

The Future of ICT in Kenyan Schools from a Historical Perspective: A Review of the Literature

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Abstract

The need for quality education has continuously unsettled Kenyans for over 100 years. The big question that still persists to this day is how to fix the educational system to fit the social and economic needs of the Kenyan people. This literature review documents the educational reforms since pre-colonial period with the goal of reflecting on what the current Information and Communication Technology (ICT) reforms in schools mean for the realization of the Kenya Vision 2030. This review of the literature suggests that the technology training, the infrastructure, and the technology resources need to be provided at the schools for the teachers as a matter of urgency.

Key words: ICT, technology, computer, and educational reforms

1. A Historical Development of the Educational Reforms in Kenya

The formal Kenyan educational system dates back to the 19th century when Johann Krapf set up the first mission school in Rabai in 1846 (Ojiambo, 2007). He began by translating parts of the Bible into Kiswahili and Rabai to provide reading material for his pupils (Sifuna & Otiende, 1992). However, before the turn of the 20th century, the curriculum embraced the 3Rs (aRithmetic, Reading, and wRiting).

With the expansion of the railway line from Mombasa to Uganda, many schools were started in the interior parts of Kenya. By 1910, 35 mission schools had been founded in Kenya (Alwy&Schech, 2004).

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For example, the first school in Western Kenya was started in Kaimosi in 1902, followed by Maseno School in 1906, and Tumutumu Mission School in 1908. The Europeans and Indians established schools in Kenya in the first decade of the 20th century. These schools were Rift Valley Academy, started in 1902, Railway School in Nairobi, established in 1907, and CMS Buxton High School in Mombasa, which was started at the turn of the 20th century. Subsequently, many other schools were started during the colonial period and the number of Kenyans who sought education increased tremendously.

However, there were obstacles; the British government-sponsored study of education in East Africa, the Joint Committee on Education, issued the *Frazer Report of 1909*, which proposed maintaining separate educational systems for Europeans, Asians, and Africans (Alwy & Schech, 2004). Consequently, although the education system was the same (the A-Level system of education), education in Kenya became racially stratified – that is, there were separate schools and curricula for the Europeans, the Asians, and the Africans, and the Africans were only required to learn how to read the Bible for the purpose of promoting evangelism. In this setting, Africans got the least schooling by receiving agricultural and technical education. Sifuna and Otiende (2002) highlighted that Christian teachings became compulsory in schools and Africans were barred from learning English until the last year of their primary school. The missionaries and the colonial government made no efforts to link African education to African problems and cultural heritage (Ojiambo, 2007). As a result, there were great disparities in educational opportunities between races and also between regions. This period marked the turning point in Kenyan education because Africans recognized the need for formal education, which led to the rise of the independent schools in Central Kenya.

With the attainment of independence in 1963, the new government retained the A-Level system of education; however, the campaign for free education (at no cost) in Kenya began. The Kenya Education Commission (The Ominde Commission) was set up in 1964 under Professor Ominde. The Ominde commission was mandated to survey the existing educational resources and advise the government on the way forward in promoting social equality, and national unity through educational reforms.

The commission recommended, in its first report, that educational facilities be located in underprivileged regions, and the religious convictions of all people be safeguarded and respected (Alwy & Schech, 2004).

This commission became the blueprint that laid the foundation of the post-independence Kenyan educational system (Ojiambo, 2007). The colonial education was abolished, and the new government embarked on training Kenyans for the needed labor in the new nation. A new policy and a legal framework were implemented to define the educational and ideological needs of the new state (Ojiambo, 2007).

In 1971, the Ndegwa Commission was formed to look into the working conditions of civil servants and assess how education could support development agenda of the country (Ojiambo, 2007). Interestingly, the commission made recommendations similar to those advocated by the Ominde commission underlining social equity, and national unity. Subsequently, in 1976, The National Committee on Educational Objectives and Policy (1976) developed the Gachathi report that aimed to enhance educational goals to meet the needs of the country. Because of the unemployment difficulties primary and secondary graduates were going through, the report noted there was a need to involve the vocational sector in secondary education. The report recommended pre-vocational, technical, and practical education for Kenyans (Ojiambo, 2007).

Moreover, due to the problem of high unemployment, the Mackay Commission: The Presidential Working Party on the Second University (Republic of Kenya, 1981) was formed. The commission was mandated to investigate the feasibility of a second university in Kenya (after the University of Nairobi, which was established in 1970) to train graduates in vocational skills. Coincidentally, its recommendations were based on the previous educational commissions, with emphasis on practical and technical aspects of education. Following this report (1) the A-level education system was scrapped and the current educational system (the 8-4-4) of education was initiated, (2) Moi University was established, and (3) the Commission for Higher Education was formed (Republic of Kenya, 2004). With the aim of reforming the education system, following the recommendations of Mackay Commission, the 8-4-4 system of education was introduced in January 1985.

This system of education adopted eight years of primary education, four years of secondary education and four years of university education similar to the American education system. Consequently, the "curriculum was reorganized and improved with greater orientation towards science subjects and practical subjects such as carpentry, arts and crafts, home science and agriculture" (Webuye, 2003, p. 15).

This reorganization was intended to make the educational system move away from an examination-centered form of education to one that prepared learners to be self-reliant through entrepreneurship (Tostensen & Scott, 1987). The new system, it was believed, would promote self-reliance among learners after leaving school and thus it was meant to provide school leavers with a wide range of employment potential (Kinuthia, 2009; Webuye, 2003).

In 1988, the Report of the Presidential Working Party on Education and Manpower Training for the Next Decade and Beyond (Republic of Kenya, 1988) – the Kamunge report was formed with the aim of improving educational cost, financing, and relevance. This was at a time “when the Government scheme for the provision of instructional materials through the National Textbook Scheme was inefficient and therefore adversely affected the quality of teaching and learning” (Republic of Kenya, 2004, p. 2). Thereafter, the Sessional Paper No. 6 of 1988 on education was adopted, and the policy of cost sharing of education was established. This led to a substantial withdrawal of government spending in education. As a result, education became expensive for the majority of Kenyans, which resulted in a massive decline of children enrollment in primary schools (Akala, 2002).

In 1999, The Commission of Inquiry into the Education System of Kenya – The Koech Report or Totally Integrated Quality Education and Training (TIQET) report (Republic of Kenya, 1999) was formed to examine “ways and means of enabling the education system to facilitate national unity, mutual social responsibility, accelerated industrial and technological development, life-long learning, and adaptation in response to changing circumstances” (Republic of Kenya, 2004, p.3). The Koech Report recommended strengthened partnerships between the government and other stakeholders, such as the Non-Governmental Organizations (NGOs) and the church, with a view to enlisting them into effective TIQET. The TIQET report was never implemented due to the cost implications; however, some recommendations were adopted and implemented such as curriculum improvement. Table 1 below summarizes all the proposals of important commissions in Kenya since 1909 to 1999.

Table 1. Summary of landmark Education Commissions in Kenya

Commission	Year	Proposals
The Frazer Report	1909	The separate Educational systems for Europeans, Asians, and Africans
Ominde Commission	1964	Sought to reform the colonial education. Proposed one that would foster unity and provide manpower for national development
Ndegwa Commission	1971	Assessed the working conditions of civil servants and outlined how educational goals would be integrated to accelerate national development.
Gachathi Report	1976	Enhance educational goals to meet national unity, socio-economic and cultural needs of Kenya.
Mackay Report	1981	Replaced the A-levels system of education with the 8-4-4 system of education, established Moi University and the Commission of Higher Education.
Kamunge Report	1988	Focused on education financing, quality and relevance that led to cost-sharing.
Koech Report	1999	Proposed Totally Integrated Quality Education and Training. Proposed technological development in education. Report was not adopted; however, some parts were adopted like the curriculum the curriculum changes.

In September 2000, heads of states and governments of the world met at the Millennium Summit in New York and agreed on a set of eight goals, 18 targets and 48 indicators on development and poverty eradication (Makhanu, 2010). Thereafter, when a new government was formed in Kenya in 2003, one of its immediate priority was to re-avail educational opportunities in order to meet Universal Primary Education (UPE); the second, of the eight Millennium Development Goals (MDG). As a result, the Free Primary Education (UPE) (education at no cost) was introduced in Kenya in January 2003, which resulted in high enrolment in both primary and secondary schools (see Table 2 below for primary and secondary school enrolment data).

Table 2. Primary and secondary school enrolment data as of 2007 (Source, Kenya Open Data Project)

Schools	Total Enrollment	Total teaching Staff	Total number of Schools
Primary Schools	9,685,533	281,143	31,231
Secondary Schools	1,185,883	73,484	6,495

From this discussion it is notable that the struggle for educational reforms in Kenya started more than 100 years ago. With attainment of independence in 1963, though, amidst many struggles and challenges, the government of Kenya has been fully committed to an education system that is relevant to its citizens. In this respect, the commissions of education that had great influence on the quality of education system in Kenya include the Ominde commission – that advocated for the abolition of colonial education, the Mackay report – that proposed the formation of the 8-4-4 system of education, and envisioned practical and technical based education, the Kamunge report – on the introduction of cost sharing and financing of education, and the Koech report that proposed for an education system that would accelerate technological advancement in Kenya. Despite these reforms efforts the current system of education – the 8-4-4 system of education has failed to meet the educational needs of its citizens. With this in mind, it is imperative to note that employment has remained an elusive dream for many Kenyan youth. Faced with the unemployment challenge, a new constitution that advocates for free and compulsory basic education for all children, and a fast rate of globalization, the government of Kenya has started to readjust and the reassess the 8-4-4 system of education by introducing ICT in schools to meet the needs of its people through the Kenya Vision 2030 (Republic of Kenya, 2007).

2. The Kenya Vision 2030

Kenya Vision 2030 is Kenya's new development blueprint between the year 2008 and 2030 that aims at making Kenya, "a newly industrializing, middle income country providing high quality life for all its citizens by the year 2030" (Republic of Kenya, 2007, p. 1).

Kenya Vision 2030 is based on three pillars: economic, social, and political. The education sector falls under the social support pillar. It is through the education sector that Kenya hopes to achieve the goals of a “globally competitive quality education, training, and research to her citizens for development and enhanced individual well-being” (Republic of Kenya, 2007, p. xi). To achieve these goals the government has specified strategies that include “integrating early childhood into the primary education, reforming the secondary curricula, updating teacher education, and strengthening partnerships with the private sector” (Kinuthia, 2009, p. 16). For instance, the overall education goals for 2012 is to reduce illiteracy by increasing access to education, improving the graduation rate from primary to secondary schools, and improving the quality of education in Kenya. Consistent with these goals, one of the projects for 2012 is to initiate a program that would facilitate equipping students with modern ICT skills. However, the government is aware that these goals cannot be attained without an elaborate and a functioning national ICT policy.

3. The National ICT Policy

The computer revolution in Kenyan classrooms dates back to the early 1980s when the Ministry of Education, Science and Technology decided to allow for some experimentation in computer education through a pilot project (Webuye, 2003). However, as Webuye observed, “during this time computers were mostly used in private schools as opposed to now, when computers are finding their way into the public schools” (p. 17) and 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” (Hennessy, 2010, p. 9). Since that time, the growth of ICTs in Kenyan schools has been slow and scattered.

In 2006, the government, through the Ministry of Information, Communication and Technology, developed the National ICT Policy that sought to “facilitate sustained economic growth and poverty reduction, promote social justice and equity, mainstream gender in national development; empower the youth and disadvantaged groups, stimulate investment and innovation in ICT, and achieve universal access to ICT” (Republic of Kenya, 2006, p. 2). The national ICT policy has several sections that include information technology, broadcasting, telecommunications, and postal services. It is the section under information technology that outlines the objectives and strategies for ICT in education.

One of the objectives related to ICT in education is “encouraging the use of ICT in schools, colleges, universities and other educational institutions in the country so as to improve the quality of teaching and learning” (Republic of Kenya, 2006, p. 10). The government aims to achieve this goal by employing the following strategies:

- Promoting the development of e-learning resources;
- Facilitating public-private partnerships to mobilize resources in order to support e-learning initiatives;
- Promoting the development of an integrated e-learning curriculum to support ICT in education;
- Promoting distance education and virtual institutions, particularly in higher education and training;
- Promoting the establishment of a national ICT center of excellence;
- Providing affordable infrastructure to facilitate dissemination of knowledge and skill through e-learning platforms;
- Promoting the development of content to address the educational needs of primary, secondary and tertiary institutions;
- Creating awareness of the opportunities offered by ICT as an educational tool to the education sector;
- Facilitating the sharing of e-learning resources between institutions. (Republic of Kenya, 2006, pp. 12-13)

When the new government was formed in 2003, the Ministry of Education Science, and Technology (MoEST) mandate included all education institutions in Kenya. However, the MoEST has since been restructured into two ministries – the Ministry of Education, and the Ministry of Higher Education Science and Technology (MHEST). The Ministry of Education mandate includes policy implementation for basic education, secondary education, and adult and continuing education, while MHEST mandate includes universities and other technical institutions. Before the National ICT policy was developed, the Ministry of Education had already developed the Kenya Education Sector Support Program (KESSP) (Republic of Kenya, 2005). KESSP was developed in order for the Government to achieve the vision for education and training in Kenya, which was to “provide ‘Elimu Bora kwaMaendeleo’ or Quality Education and Training for Development” (Republic of Kenya, 2005, p. iii). ICT in education featured prominently as one of the priority areas of KESSP.

This followed the adoption of The Kenya National ICT Strategy for Education and Training, which became part of the National ICT Policy (Hennessy, 2010). The ICT policy aimed at integrating “ICT in education and training in order to prepare the learners and staff of today for the Kenyan economy of tomorrow and therefore enhance the nation’s ICT skills” (Republic of Kenya, 2004, p. 68). Although the MoEST has several objectives, goals, and strategies to accomplish ICT integration in education, one outstanding strategy is to develop a national capacity for curricula design in all education and training sub-sectors. This will facilitate the use of ICT in service delivery so that access to quality education is improved, particularly, increasing the performance of poorly performed subjects like mathematics and sciences.

4. Research on ICT use in Kenyan Schools

With regard to ICT status in Kenyan secondary schools, The Aga Khan Academy, a private school in Nairobi, embraced computer technology in 1983 when it received five computers and the necessary hardware and software from the Aga Khan Foundation through Computers in Education Project in Kenya (CEPK) (International Development Research Centre [IDRC], 1991). Teachers in this project reported the importance and the efficiency of this computer project. One teacher reported that “my students enjoy the computer classes because of the marvel of using this innovation for the first time...I have also noticed that their concentration on their studies has improved by almost 100%” (IDRC, 1991, p. 26).

As a result, the Aga Khan Foundation, with funding help from IDRC, set up a second phase, which introduced computers to four public secondary schools in Nairobi, and others across the country, like Moi High School Kabarak, and Coast Girls Secondary School. However, the success of this project was not without problems; among them high student-teacher ratios, scarcity of time to use computers, frustrations among students trying to learn computers for the first time, high import custom duty on computer resources, anxiety among school staff because of a lack of computer knowledge and training, and the high cost of computers. However, the CEPAK project was a success story, which laid a foundation for other schools such as Starehe Boys Center, and Braeburn schools to begin using computers and other types of technologies in classrooms (Webuye, 2003). Since then, computer use in Kenyan schools, particularly in the private schools, has grown tremendously – although at a slower than desired pace.

In a study that used a cross sectional descriptive survey, Kiptalam and Rodriguez (2010) looked at the utilization of the Internet among teachers and students in 11 connected rural and urban secondary schools in Kenya. The findings revealed that the use of the Internet and its integration in teaching and learning in secondary education was increasing among the students and teachers as a means of communication and for information searching. In addition, Internet access rates for teachers and students were observed to be much higher in educational institutions that had made effective ICT investments in education. Evidence from the study showed that teachers were integrating ICT in sciences, mathematics, English, and music. Teachers who used the Internet for communication was higher at 79.3% for urban-based teachers compared to 60% of rural-based teachers. The study showed that about 44% of the teachers had over six years of using computers, while 11% had less than one year using computers. There also appeared to be a gender disparity with more male teachers having more experience in computer use than female teachers. This study suggested that ICT and its technologies are still at their infancy in Kenya, and that there is urgent need for incorporating ICT training for pre-service and professional development for in-service teachers.

Studies show that the need for professional development for teachers has been highly sought, and recognized by teachers and schools. Wanjala, Khaemba and Mukwa (2011) examined the factors that are significant in professional development that contribute to efficacy of secondary school teachers' use of ICT in their instruction. This study was conducted in the Bungoma district, Western province, Kenya. The findings showed that few teachers integrated ICTs in different content areas. For professional development learning, most teachers were found to use trial and error in their ICT integration and referred to their course work completed at the universities and training colleges to help them in ICT integration. The study also found that teachers had limited access to computer hardware, lacked the knowledge and skills to integrate ICT, lacked time to integrate ICT into their subjects, lacked the appropriate subject content software, lacked support from administrators, and had negative attitudes towards ICT. To overcome these challenges, Wanjala, Khaemba and Mukwa made several suggestions for improving initial teacher training on ICT integration, professional development on ICT integration, funding ICT implementation, and redesigning the school curriculum.

There are claims that ICT cannot transform learning for students if school leaders are not ICT literate.

Makhanu (2010) aimed to understand the ICT literacy level among secondary school principals in the Western province of Kenya. In this study involving 188 secondary school principals, a survey was done to gather quantitative data, and subsequently open-ended questions, semi-structured interviews, and observations were used to collect qualitative data. The study found that (1) secondary school principals had fair access to the internet with 41.98% access rate, however, principals lacked ICT knowledge and skills and consequently many did not integrate ICT into their leadership responsibilities; (2) the social demographic features that influenced ICT literacy were age, experience, level of education, level of ICT training, and distance of the school from an urban center; and (3) there was a relationship between the school principals' level of ICT knowledge and the school performance. For instance, the challenges faced by school principals in their attempt to become ICT literate correlated negatively with school performance. Makhanu recommended that the Ministry of Education should give priority in supplying electricity infrastructure computer resources, and principals must be involved in teachers' professional development and training in ICT.

Similarly, Webuye (2003) examined teachers' and administrators' perceptions and experiences towards computer use in Kenya. Data were collected from nine computer-using teachers, 10 non-computer-using teachers, two school administrators, four Ministry of Education administrators, and two administrators from a teacher training college. The researcher used focus groups to collect data, where open ended questions to understand on how the participants viewed computer use in Kenya. The results suggested that (1) computer-using teachers, non-computer-using teachers, and administrators acknowledged that the use of computers in classrooms was a worthwhile experience with benefits that outnumbered the obstacles, and (2) computer-users spoke positively about their experiences of using computers, while the non-computer-users expressed disappointment and resentment at the lack of ICT training. This study revealed a weakness in pre-service training programs. Webuye suggested the need to provide pre-service and in-service training programs on ICT integration skills, and develop a revised national plan to implement ICT in schools.

In a similar study, Momanyi, Norby and Strand (2006) conducted a study to find out if Kenyan educators in primary, secondary and tertiary institutions were aware of the profound influence technology had on student learning and achievement. A questionnaire survey was mailed to principals or head teachers of schools to complete.

Consistent with Webuyele and Makhanu's findings, the study indicated that the schools which lacked computer resources and teachers were incompetent in the use of educational computer applications in the content they were teaching. These researchers also found that most of the Kenyan educators understood that computers could help their students learn more relevant information.

Lastly, calculators can be used to support students in learning mathematical concepts, but teachers and students encounter challenges when using these tools in the classrooms. Ochanda and Indoshi (2011) aimed to establish teachers' challenges and the benefits that may result from the use of scientific calculators in the teaching and learning of mathematics in the Emuhaya district in Kenya. The study used a descriptive survey design. The participants were 44 mathematics teachers, two Quality Assurance and Standards Officers, 24 head teachers and 1,680 Form four students drawn from 24 secondary schools. The study found that teachers reported that scientific calculators had great potential in developing students' conceptual understanding of mathematics. Most of the students (67.14%) reported that they lacked basic training on the basic skills of how to use a scientific calculator. The difficulties students encountered by students were attributed to the teacher-centered way of teaching, and teachers' unpreparedness, which led to ineffective teaching and learning of mathematics. The study recommended professional development for teachers to help teachers reflect on their teaching and acquire effective teaching skills, and that the Ministry of Education provides scientific calculators to all learners.

The findings from these studies revealed that (1) teachers' and administrators' understood the benefits of using computers to support student learning, (2) several constraints inhibited teachers from integrating ICT in their classrooms, including teachers who lacked the necessary ICT integration training, lacked ICT resources and infrastructure, and lacked time, (3) social demographic features such gender, age, experience, and education level had effects on ICT integration, (4) lack of institutional support, and (5) school principals who lacked ICT skills to integrate ICT in their school leadership responsibilities.

Suggestions to overcome these challenges included improved initial teacher training on ICT integration, continuous professional development, redesigning curricula goals, and the funding of ICT implementation.

5. Conclusion

The review of the literature suggests that past educational reforms in Kenya have not achieved the goals they were intended to because the inequalities created in education and the society still persist. Indeed, the current technological reforms in schools appear to face challenges already. Teachers are not adequately trained to implement ICT in the classrooms and there are no adequate technology resources and infrastructure at the schools. These challenges may need to be resolved before the realization of the Kenya vision 2030 can come true.

It is discouraging to note that the existing literature does not reveal intensive research activities in Kenya regarding ICT adoption in schools. This is a call for extensive research studies to document the challenges teachers are facing during the adoption of ICT in schools so that problems can be addressed at the earliest possible time. Such findings will help the government, the educational stakeholders and researchers, and the teachers to understand the extent of ICT uses in particular content areas to improve teaching and learning.

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