

Influence of selected factors on the implementation of information and communication technology policy in public secondary schools in Naivasha Sub-county, Kenya

**Njoroge Ngugi Francis, Margaret Ngugi and Joab Kinzi
Laikipia University, Kenya**

ABSTRACT

The aim of this study was to examine the influence of selected factors on implementation of Information and Communication Technology in public secondary schools in Naivasha sub-county, Kenya. The study investigated whether the ICT infrastructural cost, schools' visions, and teachers' ICT skills hinder effective implementation of ICT policy in schools. The researcher adopted *ex post facto* research design whereby data was collected using a questionnaire for 32 Head teachers of public secondary schools and structured interview for the Quality Assurance and Standard Officers (QASO) from the Sub-county Educations office, Naivasha Sub-county. The population targeted in this study was all the Head Teachers of public secondary schools in Naivasha Sub-County. The Nominal scale data was analyzed through frequency counts and percentages while hypotheses were tested using simple regression statistic at $\alpha=0.05$ level of significance. The data was interpreted and findings were highlighted. Factors related to schools' visions on ICT policy have the highest negative impact on implementation of ICT policy compared to selected factors related to cost of ICT infrastructure and teachers skills in ICT. These findings imply that implementation of ICT policy in school depends on school's vision on ICT; where school strategic plan has clear vision and strategy of implementing ICT rather than the cost of ICT infrastructure or teachers' skills in ICT. Suggested further research area in ICT implementation is, the Head teachers' attitude toward implementation of ICT policy, and the influence of teacher's age factor and implementation of ICT policy.

Keywords: *ICT Implementation; ICT Infrastructure; ICT Policy; Schools' Visions; Teachers' skills*

BACKGROUND OF THE STUDY

The rapid growth in Information and Communication Technology (ICT) has brought remarkable changes in the twenty-first century (Kozma, 2005). This has drawn considerable international attention and especially in the developed countries where technology has permeated businesses, schools and homes (Kozma, 2005). ICT has affected all forms of demands of modern societies. It has radically changed how people live, work and play (Anderson, 2010). A country can only be part of this development if the education system deliberately focuses on knowledge, skills and attitudes that will prepare its youth for these changing trends (Anderson, 2010).

One of the Millennium Development Goals (MDGs) related to education is improving all aspects of the quality of education and ensuring that the set measurable outcomes like literacy, numeracy and life skills are achieved by all (KEMI, 2015). ICT is an important tool in achieving all the goals set in the millennium declaration (RoK, 2008). Consequently ICT is increasingly being introduced in varying degrees at all levels of education from preschool to university, in both formal and informal sectors (Blurton, 1999). Countries have been doing this through equipping schools with ICT infrastructure.

In developed countries like the United States, the ratio of students per computer was at 6:1 by 1997 while the number of schools with Internet access had reached 72% in the same year (Briggs, 2013). In Asia, similar developments were taking place. In Japan, by 1997, over 94% of public schools were computer-equipped and 10% were connected to the Internet (Briggs, 2013). In Singapore the results of the country's ICT master plan show great achievement which include students computer ratio of 4:1 in secondary schools (Twinomujuni, 2011). This is a very high ratio given that developing countries, Kenya included, are struggling with ICT implementation. Dzidonu (2010) says that the spread of the use of ICT to support education in most African countries is limited. This is because the student to computer ratio in educational institutions in some of these countries is as low as 20:1 (Dzidonu, 2010).

UNESCO initiated a project in Africa, whose aim was to equip a maximum of four teachers training colleges (TTC) in each of twenty countries with a computer and a full access to internet, as well as funding teacher training curriculum development with twenty national educational World Wide Web (WWW) sites (Eickelmann, 2011). This led to schools embracing a new tasks and duty to provide school going children with equitable opportunities to participate in the technologically growing society. The key strategy to achieve this was through formulation of ICT policy and implementation of the same in schools (Dzidonu, 2010).

In Kenya, the government acknowledges that education and training institutions can play a central role in creating a human resource base to enhance science and technology, and thus aid in the development of a knowledge economy (Hooker, et al, 2011). The government recognizes and appreciates that an ICT literate workforce is the foundation on which Kenya can acquire the status of knowledge-based-economy (MoE, 2005). There is a need then to empower learners with ICT literacy in order for the country to have early adopters of ICT.

The government of Kenya has been keen to utilize ICT to increase access to education for all Kenyans (EFA) (Makewa, Meremo, Role, & Role, 2013). In March 2004 the e-government strategy was designed and developed through government funding to provide common ICT framework and direction across public schools and all other sectors (MoE, 2006). The policy was intended to enhance collaboration in the development and implementation of ICT within and among government institutions. In line with these strategies the government formulated a national ICT policy. This provided the basis for the Ministry of Education to develop its sector policy on ICT in education. The MoE introduced the National ICT strategy for education and training in June 2006 (MoE, 2006). The overall objective of this policy in education is to integrate ICT in education management, teaching and learning.

To facilitate implementation of ICT policy the government has over the years invested heavily in installing ICT infrastructure in the country. There has been laying of fiber optic cable across the country; facilitation of growth of telecommunication, provision of computers, multimedia laboratories, connecting schools to Local Area Network (LAN) and other accessories. A case in point is the current Economic Stimulus Programme-ICT (ESP-ICT) project that aims at equipping 1050 schools with ICT infrastructure. The most important implementation strategy is capacity building of teachers in the area of ICT integration (Gitonga, 2013). The government has also embarked on funding the provision of high-speed and reliable Internet service. This is aimed at turning Kenya into a knowledge base economy by 2017 (Wakobi & Muthoki, 2013). The success of this can only be realized when schools will be connected to high speed reliable and affordable Internet.

However, in spite of the ICT education policy and the implementation strategies laid down by the government, the Ministry of Education did not anticipate specific challenges that were to hinder implementation of ICT (MoE, 2006). In the field, it has been observed that, many schools in

Naivasha have not implemented the policy; this is at a time when global technological changes have permeated all sectors including schools (Laaria, 2013). In Naivasha, research finding by Ngugi (2012) show that 50% of schools reported to have ICT tools like computers, TVs and radios but a great number of teachers and students rarely use them. Further, research findings by Nyaga (2014) shows that the effort by the MoE to sustain ICT implementation projects in secondary schools in the Nakuru County are minimal especially in rural districts. This meant that there are factors affecting implementation of ICT policy in Naivasha sub-county. This study therefore endeavored to examine the influence of selected factors on effective implementation of ICT policy in public secondary schools in Naivasha sub-county, Kenya.

The study was guided by the following specific objectives:

- i. To investigate the effects of ICT infrastructural cost on implementation of ICT policy in public secondary schools in Naivasha sub-county.
- ii. To assess the effects of schools' visions on implementation of ICT policy in public secondary schools in Naivasha sub-county.
- iii. To establish the role of teachers' skills in ICT on implementation of ICT policy in public secondary schools in Naivasha sub-county.

To achieve the objectives, the following hypotheses were tested at $\alpha=0.05$, level of significance:

H₀1: ICT infrastructural cost has no statistical significant effect on implementation of ICT policy in public secondary schools.

H₀2: Schools' visions on ICT has no statistical significant effect on implementation of ICT policy in public secondary schools

H₀3: Teachers' skills in ICT has no statistical significant role on implementation of ICT policy in public secondary schools

LITERATURE REVIEW

Concept of ICT Policy for the Education Sector

Education is an important tool in any form of development. It is expected to development skills which will enable individuals to live and contribute meaningfully for overall development of the society. For a nation to boast of educational development, it should have a functional ICT-driven-education in secondary schools since the world is getting digitalized very fast and globalization is the order of the day (Osakwe, 2006).

InfoDev (2010) indicates that ICT in the twenty-first century education has been implemented in a way that students live in a world that has an information explosion which is a significant socio-economic change. The speed at which ICT is being integrated in education sector and general availability of ICT tools for relevant information has expanded education opportunities even to marginalized areas.

Various governments in the world are now committed on promoting utilization of ICT in education. In South Asia, governments in these countries have formulated ICT policies which reflect on promotion of quality education through investing in ICT infrastructural facilities (Briggs, 2013). These facilities link schools' educational institutions and resource centers. Countries like Qatar, Oman and Jordan have specific curricula on ICT and specific related objectives related to ICT in lower and upper secondary levels (Briggs, 2013).

In Kenya, the government recognizes the positive effects of ICT in education (InfoDev, 2010). Effort to implement ICT policy was first initiated by publishing Sessional Paper No 1 of 2005. The aim of this policy document is to integrate ICT in the delivery of education curricula and promote effective and efficient educational management at all levels of education (MoE, 2005). In 2006, the government disseminated national ICT policy in education emphasizing that it will encourage adoption and use of ICT in schools. The aim of the government was to promote affordable ICT infrastructure, facilitate rural electrification and connect schools to electricity grid in order to support ICT integration in schools. Teachers and school managers were to be trained in the use of ICT through in-service courses as centres of excellence were set up where schools could draw parallel ICT implementation (KEMI, 2014). The success of this ICT policy and implementation plan ought to have been reflected in schools. It is in this light that this study endeavors to explore the influence of selected factors to the implementation of ICT policy in secondary schools.

Benefits of ICT use in Secondary Schools

Many research studies have revealed the enormous benefits that can be achieved by students, teachers and administrators where technology is applied in education (Laaria, 2013). ICT is used to improve the delivery and access to education. According to Peeraer and Peeraer (2011), ICT benefits schools in enhancing learning in classroom, improved management of school. It helps in timetabling, record storage, secretarial work like, typing staff meeting minutes, examinations and letters, improves accountability, efficiency and effectiveness in school activities, use of PowerPoint presentations and internet. This approach to ICT in education, Kozma (2005) suggests, can improve education on the margin by increasing the efficiency by which instructions are given.

ICT can be used to improve students understanding, improve the quality of education, and thereby increase the impact of education on the economy. Using ICT in education to produce ICT-literate students and a versatile, adaptable workforce is also consistent with the human capital theory of education (Andoh, 2012). Citing Hawkins (2002), Wims, and Lawler, (2007) state that workers must learn how to quickly acquire new skills. Adding the skills of the workforce in this way has the potential to benefit the economy at large and also improve the individual student's earning and chance of getting employed. Its use in education also contributes to knowledge creation, technology and technological innovativeness, and knowledge sharing. All these contribute to the transformation of education system and to sustain economic growth and social development (Kozma, 2005). Evidence shows that the use of ICT and its increasing acceptance and adoption by the society has provided opportunities and is seen as potential for promoting education on a large scale (InfoDev, 2010).

Education sector in some countries in Africa have benefited from the use of ICT to improve the efficiency of their operations. A case in Kenya is the automation of the selection and placement of secondary schools form one admission. The automation of the delivery of primary and secondary schools national examination results through posting of the results on the Ministry of education website (Dzidonu, 2010). In Nigeria, a study by Osakwe (2012), found consistently positive and moderately great achievements especially computer mediation in school subjects, particularly mathematics. The computer-assisted instructions were found more effective in all educational levels and with lower achieving students recording great improvement.

The use of ICT is changing schools and classrooms by bringing in new curricula based on real world problems. It is providing platform to strengthen learning, giving students and teachers more opportunities for feedback and reflection. ICT is making the world a global community that includes students, teachers, parents, practicing scientists, and other interested parties (Kozma & Anderson (2002). ICT can enhance the quality of education by increasing learner motivation and

engagement, by facilitating the acquisition of basic skills. ICT use in schools facilitates the transmission of basic skills and concepts that are the foundation of higher thinking skills and creativity (Aktaruzzaman, Rashedul, & CheKum, 2011). Like any other developing country, Kenya requires high skilled and creative generation. This will only be achieved if ICT is fully implemented in all secondary schools.

The greatest contribution of ICT use in classroom is transformation of learning environment into a learner centered one (Laaria, 2013). Research finding by Dzidonu (2013), indicated that students report higher attendance, motivation and academic accomplishment as a result of ICT programs. This creates new ways of teaching and learning rather than simply allow teachers and students to do what they had done before in the same way. These new ways of teaching and learning are underpinned by constructivist theories of learning and constitute a shift from a teacher centered pedagogy, which in its worst form, is characterized by memorization and rote learning – to one that is learner centered (Aktaruzzaman, Rashedul & CheKum, 2011).

Study by Laaria (2013) established that children enjoy learning using technology. This motivation may discourage students from dropping out of school because it makes school curriculum more interesting (Laaria, 2013). A research finding by Rebecca and Marshall, (2012) established that the use of Internet in schools for street children in Colombia enticed a higher than usual number back to classroom.

ICT implementation can further increase the benefits in schools like lowering the cost of education (Laaria, 2013). It increases efficiency in terms of manpower as one teacher can reach many learners through internet, interactive white board and use of video technologies (Aguyo, 2010). This would spare parents the agony of buying many textbooks because many of them would be available online. While these are the benefits of ICT integration in schools, there are factors which hinder the implementation of ICT policy so that schools are not reaping these benefits. As a result of this, the literature below will focus on factors that influence the implementation of ICT policy in schools.

Factors which Hinder Implementation of ICT in Secondary Schools

Some institutions have well formulated policies with achievable objectives and implementation framework. However, policies failures continue to be prominent in many schools, thus indicating that policy implementation puzzle remain unsolved (Kipsoi, Chang'ach, & Sang, 2012). Factors which affect implementation of policies should be addressed during policy formulation, at implementation level and after implementation.

There are factors which affect the implementation of ICT policy in schools. These factors are categorized as external and internal factors (Bo Hu, 2012). The external factors can affect the implementation of any type of policies. They include lack of equipment, unreliable equipment and lack of technical support (Bo Hu, 2012). Jo Shan Fu (2013) identifies other external factor and notes that they influence effective implementation of technology in schools. They include technology availability, accessibility to ICT equipment, time to plan for instruction, school vision on ICT and administrative support. The internal factors which influence ICT implementation relate to the teachers (Khan & Hossain, 2012). They include understanding of ICT use, beliefs and attitude towards ICT integration, teachers' intention and motive to use ICT, technological skills and readiness to use ICT (Bo Hu, 2012; Khan & Hossain, 2012; Jo Shan Fu, 2013). This subsection reviews literature related to cost of ICT infrastructure, school vision on ICT use and teachers' skills and attitude to ICT use. These factors have been identified as major factors which influence effective ICT implementation in schools (Laaria, 2013).

Cost of ICT Infrastructure and ICT implementation

A study by Aguyo (2010) shows that the use of ICT in school can be seen as cost effective especially in terms of manpower as one teacher can reach many learners through internet, interactive white board and video. However, the entire cost of acquisition of ICT tools including software, hardware, upgrading, maintenance and development remains high (Twinomujuni, 2011). Investing in ICT for schools might be perceived as an additional cost, and supporting significant ICT implementation is a problem experienced by many schools in developing countries (Laaria, 2013). Farrell (2007) argues that the high cost and maintenance of ICT infrastructure are the biggest challenge that has continued to affect adoption and implementation of ICT in schools. Lack of adequate funds to carry out educational activities in schools remains a reality in many schools in Kenya (Laaria, 2013). Hennessy, (2010) testifies that one of the greatest challenges in implementation of ICT in school is balancing educational goals with economic realities. School managers gamble with what is the priority when funds are not adequate (Twinomujuni, 2011). In the face of increased demand for educational resources, a number of schools are facing difficulties in supporting and meeting educational obligations like buying textbooks, feeding children, employing adequate qualified teachers (Dzidonu, 2010). This means that some schools have difficulties in devoting their limited educational budget to facilitating ICT infrastructure.

The implementation of ICT policy in schools demand resources, such as computers, printers, multimedia projectors and scanners and other accessories. These tools are not available in all the educational institutions. Besides, ICT requires up-to-date hardware and software and high-speed Internet connection (Gulbahar, 2007). These are key features in implementation of technology but they are not available in most public schools. In view of this, Mumtaz (2000) observed that lack of funds to obtain the necessary hardware and software is one of the reasons why teachers do not use technology in their schools.

According to National ICT in Education Strategy (MoE, 2006), most secondary schools have some computer equipment; however, due to high cost, this more often consists of one computer in the office of the school head. Very few secondary schools have sufficient ICT tools for teachers and students. Even schools that do have computers, the student-computer ratio is 150:1 (Farrel 2007). Research findings based on schools in Nakuru County indicate that it is due to financial constrains that most schools lack sufficient infrastructure to fully integrate ICT in their programmes (Nyaga, 2014). Farrel (2007) argues that students are not able to master information management skills because of lack of access to ICT infrastructure. Dzidonu (2010) noted that very few African schools and colleges provide free access to Internet for their teachers and students. However, without reasonable access to the Internet and improved bandwidth and wide spread access, most schools mayl never implement ICT policy.

While most of the research findings show that the high cost of ICT tools is a barrier to ICT implementation in school (Twinomujuni, 2011), others take a different position and consider cost of infrastructure as a less important factor. According to Farrel (2007), some 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. This may not be the case in all schools. Relying on support from parents and other development agencies to provide for ICT tools may leave many school unequipped with ICT tools. To contribute to the closure of this gap, this study will investigate the extent to which the cost of ICT infrastructure has hindered implementation of ICT in schools.

Schools Visions of ICT

A study carried out by Anderson and Dexter (2000) has pointed out that a school's ICT vision is essential to effective ICT implementation. They observed that there are educational institutions

with ICT facilities but had not integrated them effectively due to lack of a proper vision and plan (Anderson & Dexter, 2000).

A school vision for ICT describes a point in time when ICT systems electronic materials, teaching and learning methods and curriculum organization will reach a level where significant learning outcome for students will have been achieved (Gareth, 2008). Due to lack of school vision on ICT, many schools have no guidelines to support school's curriculum like teaching and learning. Where technology is available without ICT vision, teachers using these technologies in their teaching process do so in what is described as 'standard and guideline" vacuum (Dzidonu 2010). Most of schools in Australia recognize the potential of ICT in transforming all aspects of school education and contribute to achieving all learning goals (Galatis, & Williams, 2009). These schools have therefore adopted some action plan for ICT. The main objective of the action plan is to implement the National ICT policy. Schools have achieved these by putting in place their own ICT policy commitment to deliver and support ICT infrastructure, support teachers' professional development and provide ICT educational tools. Examining the school policy with respect to ICT integration from principals' perspective in Ireland, Jo Tondeur, et al, (2008) found out that school-related policy, such as ICT plan, ICT support and ICT training have a significant effect on use of ICT in schools. Their findings indicate that failure of ICT implementation is often underdeveloped and underutilized of school policy on ICT.

The Ministry of Education in Kenya acknowledges that the implementation of ICT policy needs to be based on an understanding of the total ownership of the policy by individual schools (Farrel, 2007). This involves putting into practice the prescribed computer studies curriculum at school level. The success of implementation at school level is in preparing a good foundation of ICT studies among the school stakeholders (Muriithi, et al, 2013). This can be achieved through creating a shared vision. All stakeholders must have a common understanding of ICT instructions and ICT plan in the school (El Abhour, Hildebrandt, Puckett, 2014). Successful implementation of ICT requires strategic planning. Nyaga (2014) found out that the trend in some schools in Nakuru County, Kenya is that computer Labs have been built and computers procured but no plans put in place to use them. School leaders must envision new ways of meeting school objectives within a technologically rich environment (El Abhour, Hildebrandt & Puckett, 2014). If the heads of institutions in Naivaasha Sub-county would envision the need for implementation of ICT policy in their schools, curriculum delivery can be supported and enrich public secondary schools.

THEORETICAL FRAMEWORK

This study was guided by Diffusion of Innovation Theory (DOI) of Rogers (2003). Diffusion is the process by which an innovation is adopted and gains acceptance by members of a certain community. According to Surry (1997) Everret M. Rogers is the closest any researcher has come to presenting a unified theory of diffusion. The most recent theory of diffusion related to implementation of technology presented by Rogers is Diffusion of Innovation Theory. In this theory there are variables of innovations that guide adoption of any innovation. These variables include advantage, compatibility, triability and observability of innovation (Rogers, 2003). Advantage is the degree to which an innovation is perceived to be better than the idea it supersedes. When a school has more pressing financial commitment to deal with, the cost of ICT infrastructure will be a relative advantage and so will hamper ICT implementation. Compatibility is the degree to which an innovation is perceived as consistent with the existing value. Lack of compatibility in ICT with the needs of a teacher may negatively affect his or her use of ICT (Sahin, 2006). It may influence teacher's opinion, belief, values and views about using ICT and this will hamper implementation of ICT policy. Observability is the degree to which the results of an innovation are visible to others. The benefits of ICT in schools must be observed so as to encourage the stakeholders to implement the same in their schools. There are problems which

affect the policy implementers' likelihood to adopt the new technology in their schools (Korplainen, 2011). This study considered the cost of ICT infrastructure, schools' visions for ICT and teacher's skills in ICT as possible factors influencing ICT implementation in public secondary schools in Naivasha sub-county. As demonstrated in the figure below the factors were conceived as the independent variables and they determine the implementation of ICT policy in public secondary schools.

Independent variables Dependent variable

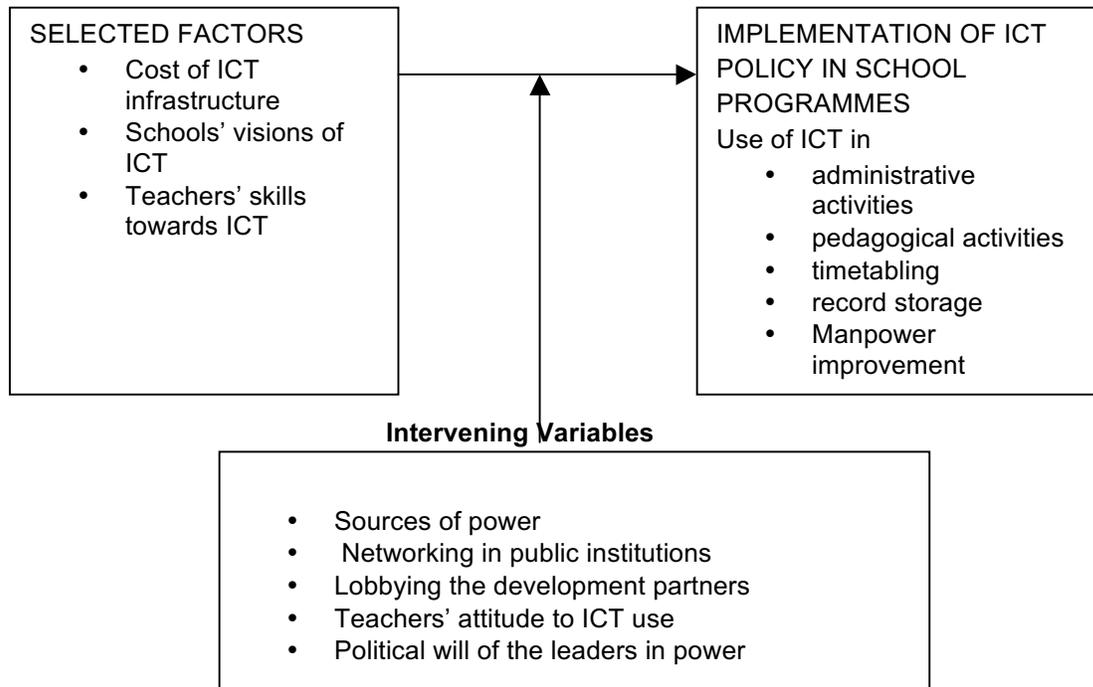


Figure 1: Concept Map of the Relationship among Variables

RESEARCH DESIGN

The study used *ex post facto* research design to investigate the influence of the cost of ICT infrastructure, schools' visions on ICT and teachers' skills in ICT on implementation of ICT policy in public secondary schools. The instruments employed in the study were: questionnaire and interview schedule. The questionnaire was used to solicit information from the head teachers while interview in this research involved Quality Assurance and Standard Officer (QASO)-Ministry of Education at Sub-county office. To establish the reliability of the questionnaire, split-half technique was used where two halves of the same questionnaires were correlated. The level of reliability coefficient was calculated, it came to 0.8 where the questionnaire was accepted as reliable.

The study population comprised of all 32 Head teachers of public secondary schools in Naivasha Sub-county. These are the stakeholders who are directly involved in school policies and policy implementation. The sub-county has 52 secondary schools, 32 of which are public schools and

20 are private secondary schools. This consisted of $32/52 \times 100 = 61.5\%$ of all secondary schools in the sub-county.

Data analysis was done using descriptive and inferential statistics with the help of Statistical Package for Social Sciences (SPSS) 22.0 for Windows. Descriptive statistical analysis involved the use of means and percentages. Simple regression analysis was used to determine whether the ICT infrastructural cost, schools' visions of ICT and teachers' ICT skills predicts the implementation of ICT policy in school programmes. A summary of the method of statistical analysis is outlined in Table 1.

Table 1: Data Analysis Matrix

Hypothesis	Independent Variables	Dependent Variable	Method of Analysis
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Ho1: ICT infrastructural cost has no statistically significant effect on implementation of ICT policy programmes in public secondary schools.

Ho2: Schools' visions on ICT have no statistically significant effects on implementation of ICT policy programmes in public secondary schools.

Ho3: Teachers' skills on ICT has no statistically significant role in implementation of ICT policy programmes in public secondary schools.

RESULTS AND DISCUSSION OF THE RESEARCH FINDINGS

The study aimed at investigating the extent which the cost of ICT infrastructure, schools' visions towards ICT and teachers' skills in ICT have on implementation of ICT policy in secondary school.

Effects of the Cost of ICT Infrastructure on Implementation of ICT Policy

In the above aspect, I intended to establish the extent to which the cost of ICT infrastructure affects the ICT policy implementation in the public secondary schools in the study area. To accomplish this task, the following Research Objective (RO) was formulated; to investigate whether the cost of ICT infrastructural for instance the cost of connecting schools to the national electricity grid, the cost of computers and computer accessories and overhead projectors has effect on implementation of ICT policy in public secondary schools in Naivasha sub-county. In order to achieve the research objective, respondents' mean scores on specified items related to effects of the cost of ICT infrastructure were computed and summarized in Table 2.

Table 2: Respondents' Mean response on Effects of the Cost of ICT Infrastructure

Factors N		Mean
The school is connected to national electricity grid	29	4.31
The cost of installing internet is high for this school	28	3.39
The cost of maintaining internet in this school is not sustainable	29	2.69
The cost of computers is very high for this school	29	3.38
The cost of running an email address is not sustainable	29	1.76
The school cannot manage to buy overhead projectors for e-learning	29	2.34
The school has budgetary allocation for repair and maintenance of ICT tools	27	3.30
Investing in ICT infrastructure is an additional cost on the existing strained school budget	29	3.31
Maintaining up-to-date software and programmes for electronic activities in school is expensive to sustain	29	3.14

Observations of data in Table 2 reveal that almost all the schools under the study were connected to national electricity grid (mean= 4.31) However most of the respondents agreed that the cost of installing internet in schools is high (mean= 3.39). Most of the respondents further agreed that investing in ICT infrastructure was an additional cost on the existing strained school budget (mean=3.31) and maintaining up-to-date software and programs for electronic activities in school was expensive to sustain (mean=3.14). This implied that the high cost of ICT infrastructure had hindered the implementation of ICT policy in the schools under study. This observation is in line with the report of the interviewee, who affirmed that schools in the area of study are not connected to the Internet and have inadequate computers to sustain effective implementation of ICT policy.

To further achieve this objective, the following hypothesis was formulated and tested at $\alpha=0.05$ level of significant by use of simple regression analysis:

H₀1: ICT infrastructural cost has no statistical significant effect on ICT policy implementation in public secondary schools in Naivasha Sub-county.

The hypothesis presumed that factors related to the cost of ICT infrastructure had no statistically significant influence on implementation of ICT policy. To confirm this assumption, responses on the 9 Likert items in Section B of the instrument were analyzed through simple regression analysis whose results are summarized in Table 3.

Table 3: Regression Analysis Summary between cost of infrastructure and implementation of ICT policy in public secondary schools

Variable	B	Std. Error	Beta	T	Sig
(Constant)	3.327	.159		20.925	.000
Cost of Infrastructure	-.010	.005	-.360	- 1.969	.060

(R= .360, R²= .130, F= 3.877)

The data in Table 3 shows that there was an association ($\beta = -.360$) between cost of infrastructure and implementation of ICT policy although the relationship was statistically insignificant ($p > .05$). The computed F-value was statistically insignificant ($F = 3.877$; $p > .05$). The two statistical indices indicate the cost of ICT infrastructure and level of implementation of ICT policy were linearly related although the relationship was statistically not significant. The generated R^2 value of .130 further implies that 13% of total variation in the implementation of ICT policy was linked to variance in the selected factors of the cost of ICT infrastructure. Thus, unfavourable factors of cost of ICT infrastructure were lowering level of implementation of ICT policy 13%. Based on this fact the relationship between the cost of ICT infrastructure and implementation of ICT policy was statistically insignificant, H_{O1} was retained as insignificant and conclusion made that the two variables were statistically independent. This implied that the selected factors of the cost of ICT infrastructure were not strong predictors of effective implementation of ICT policy in public secondary schools.

Effects of Schools' Visions on Implementation of ICT Policy

The second aspect sought to identify the extent to which the schools visions affect the implementation of ICT policy in the public secondary schools in the study area. To accomplish this task, the following Research Objective (RO) was formulated; to assess the effects of schools' visions on implementation of ICT policy in public secondary schools in Naivasha sub-county.

In order to achieve the research objective, respondents' mean scores on specified items related to effects of the schools' visions on implementation of ICT policy were computed and summarized in Table 4.

Table 4: Respondents' Mean Response on Effects of the Schools' Vision on Implementation of ICT policy

Factors N	Response Mean
The school has a 5-year strategic plan	29 4.34
The 5-year strategic plan has clear vision of ICT implementation in the school	29 3.17
The school has an existing school ICT policy which is in line with National ICT policy	29 2.90
The school has no Elaborate plan for ICT implementation	29 2.76
The school has in place clear goals and objectives for implementation of ICT	29 3.10
The school envisions the need for regular training of teachers in ICT as a staff development programme	29 3.45
The school management is committed to the acquisition of ICT tool within a given duration	29 3.76
The school has plans for the installation of ICT infrastructure	29 3.69
Strategies have been put in place to sensitize the school stakeholders on need to implement ICT policy in school	29 3.59

A look at the data in this table, reveal that out of eight selected factors related to schools' visions on implementation of ICT policy, seven factors had minimal negative effect on implementation of ICT policy. This was supported by the schools having the 5-year strategic plan (mean=4.34) and that the strategic plan had clear vision of ICT policy implementation (mean=3.17). There was commitment of the management to the acquisition of ICT tools (mean=3.76) while the school

managements envisioned the need for regular training of teacher in ICT (mean=3.45). However a drop in the mean of whether the strategic plan has clear vision of ICT policy implementation in the school (mean=3.17) implied that some schools had no timeframe for implementing ICT policy. This was further indicated by continued drop in the mean on whether the schools had existing ICT policy which is in line with national ICT policy (mean=2.90).

To further achieve this second objective, the following hypothesis was formulated and tested at $\alpha=0.05$ level of significant by use of simple regression analysis:

H₀2: Schools' visions on ICT has no statistical significant effect on implementation of ICT

Policy in public secondary schools

The hypothesis presumed that factors related to schools' visions on ICT had no statistically significant influence on implementation of ICT policy. To confirm this assumption, responses on the 9 likert items in Section C of the instrument were analyzed through simple regression analysis whose results are summarized in Table 5.

Table 5: Regression Analysis Summary between Schools' visions and implementation of ICT policy in public secondary schools

Variable	B	Std. Error	Beta	T	Sig
(Constant)	.718	.680		1.057	.300
Schools' Visions on ICT	.724	.195	.589	3.714	.001

(R= .589, R²= .347, F= 13.796)

The data in Table 5 clearly shows that there was a positive association ($\beta= .589$) between cost of infrastructure and implementation of ICT policy and the relationship statistically significant ($p<.05$). The computed F- value was statistically insignificant ($F= 13.796$; $p<.05$). The two statistical indices indicate factors related to the schools' visions on ICT and level of implementation of ICT policy were linearly related and the relationship was statistically significant. The generated R² value of .347 implies that 34.7% of total variation in the implementation of ICT policy was linked to variance in the selected factors of the schools' vision on ICT. This meant that factors with low means had high negative effect on implementation of ICT policy.

The foregoing findings were consistent with study done in Ireland by Jo Tondeur, et al, (2008) which observed that the school policy such as ICT plan with respect to ICT implementation from head teachers' perspective, have a notable effect on use of ICT in schools. They further observed that the reason for the failure of ICT implementation is often underdeveloped and underutilized of school policy on ICT. The findings were further supported by the interviewee's report which indicated that one of negative effect of ICT implementation in the area of this study was that the strategic plan at the sub-county level did not provide plan for the implementation of ICT policy in public secondary schools.

Implications

The results discussed above imply that if the factors related to cost of ICT infrastructures were addressed for instance lowering the cost of internet connection in schools and making the cost of computers affordable to schools the implementation of ICT policy in public secondary schools

may increase by 13%. This was consistent with the argument of Farrell (2007) in his survey of ICT and education in Kenya and research findings by Nyaga (2014) based on schools in Nakuru County which indicated that it was due to financial constraints that most schools lack sufficient infrastructure to fully integrate ICT in their programmes.

Based on these facts the relationship between the schools' visions on ICT and implementation of ICT policy was statistically significant and the null hypothesis was rejected and conclusion made that the two variables were statistically dependent. This implied that the selected factors of the schools' visions on ICT were strong indicators of effective implementation of ICT policy in public secondary schools. Factors like schools having elaborate plan for ICT implementation, the need for regular training of teachers in ICT and commitment to acquiring ICT tools should be addressed so as to increase implementation of ICT policy in public secondary schools.

CONCLUSION

This study found that factors related to schools' vision on ICT policy have the highest negative impact on implementation of ICT policy compared to selected factors related to cost of ICT infrastructure.

Factors related to the cost of ICT infrastructure with the highest negative effect to implementation of ICT policy were the cost of computers and installing internet in schools indicated as additional costs on the existing strained budgets of most of the schools while those with the lowest negative effect were schools connection to national electricity grid as most of respondents agree that the cost running an e-mail being sustainable in their schools.

Factors related to the schools' visions on ICT with the highest negative effect to implementation of ICT policy were schools with no clear vision of ICT implementation and school having no ICT policy which is in line with National ICT policy. Factors with lowest negative effect were schools having 5- years' strategic plan though most these strategic plans had no clear vision of ICT implementation.

Based on results from hypotheses testing, it was further concluded that the selected factors related to schools' visions are strong predictors of implementation of ICT policy in public secondary schools.

On the basis of the findings from the study, the following recommendations were arrived at: Although the results of the study indicate that the cost of ICT infrastructure as insignificant to implementation of ICT in secondary schools the negative factors should be addressed by both the schools in the study area and the Ministry of Education. The Ministry of Education should finance vote head for the acquisition of ICT infrastructure like internet connection and purchase of teaching and learning programs. In addition, schools management should allocate funds for repair and maintenance of the available ICT tools in schools.

The study also observed that selected factors related to schools' visions were comparatively the major hindrance to implementation of ICT policy in secondary schools in the study area. In this regard, the negative factors related to schools' visions need to be addressed so as to make the implementation of ICT policy a reality. This can be achieved through schools reviewing their strategic plans to include ICT policies with clear goals and objectives. The schools should plan for the installation of ICT infrastructure as well as envisioning the need for regular training of teachers in ICT as a staff development program. The school management should be committed to

acquisition of ICT tools within a given duration. The study suggests further research in area through a follow up study conducted on teachers' attitude on ICT implementation.

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