

# “An E-Learning Approach to Secondary School Education”: E-Readiness Implications in Kenya

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## Abstract

Information and Communication Technology (ICT) has the potential to enhance access, quality, and effectiveness in education. This paper examines the E-readiness implication on the adoption of e-learning in secondary schools in Kenya. The paper provides an opportunity for reflection on e-learning adoption and the potential role ICT can play in education. The review has established that up to date, less than 10% of secondary schools in Kenya offer computer studies as a subject in the curriculum despite its perceived potential. The few schools that have an ICT programme limit the number of candidates who take up the subject considering it a specialty irrespective of its being an essential subject as other compulsory subjects like Mathematics and Languages. Whereas the processing of information to build knowledge is one of the essential literacy skills vital for the workforce in the 21st century, it is often overlooked in current educational practices. The question of e-readiness of Kenyan schools cannot be overlooked if Kenya plans to use education as a platform for becoming an e-society of the 21<sup>st</sup> century as envisaged in Vision 2030. Therefore, it is imperative that E-Readiness issues be effectively addressed lest new technology introduced further marginalizes the already deprived Kenyan children. Desktop review of relevant literature was guided by Current Situation Analysis (CSA) which is equivalent to Strength, Weakness, Opportunities and Threats (SWOT) Analysis.

**Keywords:** E-Learning, E-Readiness, Secondary school, Education, Infrastructure, Internet

## 1. Introduction

The Kenya Government is committed to achieving quality basic education for all by 2015 and one of the key components of the Government's approach is through provision of secondary education. Although Affordable Secondary Education (ASE) among other interventions has been instituted raising enrolment, access to secondary education in Kenya is still low and regional disparities exist. Data from Ministry of Education (MOE) indicates that by 2009, the primary to secondary school transition rate was still below the Millennium Development Goal (MDG) targets of 70%, which was to be achieved by 2008. United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute of Statistics (UIS) indicates that the 2009 transition rates were 69.3% for Boys and 67.3% for Girls, average 68.1%, locking out about 2.8 million children from secondary school attendance, (UIS, 2006; UNESCO, 2009; MOE, 2005; 2008; 2009; Republic of Kenya, 2010).

The Government of Kenya values the use of Information and Communication Technology (ICT) in Education as a vehicle to address the critical challenges. The Sessional Paper No. 1 of 2005, KESSP and Vision 2030 documents underscore the importance of ICT in education in laying a firm base for skills development and innovation for enabling the country to attain a competitive edge. Against this background, the Government aims to make education the natural platform for equipping the nation with ICT skills in order to create a dynamic and sustainable economic growth, through integration of ICT in secondary schools, (MOE, 2008, infoDev; 2007).

Information and Communication Technology (ICT) are the mediums that utilize both telecommunication and computer technologies to transmit information. ICT consists of hardware, software, networks, and media for collection, storage, processing, transmission, presentation of information (voice, data, text, and images) and the hand held devices like mobile phones are part of ICT, (Garrison and Anderson, 2003). E-learning is an example of the use of these ICT-supported teaching and learning methods whose use in educational institutions is gaining momentum with the passage of time, (Omwenga, 2004).

### 1.2: The Concept of E-Learning

E-learning refers to the purposeful use of electronic systems in support of the learning process. It is supported by electronic hardware and software either online (synchronous) or offline (asynchronous, (Allen, 2003; Garrison and Anderson, 2003). It can be delivered as self-paced or instructor-led, either individually or on a small or large

group basis and can be used as a hybrid to the face-to-face format, or exclusively in open and distance learning (ODL), offered through electronic media such as CD-ROMs, mobile phones, Television, Video Conferencing (VC), e-mail, interactive TV and satellite among others. Different kinds of online learning can be enumerated as: Web supplemented; Web dependent; Mixed mode which involves online discussions, assessment, online project/collaborative work replacing part of face-to-face teaching/learning and Fully online, (Garrison and Anderson, 2003).

### **1.3: The Potential Role of E-learning in Education**

ICT have been touted as potentially powerful enabling tools for educational change and reform and many of the productivity gains in the developed world economies over the past decade to a great extent can be attributed to the impact of ICT, (GOK, 2005, UNESCO, 2010). ICT plays a role in addressing access and equity issues in that it is a powerful tool which has the potential transform the educational opportunities and life chances of many students, including those excluded by their special circumstances and special educational needs, thereby reducing discriminatory communication patterns based on physical and social cues such as gender, race, socio-economic status and physical features. Further, ICT represents a potentially equalizing strategy for developing countries as the new communications technologies promise to reduce the sense of isolation, offering developing countries widening the range of opportunities to populations in rural areas which have inadequate schools, women facing social or cultural barriers that limit their access to educational institutions, socially disadvantaged groups that include marginalized minorities, and students with disabilities. The largest and most successful project of this type is the Telesecundaria project in Mexico which reached over 750, 000 students in 12,000 centres, over 15% of the total junior-secondary population between 1997-8, (UTI, 2010; EU, 2011, UNESCO, 2000).

E-learning is considered the appropriate solution to the call for a just-in-time accessible, ubiquitous approach. Flexibility enables educational institutions to expand enrollment and reach more students at the student's convenience. The use of both audio and visual senses in acquisition of knowledge, such as Teleconferencing technologies enable instruction to be received simultaneously by multiple, geographically dispersed learners (synchronous learning), same the quality of teaching. Studies have shown that a person acquires only 15-20% of information through the auditory sense and 60-80% through visual sense as learners visualize computer graphics images displayed with animation in video teleconferencing making illustrations look real in actual life situation and that enhances retention, (Tinio, 2002; Omwenga, 2003, worldwide Web, 2008).

The use of technology in instruction changes the structure of the classroom whereby teachers function as coaches, mentors, advocates, and managers of information and serves as facilitators of instruction. Further, ICT facilitates access to resource persons such as mentors, experts, researchers, professionals and peers worldwide. For instance, the International Telementor Program (ITP) in Canada links students with mentor-experts through email and discussion forums and also provides project-based online mentoring support to university students. Teachers integrate technology into a challenging and interdisciplinary curriculum which addresses students' specific needs, developmental levels and learning styles, (world wide e-learning, 2008). Technology provides a record of the student's academic history and teachers have the data and information needed to individualize instruction and assessment.

E-learning reduces the cost of education through economies of scale and by the fact that the use of Internet can reach a wider population with the same fixed costs, (Kituyi-Kwake, et al 2008). Mackintosh (2005) asserts that ICT reduces costs for buildings, travelling and accommodation for the students. Through e-learning, Digital libraries enable learners in remote areas to access quality learning material anytime Mackintosh (2005). The digital libraries also facilitate easier and less costly acquisition, storage, copying, distribution, updating, and interlibrary loans of learning materials for the maintaining organization. The new technology enhances learner participation in the learning process unlike the traditional approaches where learners are passive and recipients of pre-prepared knowledge. Using ICT, students who might normally be withdrawn in a traditional class find the non-verbal interaction less intimidating (Hardin, 1998). E-learning allow students to receive feedback, refine their understanding, build new knowledge and transfer from school to non-school settings, (Strike, 2004; ITU, 2010; EU, 2010). Hardin reveals that most students who do not participate in class are comfortable asking questions and making comments through e-mail in virtual excursions. Researchers have found that the use of ICT leads to more cooperation among learners within and beyond school and more interactive relationship between students and teachers. If used to support pedagogical practices, E-learning provides learning environments that are Learner-centred, Knowledge-centred and Assessment-centred, (Strike, 2004).

ICT is presenting a new model of education with a view to preparing students for 'lifelong learning'. Lifelong learning is a continuous learning throughout one's entire life, from childhood to retirement. The "E-Lifelong

School System” can support school dropouts and the number of those who did not complete secondary education below the age of 15 is increasing, as was done in Korea, (UNESCO, 2010).

The education policy makers in Kenya and neighboring states supports the introduction of ICT in secondary schools as a remarkable step that will contribute to knowledge production, communication and information sharing among students and teachers in the school system. Speaking at the second International Conference on ICT for Development, Education and Training held in Nairobi, (2007), Saitoti, the then minister of education asserted that ICT use in education offers new ways in which the quality, effectiveness, and the flexibility of higher education can be improved and have the capacity to improve the delivery of education through distance learning”, (MOE, 2007).

However, the extent to which a country is able to participate and benefit from the electronic communication technology depends on the country’s digital divide as well as availability of technical knowhow. ITU (2010) asserts that although computers have been oversold to schools, they are underused and most educational institution remains as they were decades ago and are not reaping intended benefits from technology to justify the investments.

## **2.1: The concept of E-Readiness and its Indicators explored**

E-readiness measures the preparedness of countries to take part in the digital economy and is a concept that emerged in early 2000, the first global e-readiness report was prepared by McConnell International, (Bridges, 2001). E-readiness originated with the attempt to provide a unified framework to evaluate the breadth and depth of the digital divide between the less developed and the developed countries (McConnell International, 2001). E-readiness studies provide a country with statistics that outline the legal, financial, social, technological and physical infrastructure required for it to be a networked society, thereby providing a firm base for sound policy making and investment decisions,(CID, 2006, EU, 2011)

According to the Bridges Organization (2001), the determinants of e-readiness covers the physical infrastructure of a country, the level of usage of technology, the legal and regulatory framework, the human capital and the business climate of a country . For effective e-learning in schools such as connectivity to various networks (internet, intranet, and mobile-telephone); sources of energy/power (electricity, standby generators) and equipment (computers, radios, videos, television, LCD projectors and software), e-learning laboratories, and information storage facilities (such as flash disks, CD-ROMs, DVDs) and trained personnel must be ensured (ITU, 2010).

The World Bank (2002) categorizes e-readiness criteria into four components: Connectivity (the quality and extent of Internet infrastructure), Capability (a country’s ability to deliver and consume e-Learning), Content (the quality and pervasiveness of online learning materials) and Human capacity Policy and Cultural environment whereby the legal and regulatory environment affecting the ICT sector is considered, and finally the size of the ICT sector. Chapnick (2000) designed a model for measuring the e-learning readiness of an organization by categorizing different factors into: Psychological readiness Sociological readiness; Environmental readiness; Human resource readiness; financial readiness; Technological skill readiness; Equipment readiness and Content readiness.

In some countries, such as Estonia, Finland and France, access to the Internet is a fundamental human right and access to technology and broadband is regarded as a basic infrastructure, in the same way as electricity or roads, (ITU, 2010).According to the ITU e-readiness report (2010), Africa was ranked the lowest in connectivity, with only 50 per cent of the rural population within reach of a mobile cellular network. It is estimated that globally, over 852 million people are not covered by mobile cellular signal, out of which 230 million are from rural population in Africa, (ITU, 2010). Data from internet world statistics indicates that although Africa hosts 14.3% of world’s population, only 3.5% of the continents population are internet users compared to North America with world population consisting of 5.1%, with world internet usage of 17.5%, Middle East with 2.9% of world population and 2.9% internet usage, at same time Oceania with a population 0.05%internet usage was 1.4%, (2008 Internet World Statistics Data). In the United States, the ratio of students to instructional computers reached five to one and 98% of schools were connected to the Internet by 2007. In the United Kingdom, the ratio of students to computers was 12:1 in primary school and 7:1 in secondary school while access to the Internet was virtually universal, as it was in the European Union as a whole. (Worldwide Web, 2008).

In the Republic of Korea, the average number of students per personal computer is 5.8, and 70.7% of schools are equipped with 2Mbps Internet lines. The adoption of e-Learning was the highest in , primary schools (88.0%), middle schools (78.0%), high schools (68.7%), junior-high schools (47.1%), junior colleges (62.0%), and universities (78.0%), making it a an example of ‘an e-ready state’,(UNESCO, (2010).

A survey of selected countries by Farrel et al (2007) revealed that many secondary schools in Sub-Saharan Africa are hardly ready for e-learning as table 1.1 indicates

**Table 1.1: adoption of e-learning in secondary schools in selected African countries**

Country with computers	Number of schools	Schools with computers	%
Egypt	26000	26000	100%
Ghana	32000	800	2.5%
Mozambique	7000	80	1.1%
Namibia	1519	350	22.1%
South Africa	25582	6651	22.6%
Kenya	7396	740	10%

**Source: Farrel et al, (2007)**

From the table, it is evident that African countries are in their initial stage in embracing new technologies in secondary schools despite its perceived spillover effects on the economy.

The International Networked Readiness Index (NRI) rankings have showed that Kenya continued to drop in digital readiness in the past compared to South Africa, Mauritius and the US. In 2005, Kenya ranked at 75 out of 102 countries, dropped to 91 in 2006 and 95 in 2007 against 122 countries. A low ranking for Kenya suggests low level of readiness and usage by businesses, government and individuals. In terms of access to electricity (connectivity), Kenya's performance is among the worst in the world compared with its own income group of countries. The national electricity access rate is about 15%, below the average of 32 per cent for developing countries, such as ,Egypt (95%), Tunisia (82%), South Africa (66%), Ghana (45%) and Botswana (22%) have also performed better than Kenya,(Kenya Economic Report,2009).

## **2.2: Situational Analysis of ICT Status in Kenyan Secondary Schools**

ICT integration in Kenya education system is more recent, of a smaller scale and experimental in nature as the computer and internet technologies came into use in 1990s (Farrel, 2006). After several years of effort, Kenya promulgated a National ICT Policy in January 2006 that aims to “improve the livelihoods of Kenyans by ensuring the availability of accessible, efficient, reliable and affordable ICT services.” The Ministry of Education has adopted ICT broadly in three ways: ICT as an administrative tool referred to as e-government, ICT for teaching and learning also known as e-Learning, and ICT for education management also known as Education Management Information System (EMIS). ICT sector performance is evaluated in terms of number of fixed and mobile telephone lines; the Tele-density; the number of computers and services; Internet Service Providers (ISPs), the number of Internet users; broadcasting stations and market share of each one of them. The Education Management Information System (EMIS) survey of 2003/2004 indicates that over 70% of the secondary schools in Kenya require functional telephones and 90 per cent of such schools need to establish Local Area Networks (LANs) to improve sharing of learning resources.

### **2.2.1: Government ICT Initiatives**

The Government of Kenya in 1996 declared that all secondary schools should introduce computer studies in schools but it was not clear how schools were to acquire the computers, ,(Odera, 2002). In response, many development partners supported the MOE in the implementation of ICT initiatives, including the ICT Global Development Alliance, the ICT Integration Team, the ICT Trust Fund and a number of private partners such as Microsoft, Intel and Cisco, Communications Commission of Kenya and Digital Village Initiative as well as NGOs such as the Network Initiative for Computers in Education (NICE) and Computer For School Kenya (CFSK). The New Partnership for Africa's Development (NEPAD) e-Schools project provided 6 schools with 20 computers each, integration at Primary Teacher Training Colleges (PTTCs) being supported by a USAID funded project. Digitization of the curriculum content is underway by the Kenya Institute of Education (KIE) ,( Kenya Economic Survey,2009). Kenya became the first in sub-Saharan region to introduce digital content for Electronic learning (E-learning) in schools in2009. The move is expected to see advancements in the education sector as both students and pupils can now study via the computer through interactive programs. The program by Intel was launched at Kamiti Secondary School in the outskirts of Nairobi, and the only other beneficiaries are South Africa and Nigeria. In order to enable schools to be connected to the ICT grid to exploit and promote e-learning, Kshs 1.3 billion have been allocated in the most recent budget (2009-2010) for the purchase of digital laboratory buses for each district which is expected to be achieved through the Economic Stimulus Program,(ROK, 2009). The pertinent question is, are these computers being used to enhance teaching and learning in our secondary schools? In the current curriculum, computer studies is a



separate learning activity/subject. Teaching learners how to be computer literate, and not how to use computers to enhance learning,(Omwenga,2004).

Despite the governments evident interest and commitment, the availability and use of ICTs at secondary school level is still patchy. As at 2006, the computer student ratio for universities and colleges was 1:45 while access at the primary school level was much more limited at 1:250, secondary school being 1:150, (ROK, 2009). Out of more than 7396 Schools with an estimated enrolment of over 1, 796, 467, about 1,300 secondary schools have computers and most those schools with computers are privately funded; only about 3% of public schools had computers by 2008. It is estimated that 60% of Computers in schools are not being used as an alternative method for curriculum delivery, (ROK, 2009). The few schools that have an ICT programme have limited the number of candidates who take up the subject, considering it a specialty whereas this is an essential subject just as would be the compulsory subjects like mathematics and languages. The optional status of ICT within the curriculum and negative attitudes among school leaders towards computers and the internet further alienates learners from realizing the role of ICT in learning, Ayere, Odera, and Agak, 2010).

### **2.2.3: The Influence of E-Readiness on Adoption of E-Learning**

The principle problems underlying ICTs and rural development in many African countries are issues of access and exclusion, Bridges (2001). Bridges illustrate that access to technology is one of the key elements necessary for technology integration into society. Farrel, (2007) contends that an acute lack of infrastructure in Kenya seriously limits opportunities for using ICTs for economic and social development. Lumumba (2007), in his study on the challenges facing e-learning at public secondary schools, based on the NEPAD pilot project schools in Kenya singled out lack of adequate e-learning facilities as key obstacles to the success of the e-learning project. He attributed such challenges to lack of preparedness among the institutions and implementers. Lumumba recommended that, for successful implementation of e-learning in educational institutions, the factors determining the readiness to adopt e-learning be established and dealt with .It is worth to note that recent studies that have been carried out in Kenya on use of ICT in curriculum implementation at Secondary schools, (Lumumba, 2007; Ayere at-el, 2010) were mostly based on NEPAD set up as Centres of excellence in e-learning integration so that other schools could emulate and this do not reflect the real situation of e-readiness for e-learning in normal Kenyan Secondary Schools.

The readiness of teachers to use the new technology is critical regarding if and how they are prepared to embrace the new technologies in their teaching and learning activities,(Hennessy, Harrison and Wamakote, 2010). A study done by Lau and Sim, (2008) in Malaysia on “exploring the extent of ICT adoption among secondary school teachers in Malaysia” showed that despite the apparent benefits of the use of ICT for educational purpose, the learning potential of ICT is deprived as many teachers are still not fully ICT literate and do not use it in their teaching. Studies on teachers’ readiness for ICT suggest that there is still a long way to go before schools in the region will be able to take full advantage of the opportunities provided by 21st century technology (Ya’acob et. al., 2005; So & Paula,2006 ).

Digital content is a vital e-readiness indicator of curriculum integration. Korea launched the Digital Textbook programme in 2007 to overcome the limitation of paper based textbooks and to support innovative education and future. In Kenya, KIE is still in preparation of digital content despite the fact that the ICT Policy was promulgated more than 5years ago. Government policy plays a pivotal role in funding and security measures to determine the speed of technology adoption. Issues related to standardization for reusability and interoperability, assurance of quality, and prevention of adverse effects become crucial. Korea developed national standards for e-Learning before the infusion stage, a prime example being the enactment of the Korea Educational Metadata, (UNESCO, 2010).

Gender differences have been linked to levels of computer acceptance. In an evaluation of its programme in four African countries, World link international found that despite efforts to make ICT programme gender neutral, gender inequalities in access persist in Uganda and Ghana. In Kenya, the ratio of men to women using ICT according to 2001 estimates stood at 70% and 30% respectively, (Kariuki et al, 2001). This disparity was partly attributed to the perception in the country that ICT was a technical subject suitable for men, with many females shying away from it. Further, high student-to-computer ratios and first come first serve policies in mixed schools do not favor girls, (Farrel et al, 2007).

### **3.0: Conclusion**

The growing demand for Secondary education in presence of the fiscal crisis faced by many developing countries makes it necessary to find more cost-effective alternatives to face-to-face education. E-Learning is designed to provide education to anyone, anywhere, and anytime and can be adopted to solve the problem of inequality in educational opportunities, achieve self-motivated and creative learning abilities. Thus, adopting

modern instructional multimedia technology sounds appealing to address some of educational challenges facing Kenyan education system. However, success in implementation and leveraging ICT in education in the conventional classroom setting is heavily dependent on teachers, investments in infrastructure to support a curriculum, the formation of practical ICT skills of both learners as well as pedagogical initiatives such as computer- and Internet-assisted instruction. It means adjusting the curriculum through adaptation and modification of the content to ensure that all ICT-mediated content is accessible to all students. This calls for an urgent need for reliable data regarding ICT infrastructure, human capacity, financial base, e-content and learner's readiness for e-learning utilization in Kenyan schools. There is need to review education from the earliest levels of schooling, reorient and improve existing curricula, prepare E-learning implementation framework and so as to capitalize on new technological changes.

There is need for change of mindset that presence of computers in schools is indicators for e-learning adoption, but how ready the learners are able to use them in an enabling environment. Otherwise, regardless of positive effects of technology on student learning, technology may remain limited in use and it is unlikely to be an effective method of enhancing enrolment of marginalized groups unless e-readiness is given priority. The paradox is that for those groups that are unable to cross the literacy divide, ICT is yet another means to further marginalize them and may increase the 'structured illiteracy' of those without access unless E-Readiness issue is effectively addressed.

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