AN INVESTIGATION IN TO THE STATUS OF KENYA'S INFORMATION COMMUNICATION TECHNOLOGY (ICT) POLICY IN THE EDUCATION SYSTEM

Obonyo Paul Muga[i]
Moi University,
Kenya

Abstract:

While it is apparent that the information revolution has changed the way the world learns, conducts business or governs, there is a compelling divide between the digital 'Haves' and the 'Have nots'. Despite the many initiatives taking place in our educational institutions, there is no uniformity in the adoption and implementation of ICTs in our secondary schools. The central problem of this study was the vexed question of the status of the Kenya National ICT Policy on Education and Training. The study adopted a descriptive research design which involved collecting data in order to determine the status of ICT Policy in Education and Training in Kenya. Out of a target population of five ICT experts in the Ministry of Education Science and Technology, six from Kenya Institute of Curriculum Development, seven from Teachers' Service Commission and eight from Computer for Schools Kenya, all the respondents were purposively sampled giving a total of 26 respondents. The sample responded to items in the research instruments which were administered by the researcher. The instruments were Questionnaires and Interview Schedules for TSC ICT Department, Ministry of Education ICT Department, Kenya Institute of Curriculum Development Media Department and Computer for Schools Kenya officials. The researcher visited all the three sections of the Ministry of Education and the Computer for Schools Kenya offices and administered the instruments. The vast field of collected data was condensed and summarized before being analyzed using statistical methods such as the mean, percentages, frequency tables and graphs. The findings of the study have shown that Kenya adopted her ICT Policy on Education and Training in the year 2006. It further emerged that the Ministry of Education developed ICT curriculum for secondary schools in 1996. The study noted that computer studies are optional and most public secondary schools lacked the facilities needed for the subject. This means that computer curriculum could not be implemented in most secondary schools and the objective of making all secondary schools graduates computer literate is far from being achieved. Most teachers were found to be computer illiterate thus hindering the use of

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[i] Correspondence: email obonyo.paul@yahoo.com, paulobonyo8@gmail.com

computers in secondary schools as an instructional tool. For effective implementation of the National ICT Policy on Education and Training, the study noted that the government re-look into the ICT policy on education and training and come up with clear-cut implementation strategies and policies. The government should ensure that computer studies are made a core unit in secondary schools and in all teacher training programs. It was also noted that the government should fast track the digitization of the curriculum and provision of e-books to all secondary schools for equitable access. This would ensure uniformity in the ICT policy on education and training implementation process and help the government to achieve her objective of making all secondary schools graduates computer literate.

Keywords: ICT policy; education and training

1. Introduction

Globalization and technological change-processes that have accelerated in tandem over the past twenty years have created a new global economy powered by technology, fueled by information and driven by knowledge (US Department of Labor, 1999). The emergence of this new global economy has serious implications for the nature and purpose of educational institutions.

As the half-life of information continues to shrink and access to information continues to grow exponentially, schools cannot remain mere venues for the transmission of prescribed set of information from teacher to student over a fixed period of time. Rather, schools must promote "learning to learn" that is, the acquisition of knowledge and skills that make possible continuous learning as a lifetime. The illiterate of the 21st century according to futurist Alvin Toffler, "*will not be those who cannot read and write but those who cannot learn, unlearn and relearn*" (Thornburg, 2000). The International Labor Organization defines the requirements for education and training in the new global economy supply as "Basic for All", "Core Work Skills for All" and "Life Long Learning for All" (ILO, 2002). Information and communication technology (ICTs) which include radio and television as well as digital technologies such as computers and internet have been touted as potentially powerful enabling tools for educational change and reform. When used appropriately, different ICTs are said to help expand access to education, strengthen the relevance of education to the increasingly digital work place and raise educational quality by, among others, help make teaching and learning into an engaging, active process connected to real life (Farrel, 2007).

However, the experience of introducing different ICTs to the classroom and other educational settings all over the past several decades suggest that the full realization of the potential education benefits of ICTs is not automatic. The effective integration of ICT into education system is a complex multifaceted process that involves not just technology, but curriculum and pedagogy, institutional readiness, teacher competencies and long term financing.

It is apparent that the information revolution has changed the way in which the world learns, conducts business or governs but there is a compelling divide between the digital 'Haves' and the 'Have nots'. This divide is represented by unevenly diffused infrastructure between developed and developing countries and compounded by the cost of provision of basic tools as well as rapid changes in the nature of information technology. If used wisely, ICTs can provide a solution to these inequities as it can be a source of digital diversity and opportunity rather than a division (Thornburg, 2000).

Developing African countries can achieve the goal of a literate society by putting in place appropriate educational policies and programs and by modifying the necessary financial resources for implementation. Countries with the right policies and strategies set within the required enabling and facilitating environment can transform their economies and societies as part of meeting the challenges of globalization and the emerging information age (Dzidomu, 2002).

Until 2006, there was no serious legislation to regulate and facilitate the ICT sector in Kenya. An ICT policy was drafted in 2006 to seal this gap. However, that too is wanting in many fronts. A thriving ICT sector can only thrive with supporting legislations. The Kenya National ICT Policy part 5 sets the overall government objective for the sector as to optimize its contribution to the development of Kenyan economy as a whole by ensuring the availability of efficient, reliable and affordable telecommunication services throughout the country. One of its set targets was to provide all primary schools with affordable internet access by the year 2015; and all secondary schools and tertiary institutions to affordable internet access by the year 2010, and to establish internet access nodes at all district headquarters by the year 2010 (ICT Policy, 2006).

This provided the Ministry of Education with an impetus to develop its sector policy on ICT in education. The ministry moved quickly and in the same year 2006, introduced the National ICTs Strategy for Education and Training which aims to integrate ICT in to education and training system and to promote and enable education reform (MoE, 2006). One of its visions was to create an e-enabled and knowledge based society by 2015.

However, the Ministry of Education Policy Framework indicate that there are a number of challenges concerning access to and use of ICTs in Kenya, including but not limited to high levels of poverty, limited rural electrification and frequent power blackouts. Most secondary schools had some computer equipment; however this could consist of one computer in the principals' office. Very few schools had sufficient ICT tools for teachers and students. Even in schools that have computers, the student computer ratio is 150:1 (Fareel, 2007). Attempts to set up basic ICT infrastructure in primary schools were almost negligible until 2013 when the Jublee government pledged to provide free laptops to all class one pupils by January, 2014. This noble idea has since been abandoned. The core problem is that Kenya lacks adequate connectivity and network infrastructure. It is against this background that the study sought to find out the status of ICT policy in education in public secondary schools in Kenya with a view of making suggestions for its improvement and implementation.

1.2 Purpose of the Study

This study evaluates the status of the National ICT Policy on Education and Training and proposes a strategy to enhance the implementation of the use of ICT in teaching and learning in secondary schools in Kenya.

1.3 Objectives of the Study

1) To examine the extent of ICT use in secondary schools in Kenya.
2) To evaluate policy guidelines for ICT use in secondary schools in Kenya.
3) To determine the challenges facing the implementation of ICT Policy in Education and Training.

1.4 Research Questions

1) What kinds of ICTs are commonly used in teaching and learning in secondary schools in Kenya?
2) What is the level of ICTs literacy among secondary school teachers in Kenya?
3) What are the policy guidelines for ICT use in secondary schools in Kenya?
4) What are the factors limiting the implementation of ICT in secondary schools in Kenya?

2. Literature Review

Various sources of literature were consulted for the purpose of this study. The following themes were explored.

2.1 The Role of ICTs in Education

ICTs are tools that facilitate the production, transmission and processing of information. It includes all digital devices and techniques used by organizations and individuals to create, capture, organize, package, store or disseminate and dispose information (Blurton, 2002; Kwanya, 2009). According to World Bank Report (2002), ICT is defined as consisting of hardware, software, networks and media for collection, storage, processing, transmission and presentation of information. These include computers, radio, electronic mail, robots, scanners, calculators, cameras, the internet and telephony. One of the most commonly cited reasons for using ICTs in the classroom has been to better prepare the current generation of students for the work place where ICTs particularly computers, the internet and related technologies are becoming more and more ubiquitous. Technology literacy or the ability to use ICTs effectively and efficiently is thus seen as representing a comparative edge in an increasingly globalizing job market (Kwanya, 2009). Technological literacy, however is not the only skill well-paying jobs require. EnGauge of the North Central Regional Educational Laboratory (US) has identified what it calls "the 21st Century Skills" which includes digital age literacy (consisting of functional literacy, visual literacy, scientific literacy, information literacy, cultural literacy and global awareness), inventive thinking, higher

order thinking and sound reasoning, effective communication and high productivity (EnGauge, 2002).

The potential of ICTs to promote acquisition of these skills is tied to its use as a tool for raising educational quality including promoting a shift from teacher centered to learner centered learning environment. Improving the quality of education and training is a critical issue in Kenya particularly during this time of educational expansion. According to Kwanya (2009) ICTs can enhance education in the following ways;

A. Increasing Access to Education

ICTS have the potential for increasing access to and improving the relevance and quality of education. It thus represents a potentially equalizing strategy for developing countries. One of the greatest hardships endured by the poor and by many that live in the developing countries like Kenya is their sense of isolation. ICTs promise to reduce that sense of isolation and to open access to knowledge in ways unimaginable not long ago (World Bank, 1998).

The judicious use of ICTs can alleviate shortages of teachers, and physical materials can be cost effective when compared to building new physical infrastructure. One characteristic of the education system is the pervasive resource discrepancy between urban and rural schools. This in turn leads to low students' performance and achievement with many rural areas facing a chronic gap information deficit. ICTs can alleviate these discrepancies by providing all students with access to modern pedagogic methods and knowledge (World Bank, 2004). ICTs have the ability to transcend time and space, and can make possible asynchronous learning or learning characterized by a time lag between the delivery of instruction and its reception by learners. Online course materials, for example, may be accessed 24hrs 7days a week. ICTs based delivery also dispenses with the need for the learners and the instructors to be in one physical location. Additionally, certain types of ICTs such as teleconferencing technologies enable instruction to be received simultaneously by multiple geographically dispersed learners (synchronous learning) (Kwanya, 2004).

Teachers and learners have to no longer rely solely on printed books and other materials in physical media housed libraries (and available in limited quantities) for their educational needs. With the internet and World Wide Web (www), a wealth of learning materials in almost every subject and in a variety of media can now be accessed from anywhere any time of the day by unlimited number of learners. ICTs can facilitate access to resource persons such as professional mentors, experts, researchers and peers all over the world.

B. Facilitating the Acquisition of Basic Skills

The transmission of basic skills and concepts that are the foundation of higher order thinking skills and creativity can be facilitated by ICTs through drill and practice. Educational television programs such as Sesame stress the use of repetition and reinforcements to teach the alphabet, numbers, colors, shapes and other basic concepts. Most of the early uses of computers were computer based learning (also called

computer assisted instruction) that focused on mastery of skills and content through repetition and reinforcement.

C. Motivation of Learners

ICTs such as videos, TVs and multimedia computer software that combine text, sound and color moving images can be used to provide challenging and authentic content that will engage the student to the learning process. Interactive radio, likewise makes use of sound effects, song, dramatization and comic kits and other performance conventions to compel the students to listen and become involved in the lesson being delivered. Networked computers with internet connectivity can increase learner motivation as it combines the media richness and intractability of other ICTs with the opportunity to connect with real people and to participate in real world events.

D. Enhancing Teacher Training

ICTs have also been used to improve access to and the quality to teacher training. For example, institutions like the Cyber Teacher Training (CTTC) in S. Korea are taking advantage of internet to provide better teacher professional development opportunities to in-service teachers. The government funded CTTC established in 1997, offers self-directed, self-spaced web–based courses for primary and secondary school teachers (Jung, 2002). In China, large scale radio and television based teacher education has for many years been conducted by the China Central Radio and TV University, the Shanghai Radio and TV University and many other RTUVs in the country. At India Gandhi National Open University, satellite based one way video and two way audio-conferencing was held in 1996 supplemented by print-materials and recorded video, to train 910 primary school teachers and facilitators from 20 district training institutions in Karnataka state. The teachers interacted with remote lecturers by telephone and fax (World Bank, 2004). At Kenyatta University in Kenya there exist teacher training programs conducted through Africa Virtual University (AVU) and the KU Digital School.

Research has shown that appropriate use of ICTs can catalyze the paradigmatic shift in both content and pedagogy that is at least of education reform in the 21st century (Bransford, 1999). If designed and implemented properly, ICT supported education can promote the acquisition of knowledge and skills that will empower students lifelong learning. When used appropriately, ICTs especially computers and internet technologies enable new ways of teaching and learning. These ways and learning are underpinned by constructivist theories of learning and constitute a shift from teacher centered pedagogy in its worst form characterized by memorization and rote learning to one that is learner centered (Farrel, 2007).

2.2 The Kenya National ICT Policy on Education and Training

The earliest attempt at ICT policy formulation in Kenya dates back to the 1980s, but the process remained incomplete until 2006 (Farrel, 2007). The formation of ICT policy in Kenya education system has its roots in the ministry of research at that time. The

motivation was to develop national policy guidelines for the development of ICTs in the country in order to address the then prevailing haphazard growth of the sector.

The Kenya National ICT Policy was adopted in 2006 after several years of effort in trying to put it in place. The aim of the policy was to improve the livelihood of Kenyans by ensuring the availability of accessible, efficient, reliable and affordable ICT services in the country (MOE, 2006). The main objective regarding the use of ICTs in schools, colleges, universities and other educational institutions was to improve the quality of teaching and learning (Farrel, 2007). One strategy outlined in this report is the promotion and development of specific e-learning resources that would address the educational needs of primary, secondary and tertiary institutions. A significant step was the digitization of the curriculum by the Kenya Institute of Curriculum Development (Ratemo, 2009). Under the sub-title "E-learning, the ICT policy goes on to outline the strategies that will be used in the promotion and development of ICT in teaching and learning. The strategies outlined in the National ICT Strategy for Education and Training" (MOE, 2006) include:

- Promote the development of e-learning resources.
- Facilitate Public Private Partnerships to mobilize resources in order to support e-learning initiatives.
- Promote the development of an integrated e-learning curriculum to support ICT education.
- Promote distance education and virtual institutions, particularly in higher education and training.
- Promote the establishment of a national ICT centre of excellence.
- Provide affordable infrastructure to facilitate dissemination of knowledge and skills through e-learning platforms.
- Promote the development of content to address the educational needs of primary, secondary and tertiary institutions.
- Create awareness of the opportunities offered by ICT as an educational tool to the education sector.
- Facilitate sharing of e-resources between institutions.
- Exploit e-learning opportunities to offer Kenyan education programs for export.
- Integrate e-learning resources with other existing resources.

These strategies seem, to be dependent upon each other. For instance, whereas it was important to develop e-learning resources, it would be meaningless if there was lack of awareness, skilled personnel, facilities and public private partnerships to support the e-learning initiatives.

Also, the development of the curriculum and training of teachers both at in-service and pre-service level may be central to government's efforts of achieving the policy objectives. In an effort to promote the development of content that will address the educational needs of primary, secondary and tertiary institutions, the government came up with two ways in which the curriculum could be developed (MoEST, 2006). Firstly, by adapting existing educational materials and distributing them to the schools and secondly by beginning the process of having schools develop their own e-content.

In order to achieve this objective, the Kenya Institute of Curriculum Development (KICD) was singled out as the sole government body charged with the responsibility of developing ICT and curriculum as well as distributing the educational materials. KICD would further oversee other institutions that develop appropriate content (Farrel, 2007). He further asserted that while technicians can be employed to fix and maintain computers, teachers and educators must know how to exploit ICTs for what it does best - opening learners up to the world of knowledge.

2.3 Challenges in the Implementation of ICT Policy in Education

Kenya government's efforts towards improving access to ICT have not been without hitches, and although the use of ICT in education is increasing, the e-learning initiative in Kenya faces the following challenges;

- Many secondary schools, especially those in rural areas can fully embrace ICTs only if electricity is made available to them. The alternative is to use generators, but the operational costs are too high.
- Most teachers in public secondary schools are computer illiterate and few have basic IT skills. In addition, some senior education officials are technologically shy (technophobic), making it difficult to implement e- learning.
- Kenya has well over 20000 primary and secondary schools, so implementing an e-learning is an expensive exercise. The costs of purchasing and installing computers, their maintenance and connection to the internet and use of online services would add a heavy burden to the government and school budgets.
- Security is another problem. Most public secondary schools especially in rural areas can-not afford to set up a good computer laboratory with acceptable security features.
- Because it is not easy to control information on the internet, it is highly likely that students could access pornography and security compromising material, and could send hate messages or threats to their teachers/public (Kathuri, 2005).

A study conducted by Kathuri (2012) on e-learning readiness in public secondary schools in Kenya, a case of Nakuru district, supports the above view and stated that public secondary schools in Kenya lack adequate ICT infrastructure and connectivity to support e-learning. The study further found out that there exist capacity building gaps among teachers on how to integrate ICT tools in education. The study noted that e-learning is most limited to computer based training and schools are not benefiting from other modes like online learning, synchronous learning and asynchronous learning.

3. Research Methodology

3.1 Research Design

In this study the investigator explored the status of ICT policy in education and training in secondary schools in Kenya. The study adopted a descriptive survey design. The survey was most appropriate because the study aimed at describing the status of ICT policy in Kenya's education system. Travers (1969) stated that surveys are conducted to

establish the nature of existing conditions. Similarly, Good (1963) states that descriptive studies may include present facts, current conditions concerning the nature of persons, a number of objects or class or events and may involve the procedures of induction, analysis, classification, enumeration and measurement. According to Good (1963), the purpose of the descriptive survey is to secure evidence concerning all existing conditions in order to plan the next step having determined where we are and where we wish to go. The design was found appropriate because it attempted to describe the way ICT policy was and the recommended way forward.

3.2 Target Population

The target population in this study included all stakeholders/policy makers dealing with ICT in education. These were five members from the Ministry of Education, seven members of Teachers' Service Commission (TSC) ICT department, eight members from Computers for Schools Kenya (CFSK) and six members from the Kenya Institute of Curriculum Development (KICD) media department.

3.3 Sample and Sampling Procedure

There were twenty six members of the ICT departments who all participated in the study. Five members from the Ministry of Education, seven from TSC, eight members from CFSK and five members from KICD giving a total of 26 respondents. Since the population was small, the researcher took all the 26 respondents. This is because policy makers are few, thus the study consisted mainly of the major stakeholders. The rationale for taking all the respondents was to take care of non-respondents, if any, during the main study. ICT being a relatively recent area, all members of the population were included so as to obtain a general picture regarding the issue under examination (Russel, 2001).

3.4 Research Instruments

The study used three research instruments to collect the data; that is questionnaires, interviews and documentary analysis. Questionnaires were administered to senior officials in the ICT department from each institution. They were appropriate in collecting information that is not observable as they inquire about feelings, motivation, attitudes, accomplishments as well as individuals (Gall et al, 1996). Interviews were used to gather qualitative data from the same officials targeted for questionnaires. Interviews were appropriate because they provide reliable, valid and theoretical satisfactory results than questionnaires (Peil, 1995). Bell (1993) observes that interviews put flesh on the bone on questionnaire responses. Documentary analysis was also used in the study since it is essential to convey the substance and means of what has been written (Harris, 2004).

3.5 Piloting Reliability

A pilot study was conducted to enhance the suitability of the research instruments. They were pre-tested at the KICD. The officers who were used during piloting were excluded from the study.

3.6 Validity

To validate the research instruments, the researcher used the face validity which is the degree to which the sample of the test items represent the content that the test is designed to measure (Nachiamas and Nachiamas, 2003). They further point out that in face validity, the relevance of an instrument, the characteristics of the variable it is meant to measure is assessed by face validity……the researcher's subjective assessment of the instruments appropriateness….and sampling validity…..the degree to which the statements, questions or indicators constituting the instruments adequately represent the qualities measured. In this case face validity was used whereby formulated questions and interview schedules were given to two experts at Kenyatta University to assess their validity and ensure their accurate measurement of what they were supposed to measure. The experts verified and independently validated the research instruments. They made corrections and offered suggestions which were used to make modifications in the questionnaires.

3.7 Data Analysis

Both descriptive and inferential statistics were used to analyze the data. Results from quantitative data were analyzed using descriptive statistics in the form of arithmetic mean, tables of frequency distributions and percentages while all the responses from qualitative data were recorded and later transcribed and the transcripts analyzed for patterns of regularity- that is, categories and themes (Cohen and Marion, 1994; Clandinin and Connelly, 2000) and the findings reported. Data was analyzed using Statistical Package for Social Sciences (SPSS) version 16 for easy interpretation.

4. Research Findings

The following is a summary of the major findings of the study;

4.1 The Extent of ICTs Use in Secondary Schools in Kenya
a) Kinds of ICTs Used in Teaching and Learning in Secondary Schools in Kenya

With regard to commonly used ICTs to deliver educational programs to secondary schools, it was found out that print media, radio and television were the most (85%) commonly used ICTs. The KICD media department has been delivering programs to primary and secondary schools for the past three decades. The department produces programs in all the teaching subjects. These were disseminated through radio and television to primary and secondary schools. This effort has enhanced quality teaching and access to education. The results further revealed that the use of computers and internet is still very low in secondary school and negligible in primary schools. The

Kenya government has recognized this and with partnership with NGOs has installed internet services in most secondary schools in Kenya. In the year 2011, Computer for Schools Kenya supplied ten secondary schools with eleven computers and internet connectivity to 290 constituencies in Kenya.

b) Subject Areas where ICTs are Commonly Used

Concerning subject areas where ICTs are commonly used, the research findings showed that most programs from KICD were produced in languages (English, Kiswahili and Foreign languages) and on areas on emerging issues in the society. This was due the fact that since most programs are aired on radio, it was easy to air languages because they were not practical oriented. Technical and science subjects would require demonstrations to accompany them. The biasness towards languages was also due to the fact that they were compulsory subjects and would benefit a large audience. The above scenario however, reveals that computer interactive skills are not exploited in teaching and learning. This denies the learners the opportunity to acquire a wide range of information and skills that are available through the internet.

c) Strength of Computer Programs in Secondary Schools

With regard to the strength of computer programs in schools, most (80%) respondents rated the programs as average while another (20%) said the program was poor. The data analysis further indicated that most (85%) Kenyan secondary schools have no or inadequate computer facilities. All (100%) respondents indicated that the ratio of computer to student in public secondary schools in Kenya stands at 1:150 which is far much lower than the recommended ratio of 1:40. Key to effective introduction and use of computer technology in public secondary schools is the availability of adequate computer facilities. It is in recognition of this that the Ministry of Education is working with NGOs to facilitate the acquisition of computers in schools. The government has also zero rated the importation of computer hardware and software to enable more institutions to acquire computer facilities. The government also tries to develop a program under rural electrification program and last mile targeting all secondary schools for electricity connection.

d) Level of ICTs Literacy among Secondary School Teachers in Kenya

Concerning the level of literacy among secondary school teachers, research findings indicated that most (80%) teachers had a very low level of computer literacy. The inadequacy of teachers with relevant skills in ICTs is an indication that schools have no capacity to undertake computer teaching and learning. This means that there is need for human development through capacity building. It is in view of this that KICD developed to train at least two teachers at secondary level in computer skills. The CFCK is also contributing to the training needs by offering free training to two teachers, principal and one BOG member from every school they install computers. The T.S.C is also providing incentives to teachers who opt to pursue computer studies by giving them paid study leave.

4.2 Policy Guidelines for ICTs use in Secondary Schools in Kenya.
a) Curriculum for ICTs use in Public Secondary Schools in Kenya

With regard to curriculum development in ICTs, it was found out that only tertiary institutions and secondary school levels had ICT curriculum. The secondary school curriculum was developed in 1996 while that of Teachers' Training Colleges was developed in 2004. The study also noted that computer studies are optional and most public secondary schools lack computer facilities needed for the subject. This means that the computer curriculum could not be implemented in most secondary schools and the objective of making all secondary school graduates computer literate is far from being achieved. In all the 21 teachers training colleges on the other hand, the ICT curriculum has been implemented. However, it was noted that with exception to Kenya Technical Teachers College, it is merely the implementation of computer courses such as introduction to computer packages that are being offered. The number of computers was also found to be inadequate.

b) Availability of ICT Policy in Education in Kenya

Regarding the availability of ICT policy in education, the findings indicated that Kenya enacted her ICT policy in education and training in 2006. The main objectives of the national ICT policy on education were stated as follows:

- Promote the development of e-learning resources.
- Facilitate Public Private Partnerships to mobilize resources in order to support e-learning initiatives.
- Promote the development of an integrated e-learning curriculum to support ICT in education.
- Promote distance education and virtual institutions, particularly in higher education and training.
- Promote the establishment of a national ICT Centre of Excellence.
- Provide affordable infrastructure to facilitate dissemination of knowledge and skills through e-learning platforms.
- Promote the development of content to address the educational needs of primary, secondary and tertiary institutions.
- Create awareness of the opportunities offered by ICT as an educational tool.
- Facilitate sharing of e-resources between institutions.
- Exploit e-learning opportunities to offer Kenyan education programs for export.
- Integrate e-resources with other existing resources.

c) The Level of Implementation of ICT Policy in Secondary Schools in Kenya

With regard to the level of implementation of the National ICT Policy on Education, it was found that the implementation level was just average. The research further found out that there was no regulatory policy guiding the use of ICTs in secondary schools in Kenya. This resulted to scenarios where schools bought obsolete computers. Schools were left to make their own internal regulatory policies regarding the use the use of ICTs.

4.3 Challenges Facing the Implementation of ICT Policy in Secondary Schools in Kenya

a) Factors Limiting the Implementation of the National ICT Policy in Education and Training in Secondary Schools in Kenya

Constraints hindering the implementation of the ICT policy in education included limited access, inadequate funding, inadequate ICT facilities, high cost of developing interactive e-learning content, ICT not embraced as a medium of instruction and management tool, inadequate capacity for teachers, the dynamic nature of ICT technology and inadequate capacity for maintaining ICT equipment. A key issue affecting ICT provision in rural areas is the limited access to electricity and where this exists, frequent power blackouts. Further, high costs of internet provision and other costs associated with ICT, equipment, infrastructure, limited funding from the government and support costs as a result of the Jublee government paying more attention to supplying laptops to primary schools are obstacles to rolling out a national ICT program in public secondary schools in Kenya.

b) Efforts put in place by the Government to Promote the Use of ICTs in Public Secondary Schools in Kenya

The respondents mentioned the introduction of e-books by Kenya Institute of Curriculum Development, electricity connection of all public secondary schools in Kenya, zero rating of tax on the importation of computer hardware and software to enable more institutions to acquire computer facilities, Teachers Service Commission offers paid study leave pursuing computer studies, distribution of computers to schools through Computer for Schools Kenya (CFSK). CFSK offers training to two teachers, principal and one BOG member from every school where they installed computers. KICD has developed a program to train at least two teachers at secondary level in computer skills.

5. Conclusion

From the foregoing research findings the following conclusions emerged:
1) The government enacted the Kenya National ICT Policy on Education and Training in 2006. The policy had objectives and strategies without proper timelines and in cases where timelines were set, they had not been met.
2) The implementation of the policy in secondary schools was average. Most secondary schools lacked the requisite ICT infrastructure. Schools that had computers were either using them for administration purposes or as an optional subject. The ratio of computer to student was 1:150 which was far much below the recommended ratio of 1:40.
3) Most teachers were ICT illiterate. This hindered the use of computers in schools as an instructional tool.
4) The main challenge facing the implementation of ICT policy on education and training was inadequate computer infrastructure in public secondary schools.

5) Government initiatives to promote the implementation of the policy were: distribution of computers to schools through Computer for Schools Kenya, electricity connection to all schools through rural electrification program, the government has zero-rated tax on importation of computer hardware and software to enable more schools to acquire computer facilities, the introduction of e-books by KICD, TSC offered paid study leave to teachers pursuing computer studies, CFK offered training to two teachers, principal, one BOM member to schools where they installed computers, KICD developed a program to train at least two teachers in each secondary school in computer skills.

6. Recommendation

As depicted in the conceptual framework, successful implementation of the use of ICTs in our education system requires clearly laid down strategies and policies. The report therefore recommended the following measures to help achieve full implementation of the use of ICTs as an instructional tool in teaching and learning:

1) The government should re-look into the National ICT Policy on Education and Training and come up with adequate clear-cut implementation strategies and policies by bringing all stakeholders in the education sector on board. A thriving ICT sector can only exist with supportive legislations with clear cut and achievable timelines.

2) Effective access and use of ICT requires basic infrastructure like computers, electricity and internet connectivity. To date, most public secondary schools lack these basic amenities. This has in turn restricted accessing ICTs to the exclusive privilege of the urban secondary schools. The government should therefore ensure that all public secondary and primary schools have internet and electricity. The government should also provide funds for purchase of computer accessories under tuition vote head to all public secondary schools through Free Secondary Education program.

3) For effective use of ICTs in schools, teachers must be technologically literate. ICT should therefore be a core unit in all teacher training programs in Kenya. This should be one of the conditions for accreditation for colleges and universities that offer teacher training programs. ICT literacy should be a requirement to qualify for registration for teaching in all learning institutions in Kenya.

4) Computer studies should be made a compulsory subject in both primary and secondary level education. It should further be compulsory for all secondary schools to use computers as an instructional tool.

5) The government should fast track the digitization of the curriculum and provision of e-books to all secondary schools in Kenya as part of the education reform process. This will enable all learning institutions to equally access the learning materials.

7. Recommendations for Further Research

Since this research was limited to the status of ICT policy on education and training in secondary schools in Kenya, further research can also be done on the incorporation of computer courses in teacher training colleges. This would be useful in establishing whether those graduating from teacher training colleges acquired the requisite instructional skills required in the rapidly changing teaching and learning process.

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Obonyo Paul Muga
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