

4.12 Educational Level of the Principals and the Level of Integration of ICT in the Management of Secondary Schools

H0₃) There is no significant relationship between educational level of principals and the level of integration of information communication technology in management of secondary schools.

In order to test whether there was a significant relationship between educational

level of principals and integration of ICT in management of secondary schools, chi square test (χ^2) was applied. Table 16 shows the educational levels of principals.

Table 16.

Educational Levels of Principals Cross Tabulation

	High		Level of integration Moderate		ICT Low		Total	
	N	%	N	%	N	%	N	%
	Total	21	30.8	42	61.7	5	7.3	68
Undergraduate								
degree	7	10.2	20	29.4	2	2.9	29	42.6
Master's degree	14	20.6	22	32.3	3	4.4	39	57.4

From table 16 it can be observed that 29.4 % who had an undergraduate degree while 32.3 % who had a master's degree had moderately integrated ICT. Further the table reveals that 10.2 % who had an undergraduate first degree and 20.6 % who had a master's degree had highly integrated ICT in secondary school management. There were more principals with a master's degree in Nairobi County than those with degree.

The results of the chi square test were presented in Table 17.

Table 17

Chi Square Tests Showing Educational Levels of Principals

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2- sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.655a	2	.238	.240	
Likelihood Ratio	3.954	2	.215	.228	
Fisher's Exact Test	3.930			.244	
Linear-by-Linear Association	.177b	1	.168	.195	.097

Table 17 indicates the results of chi square (χ^2) testing for the hypothesis on relationship between the educational level of principal and integration of information communication technology in management of secondary schools. The null hypothesis (H_0) was tested using chi square test (df=2, Pearson $\chi^2=2.65$, $p=0.238$ at 0.05 level of significance). The findings indicated that the computed chi square is not significant and therefore the null hypothesis (H_0) was therefore not rejected. It was accepted. There is no significant relationship between educational level of principals and level of integration of information communication technology in management of secondary schools. Past research on the relationship of education on technology (PC) integration suggests a positive correlation between the level of education, technology ownership and usage (Morris and Venkatesh, 2000).

Morris and Venkatesh (2000) found that people with higher educational qualifications used computers more than less educated people. Education is widely reported to be one of the most important drivers of broadband integration

in South Korea (Choudrie and Lee, 2004; Choudrie and Papazafeiropoulou, 2006). It is expected that the higher the educational level of a principal of a secondary school, the higher the level of information communication technology exposure and use. Therefore principals with higher educational levels are expected to highly integrate information communication technology use in management of secondary schools compared to those with low educational levels. In this study, no statistical significant relationship was found between principals' educational level and level of integration of ICT in management of secondary schools in Nairobi County.

4.13 Relationship between Levels of Training in ICT of Principals and Level of Integration of ICT in Management of Secondary Schools

The researcher was interested in finding out how training affected the level of ICT integration of public secondary school principals. From table 18 and table 19 there is overwhelming evidence that computer in service training plays a big role in determining the levels of integration of ICT by principals of secondary schools. Table 18 shows in-service training in ICT of principals and level integration of ICT in management of public secondary schools.

Table 18.

In-Service Training in ICT of Principals and Level Integration of ICT

	Level of ICT integration							
	High		Moderate		Low		Total	
Have you taken an in service course?	N	Percent	N	Percent	N	Percent	N	Percent
Yes	22	32.5	39	57.3	2	2.9	63	92.6
No	0	0.0	0.0	0.0	5	7.4	5	7.4
Total	22	32.5	39	57.3	7	10.2	68	100

From table 18 it can be observed that 32.5% of the respondents had trained in an in service course for computer had highly integrated ICT in the management of public secondary schools. 57.3 % of the respondents had trained in ICT. Examining the data further, the results revealed that those who had not received any training in the use of computers had not integrated ICT.

Table 19.

Chi Square Tests on in Service Training of Principals in ICT

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1- sided)
Pearson Chi-Square	38.343 ^a	2	.000	.000	
Likelihood Ratio	17.678	2	.000	.000	
Fisher's Exact Test	15.282			.000	
Linear-by-Linear Association	14.282 ^b	1	.000	.000	.000

Table 19 indicated the results of the chi square (χ^2) testing of the hypothesis on relationship between the level of information communication technology in service training of the principal and their integration of information communication technology in management of secondary schools. The null hypothesis (**H0₄**) was tested using chi square statistic (df=2, Pearson $\chi^2=38.34$, $p= 0.00$ at 0.05 level of significance) indicated that the finding was significant and therefore the null hypothesis (**H0₄**) was therefore rejected. The level of training of the principal in information communication technology is therefore significantly related to the level of integration of information communication technology in management of secondary schools. The chi square table confirms that there is a very strong relationship between training and ICT integration.

The finding of this study on the significant relationship between ICT in-service training of principals and level of integration of ICT in management of secondary schools in Nairobi County is expected. Principals with ICT training would be expected to use ICT with ease than those without. Such principals would be expected to be technically functional compared to the one who has no training. This finding concurs with the findings of the study by Peansupap & Walker (2005) which indicated a need for users to get intermediate training when exposed to ICT applications.

4.14 Relationship between Principals' Access to ICT and Level of Integration of ICT in Management of Secondary Schools

The researcher was interested in establishing the relationship between principals' access to ICT and the level of integration of ICT in public secondary schools in Nairobi County. Table 20 shows the relationship between principals' access to ICT and level of integration of ICT in secondary school management

Table 20 .

Principals' Access to ICT and Level of Integration of ICT in Secondary School Management

Access to computer	High		Level of ICT integration Moderate		Low		Total	
	N	Percent	N	Percent	N	Percent	N	Percent
Adequate	3	4.4	8	11.7	0	0.0	11	16.1
Inadequate	18	26.4	31	45.5	1	1.4	50	73.6
Not available	0	0.0	3	4.4	4	5.9	7	10.3
Total	21	30.8	42	61.6	5	7.3	68	100.0

From table 20 it can be noted that 45.5% of the respondents who had moderately integrated stated that they had inadequate access to computers and 26.4% who had highly integrated ICT stated that they inadequate access. This examination revealed that principals do not have adequate access to computers.

Table 21 shows the results of Chi square tests on access to ICT of principals.

Table 21

Chi Square Tests on Access of ICT to Principals

	Value	Df	Asymp. Sig. (2- sided)	Exact Sig. (2-sided)	Exact Sig. (1- sided)
Pearson Chi-Square	12.481 ^a	3	.032	.122	
Likelihood Ratio	14.528	3	.069	.084	
Fisher's Exact Test	10.823			.141	
Linear-by-Linear Association	3.562 ^b	1	.059	.071	.035

Table 21 indicates the results of the chi square (χ^2) testing of the hypothesis on relationship between access to information communication technology of principals and the level of integration information communication technology in management of secondary schools. The null hypothesis (**H0₅**) was tested using chi square statistic (df=3, Pearson $\chi^2=12.48$, p= 0.032 at 0.05 level of significance). The findings indicated that the computed chi square was highly significant and therefore the null hypothesis (**H0₅**) was therefore rejected. Access to information communication technology to the principals is therefore significantly related to the level of integration of information communication technology in management of secondary schools. This result is expected. It is expected that the higher the level of access to ICT a principal has, the higher the information communication technology exposure and use. Therefore principals with higher level of access to ICT are expected to highly integrate information communication technology use

in management of secondary schools compared to those with low level of access to ICT. There is an apparent relationship between access to ICT by principals and integration of ICT for management by principals of secondary school in Nairobi County.

Findings of this study from interview and observation checklist indicated that Nairobi county secondary school principals are lacking in proficiency on database, spreadsheet, presentation/ multimedia software, the Internet, and information seeking as compared with other technology competencies. Hence, the government needs to provide professional development for principals to become proficient in all the competency areas. Also, they should implement an evaluation system that ensures school principals are working with the technologies at a proficient level.

Therefore access to ICT is a key element to successful integration of ICT in secondary schools. A study by Yildirim (2007) found that access to technological resources is one of the effective ways to ICT integration. In another study on ICT integration among faculty members in higher education in Turkey conducted by Usluel, Askar & Bas (2008) it was revealed that majority of the respondents (81.2%) reported having access to ICT in management of secondary schools

4.15 Principals' Attitudes towards the Level of Integration of ICT in Management of Secondary Schools

The researcher further administered a Likert-type scale to determine the principals' attitude toward use of information communication technology in school administration. This was assessed using a four-point Likert-type scale ranging from "Strongly Agree" to "Strongly Disagree". The scoring of the statement was conducted as indicated below.

For positively stated items (Nos.1-7)	Scores assigned
a) Strongly Disagree	5
b) Disagree	4
c) Undecided	3
d) Agree	2
e) Strongly Agree	1

For negatively stated items (Nos.8-14)	Scores assigned
a) Strongly Disagree	1
b) Disagree	2
c) Undecided	3
d) Agree	4
e) Strongly Agree	5

Table 22.

Principals Attitude Scale

Attitude Statements	N	Mean
1. ICT is important in school administration	68	4.36
2. ICT is important for the progress of society	68	4.32
3. I always look forward to working with computers	68	4.46
4. I enjoy trying to solving problems using ICT during my free time	68	4.49
5. I have always enjoyed studying ICT	67	4.38
6. Computer lessons are easier to understand	68	3.89
7. I am interested in acquiring further knowledge of ICT	68	4.26
8. ICT is uninteresting in that it leaves no room for personal growth	67	2.13
9. ICT is an area I find more difficult to understand	68	2.83
10. I think society can develop perfectly well without ICT	68	2.24
11. I never like computer lessons	67	3.69
12. I think ICT is not practical	68	3.73
13. I can get along well in everyday life without ICT	67	3.89
14. I work very hard to understand ICT	68	2.28

The expected minimum scores for both positively and negatively stated items were 7, while the maximum scores were 35. The results were reported in means. The mean score above 3.00 denotes a positive attitude, while the mean score below 3.0 is negative. A mean score of 3.0 denotes neutral attitude. Higher scores on positively stated items indicated positive attitudes towards information communication technology while higher scores in negatively stated items indicated less positive attitudes.

The table 22 indicated that the principals had an attitude score towards ICT ranging from a mean of 2.13 to 4.49 for each of the items and an overall mean of 3.6. This clearly indicated that the majority of the principals of public secondary schools in Nairobi County had a positive attitude towards ICT as it was above the neutral mean of 3.0. This implies that principals had positive emotional feeling of ICT in education management.

The researcher went further to get in depth information from the principals on their attitude towards ICT integration in management of public secondary schools.

They responses answered the following research question:

“Is there a significant relationship between the principals’ attitude and the level of integration in information communication technology in the management of public secondary schools in Nairobi County? “

Their responses were tabulated in Table 23.

Table 23.

Responses from Interviewees on Principals' Attitude towards ICT Integration in Public Secondary Schools Management in Nairobi County

Principals attitude towards ICT integration	N	% responses from the 9 sampled principals
ICT is important in everyday life	4	(44%)
Looking forward to working using computer	2	(22%)
Computer do not solve problems	1	(11%)
ICT has created efficiency in schools	3	(33%)
Total	9	(100%)

Results of the Likert scale and research question 1 (interview item d) reveal that principals attitude towards ICT integration in Nairobi County is positive. Principals through interviews were asked to give their views on attitude towards ICT integration in management of public secondary schools in Nairobi County. Their opinions showed that 4 (44 %) out of the 9 indicated ICT was important in their everyday life. Responses from 2 (22 %) indicated that principals were looking to using a computer. Results indicated that 1 (11%) of the principals indicated that computers do not solve problems. On the other hand, 3 (33 %) of the principals indicated that ICT has created efficiency in schools (See Table 23)

Majority of principals stated that they have realized the impact of technology on their life and society in general. The principals were ready to integrate ICT in the

management of secondary school principals and provide leadership as well as resources. However, their attitude did not translate into using of information communication technology as other factors/ challenges affected integration of ICT in their schools. An increasing number of scholars agree that leadership plays a major role in ICT implementation at schools, especially in its integration into the curriculum (Dawson & Rakes 2003, Mulkeen 2003, Tondeur 2008). As Polizzi (2011) stated that amongst other things, attitudes of school principals play a role in determining the extent computers are used. The attitudes of participants who are involved in an educational innovation play a role in determining the degree and speed, change will be effected (Polizzi, 2011). Polizzi's research showed that principals with very positive attitudes towards the usage of computers tended to influence their teaching staff by emphasizing the importance of computer-integration.

4.16: Results from Observation Checklist from Schools

The researcher sought to observe physical evidence of ICT facilities in all the schools. Observations were recorded on the spot using observation checklist on the availability of observable items. A record of infrastructure was kept based on the observation checklist that included: digital cameras, office computers computer network, laptops, class computers, servers/ internet, printers, video cameras, scanners, projectors, availability of electricity, email addresses, fax machine, copier, computer software programs and surveillance camera.

Physical verification of ICT equipment and infrastructure revealed the following results as indicated in Table 24

Table 24.

ICT Equipment and Infrastructure

ICT equipment/ infrastructure	Total number of ICT equipment and infrastructure
Digital cameras	4
Office computers	60
Computer network	10
Laptops	5
Class computers	500
Servers / internet	10
Printers	60
Video cameras	3
Scanners	10
Projectors	2
Electricity	67
Email	10
Fax machine	10
Copier	50
Software	50
Surveillance camera	0

Table 24 shows the results from observation checklist. It reveals the ICT equipment and infrastructure in public secondary school in Nairobi County. It included five hundred Pentium computers that were in about twenty computer laboratories for students. Nine computer labs were fully equipped with about forty computers with internet network and were used by computer students. About nine

schools had an average of twenty computers. Two schools had a library which housed a collection of digital video and video tapes. Two schools had LCD projector. In one of the two schools the LCD was used during B.o.M meetings. The principals prepared power point reports for presentation during the meetings specifically on exam analysis, budgeting and construction project reports. to present that one school did not have electricity at the time of the study. This was a new school constructed by Constituency Development Fund (CDF) funds. It is also clear that there were less ICT equipment and infrastructure in a high proportion of the schools. Ten schools had internet servers meaning the schools could access internet services.

It was therefore possible for these schools to communicate through email to parents and other interested parties. Information could be sent through fax in the same schools. Two schools had projectors which were used for teachers' seminars but not for students use. About fifty schools had office computers, copiers and printing machines which were mainly used for office work, processing continuous assessment tests and examinations. Fifty schools had software for processing examination marks and fees balance for students. The schools had benefitted from government funding of selected schools. It is evident that generally there were inadequate equipment, infrastructure and security as there was no surveillance camera in the school.

4.17: Challenges faced by Principals in the Integration of ICT in

Management of Secondary Schools

Objective seven sought to explore the challenges the principals' face in integration of information communication technology in the management of secondary schools in Nairobi County. The following research question guided the search for this objective.

“What are the challenges faced the principals' in their effort to integrate information communication technology for the management of secondary schools? “

The principals were taken through and interview guide to elicit responses on challenges they faced in their effort to integrate ICT.

Research question two and specifically structured question 17 sought to explore the challenges the principals' face in integration of information communication technology in the management of secondary schools in Nairobi County. The principals were taken through and interview guide to elicit responses on challenges they faced in their effort to integrate ICT.

The information from the principals on challenges they face are presented in Figure 4.

Factors limiting the adoption of ICT by principals

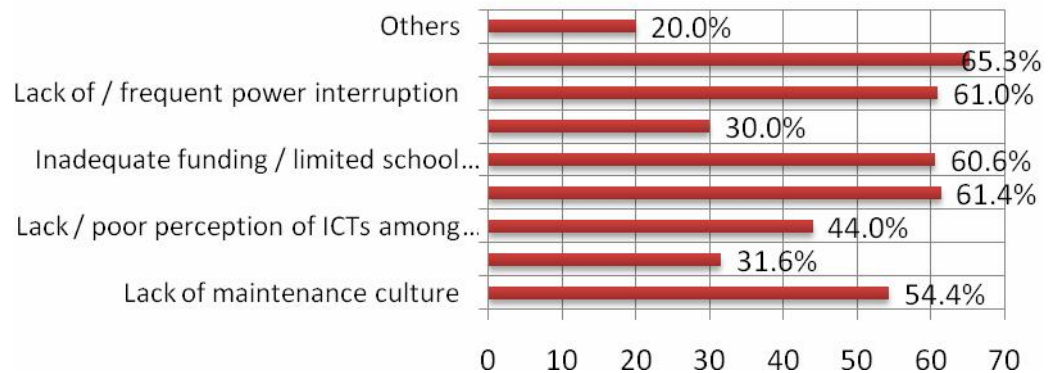


Figure 4. Challenges faced by principals of public secondary schools in ICT integration

Figure 2 shows that the most serious problem militating against the application of ICT resources in the management of public secondary schools in Nairobi County was lack of / inadequate ICT facilities as was indicated by 65.3% respondents. This includes computers and their accessories. Lack of computer / ICT skills was cited by 61.4% of the public secondary school principals. Inadequate funding by the government and some of the parents was cited by 60.6% of the principals of public secondary schools in Kenya. Computers are still very expensive in Kenya thus majority of the individuals and schools cannot afford to buy a computer and consider it as a luxury item. Ndiwa (2014) concurs that the usage of ICT equipment in the public secondary schools in Kenya was at a low level. His study found that there were inadequate facilities and other constraints such as inadequate funding to provide ICT equipment.

Lack of electricity and erratic power supply was cited by 61.4% respondents. One school though in Nairobi city was not yet connected to electricity. Consequently the school may not offer computer studies or use computers for administrative tasks. High workload attracted 31.6% responses from the respondents; 44.0% respondents indicated negative attitude by schools administrators. 54.4% respondents cited lack of maintenance culture. While a good number of schools have benefited from donated used computers, they have not been adequately equipped with the same on maintenance and repair. It is very common therefore to see a school computer lab full of broken down computers, some repairable and some not. The other challenges such as age, techno phobia, fear, lack of importance/recognition attached to the ICT was mentioned by 20.0% of the respondents.

There is still a strong perception especially by the older generation that computers require highly skilled personnel to operate them, while this may not be the case, some school administrators also fear the infection of viruses to their computers leading to data loss, while this may be true to some extent, proper education on the safe use of computers may alleviate some of this fears. Yet other reasons given by respondents include time constraints due to crowded office schedules. The fact that computers are still very expensive in Kenya, makes them a target for thieves who usually have ready markets to another party at a much less cost. This has made many schools to incur extra expenses trying to burglar proof the

computer rooms. This extra expense makes some schools shy away from purchasing computers for their students. Lack of internet or slow connectivity; most schools are not able to connect to the World Wide Web, due to the high costs involved in the connectivity. This is considered as very expensive for a very slow speed. The other nagging problem is the disturbances by the viruses, which distort any programme or make the computer, fail to open to view programmes. Lack of information regarding the benefits of ICT is also revealed in this study. Okewa (2011) found out that there is a lack of information regarding the contributions of ICT in organizations in a research done in Kisumu among teachers of public secondary principals.

4.18 Findings on the Potential Benefits of ICT Integration

The principals agreed that they were ready to integrate ICT in the management of their schools which can replace the manual processes being used in some schools at the time of the study. Principals had a positive attitude towards integration of ICT and this was in agreement with a study done by Okewa (2013) and Kipsoi (2012). This study found that most principals were using mobile phones to communicate to parents especially on meetings and reminders of school fee payments. Portable mobile phones were popular for communication purposes but could not deliver all the required information needed by the parents. Email was an alternative mode but it was reported many parents were not connected to email and likewise not all schools had email at the

time of study. In terms of effective management, most school principals agreed that they would benefit greatly if integration of ICT was enhanced. Training principals in ICT was emphasized by the respondents as a way towards faster integration of ICT in management of public secondary schools.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the study. It also presents conclusions, recommendations and suggestions for further research.

5.2 Summary of the Study

The purpose of the study was to investigate the determinants of principals' level of integration of information communication technology in public secondary schools management in Nairobi County. The specific objectives of the study were the following:

- i. to establish if principals' gender is significantly related to their level of integration of Information Communication Technology in management of public secondary schools;
- ii. to establish if principals' age is significantly related to their level of integration of Information Communication Technology in management of public secondary schools;
- iii. to determine the extent to which principals' educational level is significantly related to their level of integration of Information Communication Technology in management of public secondary schools;
- iv. to establish whether the level of training in Information Communication Technology (ICT) is significantly related to their level integration of

Information Communication Technology in management of public secondary schools;

- v. to establish if principals' access of ICT facilities is significantly related to their integration of Information Communication Technology in management of public secondary schools;
- vi. to investigate the principals' attitude towards integration of information level of integration in information communication technology in the communication technology.
- vii. to find out the challenges the principals' face in integration of information communication technology in the management of public secondary schools.

The following were the research questions that the study sought to answer

- i. What is the principals' attitude towards integration of ICT in the management of public secondary schools in Nairobi County?
- ii. What is the relationship between the challenges faced by principals' in their integration in information communication technology in the management of public secondary schools in Nairobi County?

The following hypotheses were tested:

Ho₁: There is no significant relationship between the principals' gender and the level of integration of information communication technology in management of public secondary schools.

Ho₂: There is no significant relationship between the principals' age and the level of integration of information communication technology in management of public secondary schools.

Ho₃: There is no significant relationship between the principals' educational level and the level of integration of information communication technology in management of public secondary schools.

Ho₄: There is no significant relationship between the principals' level of training in ICT and integration of information communication technology in management of public secondary schools.

Ho₅: There is no significant relationship between principals' level of access of ICT and their integration of information communication technology in the management of public secondary schools.

Each hypothesis Ho₁ to Ho₅ was tested for significance using the Chi-square test at $p = 0.05$ level of significance. The findings of the hypotheses complemented the findings of the descriptive statistics and observations made on the other research instruments. The study was conducted in all public secondary schools of Nairobi County. The respondents comprised of secondary school principals. There were sixty eight principals who participated in the main study. This study was guided by Roger's Diffusion of Innovation (Dof) theory which is widely acknowledged as applicable to educational settings and which provide a framework that helps to understand why ICT is integrated in school instruction

and management. The design of the study was a descriptive survey research design. Random sampling was used to get the seven schools for piloting and nine for interviewing. The research instruments: questionnaire, interview guide, and observation checklist were validated by the two supervisors as recommended by Tichapondwa (2013). The supervisors examined the research instruments after the pilot study and made corrections. Reliability of the instruments was determined using Cronbach alpha method to ascertain the internal consistency of the questionnaire items. The result from the analysis was found to be 0.78 which was considered to be reliable. Qualitative data was analysed by categorizing data into themes as per the objectives of the study. Quantitative data was analysed through descriptive statistics using frequencies and percentages and chi square test.

5.3 Summary of Findings

This section presents a summary of the findings according to the objectives of the study.

5.3.1 Research Objective One: To Establish if Principals Gender is related to their Level of Integration of ICT in Management of Public Secondary Schools.

The findings of this study show that secondary schools in Nairobi County which is an urban area are dominated by female principals (51.5%) while male

principals were 48.5%. The majority of principals (58.8%) were aged between 41-50 years. The results showed that there is no significant relationship between the principals' gender and integration of information communication technology in management of secondary schools. The results indicated that a Pearson $\chi^2 = 3.18$, $P=0.204$ at 0.05 level of significance ($df=2$). The null hypothesis (H_{01}) was therefore not rejected. It was accepted. The gender of the principal is therefore not significantly related to the level of integration of information communication technology in management of secondary schools. However other research studies revealed that male teachers used more ICT in their teaching and learning processes than their female counterparts (Kay, 2006; Wozney et al., 2006).

5.3.2 Research Objective Two: To establish if Principals' Age is related to their level of Integration of ICT in Management of Public Secondary Schools.

The results of testing hypothesis on age and level of ICT integration indicated that Pearson $\chi^2 = 10.22$, $P=0.037$ at 0.05 level of significance ($df=3$). The null hypothesis (H_{02}) was therefore rejected. It was not accepted. The age of principals is therefore significantly related to the level of integration of information communication technology in management of secondary schools. Therefore there is statistical significant relationship between the principals' age and level of integration of information communication technology in management of secondary schools.

5.3.3 Research Objective Three: To Determine the Extent to which

Principals' Educational Level is related to their Level of Integration of ICT in Management of Public Secondary Schools.

The results of testing the hypothesis on relationship between the educational level of principal and integration of information communication technology in management of secondary schools indicated a Pearson $\chi^2 = 10.22$, $p=0.037$ at 0.05 level of significance ($df=2$). The null hypothesis (H_0) was therefore not rejected. It was accepted. The educational level of the principal is therefore not significantly related to the level of integration of information communication technology in management of secondary schools.

5.3.4 Research Objective Four: To Assess Whether the Principals' Level of

Training in ICT is related to their Level of Integration of ICT in Management of Public Secondary Schools

On access to ICT based in-service training, majority 92.6% of the respondents had received ICT in-service training while 7.4% had not. The results of testing the hypothesis on relationship between the level of information communication technology training of the principal and integration of information communication technology in management of secondary schools indicated a Pearson $\chi^2 = 38.34$, $p=0.000$ at 0.05 level of significance ($df=2$). The null hypothesis (H_0) was therefore rejected. The hypothesis was not accepted. The level of training in ICT of the principal is therefore significantly related to the level of integration of

information communication technology in management of secondary schools. While enhancing integration of ICT to promote effective management of secondary schools, it is important to enhance and provide principals with adequate training in various management systems for financial, administrative, human resource management, library and student personnel. Therefore the issue of training should be addressed for the benefits of ICT to be realized.

5.3.5 Research Objective Five: To Establish if Principals' Access to ICT

Facilities is Related to their Level Integration of ICT in Management of Public Secondary Schools.

This part of the investigation attempted to establish the link between ICT access, which included hardware and software, and use of ICT in management of secondary school. The most available ICT hardware to principals consisted of a computer. The results indicated a Pearson $\chi^2 = 12.48$, $p=0.032$ at 0.05 level of significance ($df=3$). The null hypothesis (H_0) was therefore rejected. It was not accepted. The level of access of ICT of the principal is therefore significantly related to the level of integration of information communication technology in management of secondary schools. The integration of ICT is expected to promote principals access to ICT. It is important to provide enough ICT equipment both hard and software and maintenance to secondary schools in Kenya. This will give principals ample time to manage the schools effectively. This task lies with the ministry of education and all the stakeholders of the schools.

The results from checklist observation revealed that one school did not have electricity at the time of the study. The school was constructed by CDF funds. It is clear that there were less ICT equipment and infrastructure in most of the schools. In conclusion, it is evident that generally there were inadequate equipment, infrastructure and security as there were no surveillance cameras. Only ten schools had internet connection.

5.3.6 Research Objective Six: To Assess the Principals' Attitude towards ICT

All principals had a positive attitude towards ICT literacy development. Majority of the principals had a positive attitude toward ICT with a mean 4.1 to 4.5 and an overall mean of 3.8 out of a maximum of 5.0. Furthermore, findings of this study indicated that the affective domain has the highest mean score (M= 4.11) among the 8 subscales of attitude scale. This implies that principals had positive emotional feeling of computer in education. So, the majority of respondents reported that they like, enjoy, and feel comfortable using ICT in general and in education. Majority of principals stated that they have realized the impact of technology on their life and society in general. However, their attitude did not translate into using of ICT as other factors may have affected integration of ICT in their schools.

5.3.7 Research Objective Seven: To Establish the Challenges the Principals Face in their Integration of ICT Management of Public Secondary Schools.

This part of the investigation attempted to establish the correlation between challenges principals face while using ICT in management of schools. Most principals agreed that they faced the following challenges in an attempt to use ICT. The most serious problem militating against the application of ICT resources in the management of secondary schools was lack of / inadequate ICT facilities as indicated by 65.3% respondents. This includes computers and their peripherals. Lack of skills was cited by 61.4% secondary schools principals at Nairobi County. About 60.6% secondary schools principals at Nairobi County cited inadequate funding by the government and some of the parents. Lack of electricity /Epileptic power supply was cited by 61.4% respondents. Some schools though they are in Nairobi city are not yet connected to electricity. Consequently those schools are handicapped and may not be able to offer computer studies or use ICT in management of schools. High workload attracted 31.6% responses from the respondents; 44.0% respondents indicated negative attitude by schools administrators. Lack of maintenance culture was cited by 54.4% respondents.

Financial constraints, lack of ICT infrastructure and lack of interest to learn ICT skills and lack of ICT infrastructure significantly reduced the use of ICT in school management. Other challenges included lack of time, lack of interest to learn ICT

skills and ICT learning centres were some of the challenges principals of secondary schools faces. Therefore principals need to be provided with access to ICT facilities and be encouraged by being given incentives to learn how to use computers and have general knowledge on ICT applications and programmes.

5.4 Conclusions

From the findings of the study, it was concluded that gender and principals' educational level were not significantly related to their level of integration of ICT in secondary school management. However, age, level of in-service training and access to ICT were significantly related to their level of integration of ICT in management of secondary. This study revealed that the available ICT facilities in the Nairobi county schools were not adequate. Also, the study has shown that most of the principals in Nairobi public secondary schools do not have the adequate knowledge, skills and the facilities needed for effective and efficient ICT usage. This situation has not enabled them benefit from ICT usage. This may be the reason for the number of administrative problems seen in most secondary schools in the Nairobi County. Based on the aforementioned findings on challenges, it is imperative to conclude that the provision of ICT facilities and proper utilization of ICT in the management of public secondary schools will make principals manage their schools effectively and efficiently.

5.5 Recommendations

It has become apparent throughout this study that lessons have been learnt and useful insights gained to guide present and future roll out plan in computer based technology in administration and management of public secondary schools in Nairobi County. The findings further revealed that Nairobi county secondary schools principals were lagging behind in the level of integration of computer based technology. Based on the findings of this study and their implications the following recommendations were made:

5.5.1 Recommendations for Policy

The results of this study have implications for policy. There are a number of policies that provided the background for this study such as MDGs, Sessional papers among others. The findings of this study emphasized on the following aspects on policy.

- a) The government of Kenya should implement the ICT policy on education as stipulated in policy documents.
- b) The government of Kenya should lay down specific strategies for the formulation and implementation of ICT policy which addresses the issue of management in secondary schools.
- c) ICTs can be important drivers for educational reforms. This study recommends that for that successful ICT policy implementation consultation with diverse groups of stakeholders both within and outside

the MoE should be done alongside proper timing as innovations in ICT are introduced faster to the market.

5.5.2 Recommendations for Management Practice

The findings of this study have implications for leaders, managers and administrators for the fact that ICT integration was found to have a significant relationship with training, access to ICT facilities among others. This calls for concerted efforts of managers to mobilise both human and financial resources to provide adequate training and facilities. Therefore the following recommendations were made based on the findings of this study.

- a) The government of Kenya should increase funding for the entire educational sector with emphasis on ICT which will improve the level of ICT facilities and infrastructure in public secondary schools. Budgetary allocations will need to be made available specifically for this purpose
- b) Ensure the provision of electricity in every school by giving priority to providing electricity infrastructure and other sources of energy where applicable to improve on ICT access.
- c) Currently there is training of principals at KEMI in ICT integration. However, the government should put in place a continuous and periodic training of all teachers and principals on computer and ICT skills acquisition.
- d) Come up with policies that encourage school principals to use ICT for

administration and management of schools more effectively need to be developed by the Ministry of Education. When policies are in place, the MoE may further develop an integrated framework for developing ICT competencies of guidance and counselling for both principals and teachers.

- e) The Board of Management (BoM) of public secondary schools may set aside funds for purchase of software and hardware components of computers and for security and maintenance.
- f) The principals of public secondary schools to be encouraged to develop positive attitudes towards ICT and participate in continuous training. The principals should encourage all staff to use ICT and be trained locally by KEMI and be sponsored by the BoM.
- g) Strengthen joint efforts among governments, educational authorities and teachers' organizations, business and industry to ensure availability of adequate ICTs at all levels of education;

5.5.3 Recommendations for Research

This study contributed to academia by developing a conceptual framework and formulating testable hypotheses. The conceptual framework shows the most important variables in ICT integration and its relationship to management of

secondary schools. The testable hypotheses could be a rich source of empirical studies. From the findings of this study it is recommended that there is a need for developing research and information exchange on the impact, role and limitations of ICT application in educational management.

5.6 Suggestions for Future Research

Based on the findings of this research it is necessary that systematized interventions are put in place for capacity building amongst secondary schools principals in the use of ICT for school administration and management. This will enhance efficiency and effectiveness in administration and management of secondary schools. It has become evident in the course of this investigation that further research needs to be carried out in the following related areas:

1. Replications of this investigation will need to be carried out five or six years from now to establish exactly what changes will have taken place in the use of ICT in administration and management of secondary schools.
2. There is need to conduct a research to assess the effectiveness of ICT in teaching and management primary schools. Data on such study would highlight the relevance of ICT in primary schools since the government is in the process of rolling out computers for class one pupils.
3. This study was conducted in the Nairobi county public secondary schools. There should be a comparable study to find out the level of

integration of ICT in public secondary schools in other counties in Kenya.

4. The findings of this study were limited to the public secondary school principals in Nairobi County in Kenya which is an urban setting and many of these principals have had wider access to information and communication technology. Thus, there is a possibility that the outcome of this study could not be generalized to the entire public secondary school principals in Kenya. Future studies could be carried out among principals in rural public secondary schools in Kenya. Hence, the results could provide a more complete scenario and a better generalization. This input eventually will be important for policy makers to implement information communication technology programs across the many public secondary schools in Kenya.

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APPENDIX 1: Transmittal letter

Susan Chepkonga
University of Nairobi
P.O Box 92
KIKUYU.

To The Principal -----

Dear Sir/ Madam,

RE: COLLECTION OF DATA

I am a Post Graduate student in the Department of Educational Administration and Planning of the University of Nairobi. I am carrying out a study on **‘Determinants of Principals’ Level of Integration of Information Communication Technology in Secondary Schools Management in Nairobi County.’**

I am requesting you to participate by completing the questionnaire as honest as possible and responding to the interview questions. The information you give will be used for the purpose of the research only while your identity will be kept confidential.

Your response will be highly appreciated.

Thank you in advance,

Yours faithfully,

Susan Chepkonga

0722647351

APPENDIX 2: Questionnaire for Principals

Section A: School profile

1. Which district is your school located? _____
2. Indicate the category of your school.
(a)BB [] (b) BD [] (c) GB []
(d) GD [] (e) MB [] (f) MDB []
3. In which year was your school established? _____
4. How many streams does your school have? _____
5. Is your school a) National [] (b) Provincial [] (c) District [] ?

Section B: Personal characteristics and other details

6. (i) What is your gender?
(a) Male [] (b) Female []
(ii) Do you agree that integration of ICT
7. What is your age bracket?
(a) 21-30 years [] (b) 31-40years []
(c) 41 -50 years [] (d) Over 50 years []
8. What is your highest academic qualification?
(a) Diploma []
(b) Degree []
(c) Others specify) _____

9. What is your highest professional qualification?

- (a) B.Ed [] (b) PGDE []
(c) M.Ed [] (d) PhD []
(e) Others (specify) _____

10. How long have you been a principal?

- (a) Less than 1 year [] (b) 1-5 years []
(c) 6-10 years [] (d) Over 10 years []

11. How long have you been a principal in your present school?

- (a) Less than 1 year [] (b) 1 - 5 years []
(c) 6- 10years [] (d) Over 10 years []

12. Have you ever taken an in-service course in ICT?

- (a) Yes [] (b) No []

13. If yes how has the in-service enhanced your performance in the aspects indicated below

Aspects	High	Moderately	None
a. School Administration			
b. Curriculum Implementation			
c. Financial Management			
d. Guidance and Counseling			
e. Management of school resources			

14. How long have you been using ICT for administration purposes?

- (a) Less than 1 year [] (b) 1-5 years []
(c) 6-10 years [] (d) Over 10 years []

15. Indicate in the table below the availability and adequacy of ICT facilities / resources for secondary school management.

Resource	Number	Adequate	Inadequate	Not available
a. Computer				
b. Printer				
c. Fax machine				
d. Overhead projector				
e. Mobile phones				
f. Scanner				
g. Computer laboratory				
h. Others (specify)				

16. To what extent are you using ICT to manage the following aspects of secondary school management?

Aspects	Highly	Moderately	Lowly	
a. School Administration: i. To make logical and timely decisions ii. Seeking information on rules and policies				
b. Curriculum Instruction: i. Classroom teaching ii. Analysis of exam results				
c. Financial Management: i. Fee payments ii. Balancing accounts				
d. Guidance and Counseling: i. Records of students ii. Records of topics/experts				

e. Management of school resources: i. Stores ledgers ii. Stores balance				
f. Human resource management: i. Resource details ii. Staff appraisal				

17. What are the factors limiting the integration of ICT by Principals of secondary schools in their management?

.....

18. What are the suggested solutions?

.....

19. Do you think that there are problems with the integration of Information and Communication Technologies (ICT) in the management secondary schools ? (Yes)..... (No).....

20. Kindly indicate the software you easily access in your work area for management of secondary schools. (Internet, email, word processing, spreadsheet, database, power point).

21. How often do you use ICT for sharing administrative information with teachers and other education stakeholders?

.....

22. How long do you spend (in hours) per week on computer for management of school. () 1-5 hrs, () 6-10hrs, () 11-15hrs, () 16-20hrs, () 21-25hrs

23. What are the consequences for Principals not using ICT: today and the future?

.....

.....

.....

(Tick the most applicable to your school in 21, 22, and 23)

24. How would you describe the level of integration of ICT for management at your school?

- i. Successful wide-scale implementation, (5)
- ii. Successful small-scale implementation, (4)
- iii. Progressing towards small-scale implementation, (3)
- iv. Highly prioritized for future implementation, (2)
- v. Non-existent, Other - please specify (1)

25. How would you describe the overall level of support amongst your school community for the integration of ICT?

- i. Very positive, (5)
- ii. Somewhat positive, (4)
- iii. Neutral, (3)
- iv. Somewhat negative, (2)
- v. Very negative) (1)

26. How effective do you personally perceive integration of ICT in improving management of secondary schools?

- i. Very effective, (5)
- ii. Somewhat effective, (4)
- iii. Neither effective nor ineffective, (3)
- iv. Somewhat ineffective, (2)
- v. Very ineffective. (1)

Section B: Principals attitude scale

The following is an attitude scale. Please rate the following statements using the key below.

Key:

For positively stated items (Nos.1-7)	Scores assigned
f) Strongly Disagree	5
g) Disagree	4
h) Undecided	3
i) Agree	2
j) Strongly Agree	1
For negatively stated items (Nos.8-14)	Scores assigned
f) Strongly Disagree	1

- g) Disagree 2
- h) Undecided 3
- i) Agree 4
- j) Strongly Agree 5

Please place a tick in the right box.

	Statements on attitude scale of integration of ICT	1	2	3	4	5
1	ICT is important in everyday life					
2	ICT is important for the progress of society					
3	I always look forward to working with computers					
4	I enjoy trying to solving problems using ICT during my free time					
5	I have always enjoyed studying ICT					
6	Computer lessons are easier to understand					
7	I am interested in acquiring further knowledge of ICT					
8	ICT is uninteresting in that it leaves no room for personal growth					
9	ICT is an area I find more difficult to understand					
10	I think society can develop perfectly well without ICT					
11	I do not like computer lessons					
12	I think ICT is not practical					
13	I can get along well in everyday life without ICT					
14	I work very hard to understand ICT					

Thank you very much for completing the questionnaire

APPENDIX 3: Observation Checklist for ICT Equipment and ICT Use

University of Nairobi

Susan Chepkonga

Date of visit_____

Category of school_____

Location of school/district

Category (a) physical verification of equipment

ICT equipment	In which room	Number	Use of ICT equipment for Management		
			Alw ays	Little	None
Digital; Cameras					
Pentium Computers					
Computer Network					
Laptops					
Class Computers					
Servers					
Printers					
Video cameras					
Scanners					
Projectors					

Category (b) Access to ICT facilities

- a. Electricity infrastructure.....
- b. Internet/e-mail infrastructure
- c. Printer.....
- d. Scanner.....
- e. Copier.....
- f. Fax machine.....
- g. Projector.....
- h. Surveillance camera.....

Category (c)

General application of ICT in school operations.....
.....

APPENDIX 4: Interview Schedule for Principals

Determinants of principals' level of integration of information communication technology in secondary schools management in Nairobi County, Kenya

Susan Chepkonga, PhD Research Student, Department of education administration and planning. School of Education, CEES, University of Nairobi, Kenya

Introduction

The purpose of this interview is to understand how the principal can be effective in integration of ICT by utilizing both computer hardware and software using ICT tools and techniques in the school environment.

No	Questions	Categories
(a)	Level of ICT usage by principals	Responses to the questions were sorted into :
1	In your opinion, which area of your administrative work is benefiting from the use of ICT?	Timetabling(TT) Financial Management(FM)
2	What are the benefits and Limitations derived from the use of ICT tools and techniques in administrative process?	Efficiency (EF) Accuracy(AC)Confidentiality (C)Timeliness(TL) Electricity(E) Security(SC) Storage(S) Untrained personnel (UP) Cost (C)
3	What are the main computer hardware and software you are using for administrative purposes?	Computer (C)Printer (P)Photocopying Machine (PM) Computer Packages (CP) Internet(I)
4	In what ways do you think your training needs are being met in terms of efficient usage of computer hardware and software provided by your school?	Highly(H) Moderately (M)Lowly(L)
5	Do you agree that integration of ICT in secondary school management is affected by gender?	

- 6 Does age influence the uptake of ICT integration?
- 7 Is academic qualification a requisite for ICT integration in management of secondary schools?
- 8 In your opinion what limits ICT integration in management of secondary schools?
- (b) ICT and registration of Students
- 1 How advantageous is the integration of ICT to: Efficiency (EF) Accuracy (AC) Timeliness(TL)
- i. Supporting admission of students?
 - ii. Registration of students?
 - iii. Verification of students payments?
 - iv. Management of student personal records?
- (c) Analysis of ICT influence on administrators' examination management
- 1 How efficient is reporting facilities of ICT in terms of managing academic records? Highly(H) Moderately (M) Lowly(L)1.
- Consider the following aspects
- i. Time/speed
 - ii. Effectiveness/ competence
 - iii. Ability to use
 - iv. Motivation
-

Thank you very much for your time and the information you have given me.

APPENDIX 5: List of Public Secondary Schools in Nairobi County

A. Dagoretti District

1. Dagoretti High
2. Dagoretti Mixed
3. Lenana School
4. Muthuini Secondary School
5. Nembu Girls
6. Rithimitu Girls
7. Rithimitu Mixed
8. Precious Blood
9. Moi – Nairobi Girls
10. Upper Hill School

B. Embakasi District

1. Dandora Secondary
2. Dr. Mwenje Secondary
3. Embakasi Girls Secondary
4. Kayole Secondary
5. Kayole South Secondary
6. Peter Kibukosya
7. Embakasi Garrison Secondary

C. Kamukunji

1. Kamukunji Secondary
2. Our Lady of Mercy Shauri Moyo
3. Eastleigh High
4. Maina Wanjigi Secondary
5. Moi Forces Academy
6. Uhuru Secondary

D. Kasarani

1. Baba Dogo Secondary
2. Kahawa Garrison Secondary
3. Kamiti Secondary
4. Ruaraka Secondary
5. Our Lady of Fatima Secondary
6. Ndururuno Secondary
7. Starehe Girls

E. Langata

1. Karen 'c' secondary
2. Olympic secondary
3. Langata high
4. Langata barracks
5. Raila Educational Centre – Mixed Day

F. Makadara

1. Aquinas High School
2. Buruburu Girls
3. Huruma Girls
4. Nile Road Secondary
5. Makongeni Secondary
6. Ofafa Jericho Secondary
7. Highway Secondary
8. Our Lady of Mercy South B

G. Njiru

1. Muhuri Muchiri Secondary School
2. Drumvale sec sch
3. Jehovah Jireh
4. Ushirika Secondary
5. Ruai Girls Secondary
6. St. George Athi Sec Sch – Mixed Boarding

H. Starehe

1. Starehe Boys Centre
2. Pumwani Boys Secondary
3. Pumwani Girls Secondary
4. St Teresa Boys Secondary
5. St Teresa Girls Secondary
6. Ngara Girls Secondary
7. Pangani Girls Secondary
8. Muranga Road Secondary
9. C.G.H.U Secondary
10. Ndururuno Secondary
11. Jamhuri High
12. Jacaranda Special school
13. Muslim Academy Sec School
14. Hon.Maina Kamanda

I. Westlands

1. Hospital Hill Secondary
2. Highrigde Secondary
3. Parklands Arya Girls
4. Nairobi School
5. Kenya High
6. State House Girls
7. St Georges Girls
8. Nairobi Milimani Secondary
9. Lavington Mixed
10. Kangemi Sec

Source : Ministry of Education

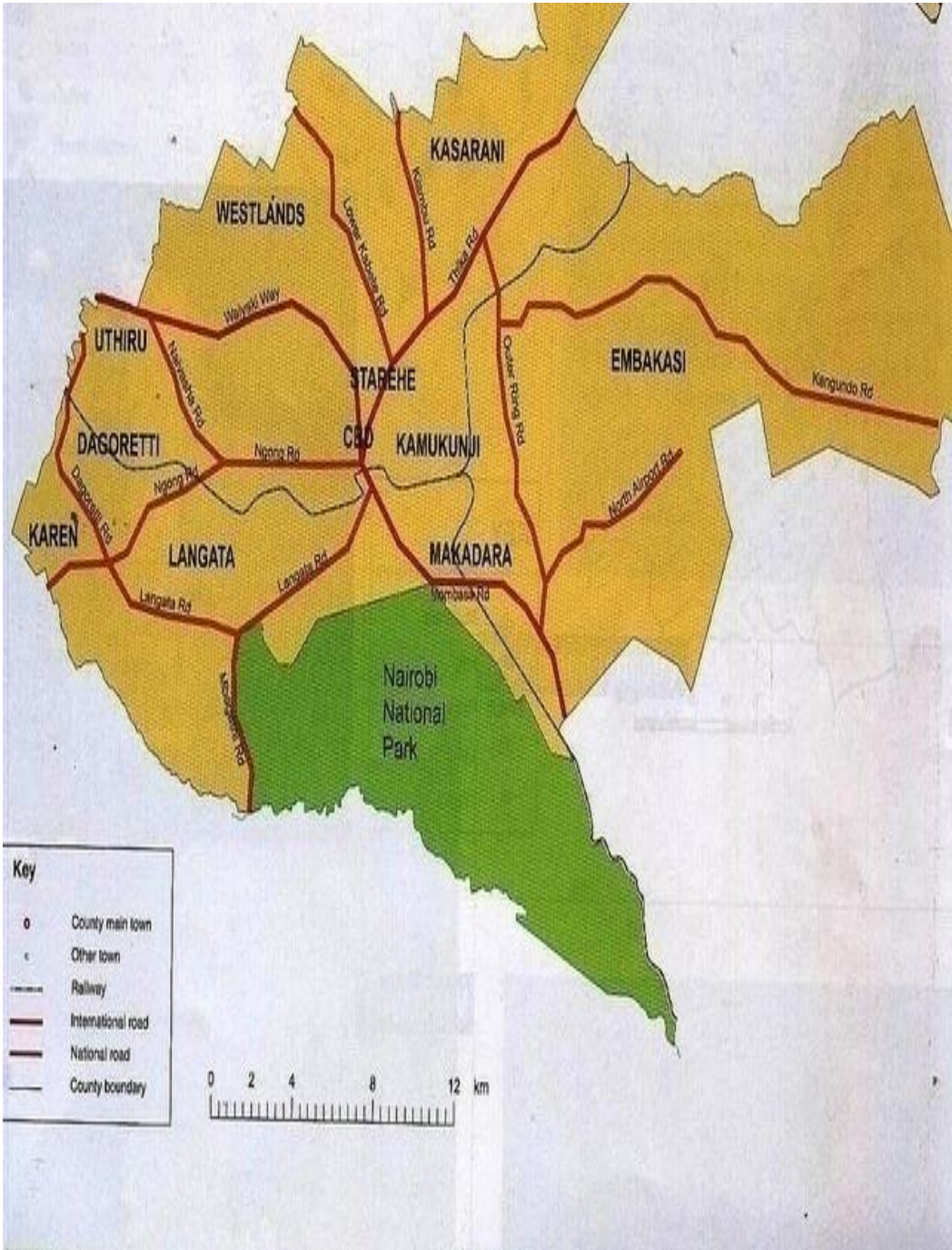
APPENDIX 6: Summary of Chi Square Tests Results

	Objectives	Hypothesis	Results	Comments
1	The first objective dealt with the relationship between principals' gender and the level of integration of ICT in the management of secondary schools in Nairobi County	Ho 1: There is no significant relationship between the principals' gender and the level of integration of information communication technology in management of secondary schools	df=2 Pearson $\chi^2 = 3.18$ P=0.204 at 0.05 level of significance	No significant relationship exists (Hypothesis accepted)
2	The second objective dealt with the relationship between principals' age and the level of integration of ICT in the management of secondary schools in Nairobi County.	Ho 2: "There is no significant relationship between the principals' age and the level of integration of information communication technology in management of secondary schools"	df=3 Pearson $\chi^2 = 10.22$ P=0.037 at 0.05 level of significance	A significant relationship exists (Hypothesis rejected)

3	The third objective dealt with the relationship between principals' educational level and the level of integration of ICT in the management of secondary schools in Nairobi County.	Ho 3: "There is no significant relationship between the principals' educational level and the level of integration of information communication technology in management of secondary schools"	df=2 Pearson $\chi^2 =$ 2.65 P=0.238 at 0.05 level of significance	No significant relationship exists (Hypothesis accepted)
4	The fourth objective dealt with the relationship between levels of training in ICT of principals and the level of integration of ICT in the management of secondary schools in Nairobi County.	Ho 4: "There is no significant relationship between the principals' level of training of principals in ICT and integration of information communication technology in management of secondary schools."	df=2 Pearson $\chi^2 =$ 38.34 P=0.000 at 0.05 level of significance	A significant relationship exists (Hypothesis rejected)


5	The fifth objective was to assess relationship between principals' level of access of ICT and their integration of information communication technology in the management of secondary schools	Ho 5: "There is no significant relationship between principals' level of access of ICT and their integration of information communication technology in the management of secondary schools."	df=2 Pearson $\chi^2 =$ 12.48 P=0.032 at 0.05 level of significance	A significant relationship exists (Hypothesis rejected)
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APPENDIX 7: Nairobi County Education Administrative Boundaries



APPENDIX 8: Authorization Letter

REPUBLIC OF KENYA



NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telegrams: "SCIENCETECH", Nairobi
Telephone: 254-020-241349, 2213102
254-020-310571, 2213123
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NAIROBI-KENYA
Website: www.ncst.go.ke

Our Ref: **NCST/RCD/13/011/81/5**

Date: **9th January, 2012**

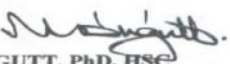
Susan Chepkonga
University of Nairobi
P. O. Box 30197
NAIROBI

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "*Determinants of principals' level of adoption of Information Communication Technology in secondary school management in Nairobi Province, Kenya*" I am pleased to inform you that you have been authorized to undertake research in Nairobi district Nairobi Province for a period ending **31st December 2012**.

You are advised to report to the **District Commissioners & the District Education Officers in selected districts in Nairobi Province** before embarking on the research project.

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



DR. M. K. RUGUTT, PhD, HSE
DEPUTY COUNCIL SECRETARY

Copy to:

The District Commissioner
Selected Districts in Nairobi Province

The District Education Officer
Selected Districts in Nairobi Province