Integration of Computer Assisted Learning in Teaching and Learning in Secondary Schools in Kenya

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ABSTRACT: The purpose of this study was to establish factors that lead to poor integration of Information and communication technology (ICT) for teaching and learning in schools in Kenya, despite comprehensive policy, institutional, infrastructural frameworks and capacity building by the Ministry of Education.

The subject of this study was administered by use of questionnaires in three categories of public schools: National School, Provincial schools and District Schools. The respondents were students from each level that is Form one, two, three and four and teachers based on the most offered subjects in the secondary schools. The Computer assisted learning facilities were classified into computers, internet and content in optical media. In National school Internet based research, optical media content provided by Kenya Institute of Curriculum Development and Cyber school program for Science subjects was used in learning. In Provincial school they lack adequate computers, reliable Internet and Content in optical media. In District school they lack adequate computer, no internet connection and content in optical media.

A Learner Management System which can be accessed by all learners by use of any internet access devices like mobile phone access will be ideal tool with over 4,000,000 mobile phone subscribers currently in Kenya.

INTRODUCTION

Computer Assisted Learning is a hybrid term that uses ICT resources to achieve teaching and learning goals. Although ICT has several definitions depending on the nature of its use, for this research ICT (information and communication technology) is used as an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems, as well as the various services and applications associated with them, such as videoconferencing, distance learning and Learner and Content Management systems. We refer to ICT in the particular context of ICT provision, policy and teacher factors that variously support teaching, learning and a range of activities in education.

The ways ICTs have been used in the education can be clearly divided into two broad categories: (1) ICT for Education and (2) ICT in Education. ICT for education refers to the development of information and communications technology specifically for teaching/learning purposes, while ICT in Education involves the adoption of general components of technologies in the teaching process (more specifically, often for the training of teachers in the use of technology for teaching (Olakulehin, 2007). In a similar vein, UNESCO (2004) classifies ICT in education into three broad categories: (1) pedagogy, (2) training, and (3) continuing education. Pedagogy is focused on the effective learning of subjects with the support of the various components of ICT. Olakulehin (2007) emphasizes that the pedagogic application of ICT involves effective learning with the aid of computers and other information technologies as learning aids, which play complementary roles in the classroom, rather than supplementing the teacher. The application of ICT in Education is now making it possible for education to transcend space time and political boundaries (kirschner, Kester, &Corbalan, 2007).

The research approach will be on three methodology dimensions.

1. The technological Components
2. Learning Model
3. Stakeholders

Technological Components.

Technological components refers to collection of technological tools (hardware and software) used to deliver learning materials and to facilitate communication among participants. They are further described as Technological Infrastructure-consisting of network infrastructure, application platforms and devices, and Content-consisting of content creation, content packaging and content delivery.

Learning Model.

It consists of an Educational environment, course development, teaching and learning student interaction, collaborative learning, and evaluation and assessment (Tennyson, 2005)

Stakeholders.

For ICT to be used in teaching and learning the stakeholders(partners and alliances) that include,Learner,teachers who assist in developing the course material, learners support, evaluation and testing, educational institutions that provide the platform,services and environment for learners and teachers to obtain what they need.(Govindasamy,2002).The education Institutions include the Ministry of education and its departments like Kenya Institute of Education and Kenya National Examination council, Kenya ICT board, Kenya ICT Trust Fund and Vision 2030.

INTIATIVES AND POLICIES.

A national ICT policy for Kenya was adopted in January 2006 after many failed attempts in preceding years (Waema, 2005; Kariuki, 2009). The aim of the policy was to improve the livelihoods of Kenyans by ensuring the availability of accessible, efficient, reliable and affordable ICT services as reported in the ICT in Education options paper (Kenya. MoEST, 2005).One important 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. *Survey of ICT in Africa Report* (Farrell, 2007).A significant step in this direction is the digitization of the curriculum which is ongoing at the Kenya Institute of Education (Ratemo, 2009) In an effort to promote the development of content that will address the educational needs of secondary education, the government came up with two ways in which the curriculum will be developed (Kenya. MoEST ICT in Education options paper, 2005). One, by adapting existing educational materials and distributing them to the schools; and the second, by beginning the process of

having schools create their own e-content. In order to achieve this policy objective, the Kenya Institute of Education (KIE) has been singled out as the sole government body charged with the responsibility of developing the ICT curriculum as well as distributing the educational material. KIE would also be in charge of overseeing other institutions that develop appropriate e-content (Farrell, 2007). Objective number 10 of the MoEST strategic plan (running from 2006 to 2011) targets strengthening the capacity of KIE to execute this mandate among others (Kenya. MoEST, 2006).The realization of achieving the computer assisted teaching and learning is expressed in the national ICT strategy for education and training, the policy document for ICT in education (Kenya. MoE, 2006). These include, among others, (1) equipping education institutions with digital equipment to stimulate integration of ICT in education and (2) supporting initiatives that provide digital equipment to educational institutions, with priority to secondary schools. The expected outcome of these measures was to improve equipping of educational institutions with digital infrastructure up to 80% in secondary schools. An ICT unit has been established at the Ministry's Head office to ensure systematic efforts are made towards strengthening adoption and use of ICT in the education sector in general (Wambui and Barasa, 2007). A main component of this implementation strategy is achieved through the Kenya ICT Trust Fund. Kenya ICT Trust Fund is a registered consortium in the form of an NGO in Kenya that brings together many partners from the public, private and civil society sectors. It is chaired by the Permanent Secretary of the Ministry of Education. Its main objective is to mobilize funds for the sole purpose of setting up computer laboratories in all Kenyan secondary schools in 4-5 years (CCK, 2005). A number of initiatives have delivered ICT infrastructure to schools, mainly at secondary level. These include initiatives supported by parents, the government, NGOs, or other development agencies and the private sector (Farrell, 2007). Notable among these are EMIS, Computers for schools – Kenya, NEPAD e-schools initiative, and the Microsoft Partners in Learning program (Microsoft, 2007).

Other Initiatives include:
Establishment of the learning resource centre that offers training in educational management and integration of ICT for school managers, lecturers, and students at the Kenya Technical Teachers College;

A MoE project "ICT equipment for schools" purchased computers for 142 schools in support of the ICT in Education Strategy;

Development of learning content focusing on digitization of curriculum content for schools at the Kenya Institute of Education;

Kenya Education Network Trust (KENET), currently funded by the Kenyan Ministry of Education and the ICT Trust, established permanent high-speed internet infrastructure in 22 School Broadcasting.

Free Software Licenses providing free access to Microsoft Corporation's operating software for schools and higher education institutions in order to reduce the cost of buying and using computers. The company was to work with the organisations involved in supplying computers to the institutions to install the software on the machines (Farrell, 2007).

METHODOLOGY

This describes the means of organizing the content for learning, the learning processes used and the support and impact on the stakeholders as used in integrating computer assisted teaching and learning in secondary schools in Kenya. Three categories are used to discuss the topic of research.

a) The technological components
b) Learning Model
c) Stakeholders

The Technological Components
Involves the teacher using technological infrastructure to deliver content to the learners. These infrastructures are classified into Computer as resource, Network infrastructure, Application platforms and devices. In Kenya secondary schools receive annual facility development fund from the Ministry of Education with national schools getting a bigger share followed by the provincial school and the allocation is done in number of student ratio factor and ICT facility development is the key priority. All the national schools have an operational Local area Network and internet connection and computers are in a 1:1 and 1:2

ratios in some schools i.e.1 Computer 2 students, with computers being Pentium III and above. The piloting of AVIDANET project of Ministry of Education was piloted in Nairobi School and The Kenya High School where learning was done through a local area network in a classroom environment. One of the major application platform used in schools more so national schools example of Nairobi School and Alliance High schools is the Cyber School for Science Subject platform where the executable file is installed in the school server or independent personal computer and the various subject 3D animated content like experiments processes in Digital Versatile Disk can be used for teaching and learning. Internet is used for research and uploading holiday assignments to the schools websites. The use of projector in teaching helps in display of internet researched materials, in animation, video, images and pictures.
Provincial schools also have local area network and internet facilities and computers as well some have website and this can be limited to some schools which have higher priorities of development dedicated to ICT and computer use on teaching is mainly focused on the Computer Studies subject students. The computer ratios is 1:2 and 1:4 and other having 1:10 if the schools does not perform prompt maintaince of the broken computers. There is use of projectors in some schools for display of teaching materials.

Districts schools lack adequate ICT facilities ranging from Computers Network infrastructure many do not offers Computer Studies subject as an examinable subject limiting then to priorities funding in ICT,moreover their government annual funding is less compared to National and Provincial schools.

Learning Model.
Learning model is further categorized into three; Content creation, Content packaging, and content delivery. Kenya Institute of Education is the only mandated body to create, package, implement and review the curriculum of primary and secondary education in Kenya. Secondary school content is created by inviting various subject teachers and examiners to develop learning content according to the syllabus whereby scripts are written and edited for audio content recording and after verification they are packaged in optical disk mainly Compact Disk(CD), for the video content recording is done in various ways it can be through a discussion of concepts by the subjects experts or live classroom teaching environment, like a science subject experiment where the processes is recorded or video shoot of features like in geography subject and images. Currently Kenya Institute of Education has embarked on an ambitious task of developing a learner content management system with the new government mission of a Laptop per every child in school starting in year 2014. Stakeholders like Cyber School for science Subjects Company has the content in 3-D animated form where the concept is delivered in a better way for the learner to understand.
Content Packaging and delivery is an important consideration when it comes to content development for learning. Currently KIE has only managed to package the content is in Digital Versatile Disk and Compact Disk which are supposed to be purchased by school, and according to the research few national schools has managed to purchase and those that have been purchased they are not fully used to support teaching and learning for example Nairobi School has a set of all the subjects but only science subject teachers uses them to teach and for lesson review by the students. In Provincial school the content is rarely used with exception of Languages subjects' i.e.English, Kiswahili, and any other foreign language offered by the school and in district school only used for Language subject as the case of national and provincial schools. However, as said earlier Language subjects has a unique wide use of content in disk digital form whereby The set books are acted by private companies and the school can borrow or purchase from the company and can be used in both computer and Television. Other learning model involves the teacher using Application packages like Power point presentation to teach and for boarding secondary schools during holiday some teacher send assignments in the schools website for student do over the holiday.

Stakeholders.
The major stakeholders in integrating computer assisted learning in secondary school in Kenya starts with the Ministry of education that develops the policy, institutional, infrastructural frameworks and capacity building for teaching and learning, through giving mandate to KIE to develop content for computer assisted learning. The secondary school principal through the district education office are advised to purchase the content as stakeholder, for the teachers to use the materials for teaching and learning, the learners are the beneficiary of the process of computer assisted learning since with technology in teaching and learning there is more learning compared to the normal classroom environment. The perception of computer assisted learning by the school Principal determines the level of integration. A number of studies have identified the school principal as a critical and pivotal person for 'establishing and maintaining

learning environments compatible with student-centered approaches to teaching and learning with ICT' (Afshari et al. 2008). They are also seen as curriculum and pedagogy leaders and are considered by stakeholders as central figures in leading processes for creating the conditions to teach and learn with ICT. From these arguments, it appears school leadership plays a key role in ICT integration in education. The competence of the School Manager in the use of ICT and a broad understanding of the technical, curricular, administrative, financial, and social dimensions of ICT use in education is important to the effectiveness and sustainability of ICT integration programmes.

Barriers affecting integration of computer assisted learning in secondary schools Kenya.

Use of Computer assisted learning in teaching and learning my encounter many difficulties and these difficulties are known as "barriers" (Schoepp, 2005)

Classification of barriers.
Several studies have divides barriers into two categories.Extrinisic and Intrinsic. However, what they meant by extrinsic and intrinsic differed. In one study Ertner(1999)refer to extrinsic barriers as first-order and cited access, time ,support,rescources and training, and intrinsic barriers as second-order and cited aattitudes,beliefs,practices,and resistance.Herdren(2000 as cited in Al-Alwani,2005) saw extrinsic barriers as pertaining to organization, rather than individuals and intrinsic barriers as pertaining to teachers, administrators and learners. Another classification was based on teacher-level barrier versus school-level barriers Becta (2004) such as lack of time, confidence and resistance to change or school level barriers such as lack of effective training, lack of enough resources. Further more the barriers can also be classified into Resource, Teacher-level, and school-level and management barriers.

Resource Barriers.
Lack of adequate computer assisted learning resources like computers, internet connectivity, and content in digital form, devices that support teaching and learning like the projector, speakers and optical disk readers and players.

Teacher-Level Barriers.

Lack of teacher confidence.
In Kenya teachers lack confidence of using computer assisted learning in teaching and learning Some studies have investigated the reason for teachers lack of confidence for example, eggs (2000) asserted that teachers" fear to failure" caused lack of confidence, and limitation in teacher ICT knowledge makes them feel anxious about using ICT in teaching Balanskat et al.(2006) where the learners could be having more skills than them.
Lack of Competence.
In Secondary schools in Kenya many teacher lack skills and knowledge to use computer assisted learning where by in secondary schools in Kenya this causes a barrier in adoption of computer in teaching and learning.
Resistance to change and negative attitude.
Resistance to adoption of Computer assisted material and continual text book use is a barrier in Kenya for computer assisted teaching and learning and resistance is caused by lack of technical support, poor planning on time schedule.

School-Level Barriers.
Lack of time
The research indicated that many teachers have competence in using computers in the classroom, but they still make little use of technologies because they do not have enough time. This is attributed by the school management not scheduling enough computer time for classes, the research time to explore sites to gather information, connecting devices and preparing the lesson in power point presentation form or in any other digital form, like photos and images.

Lack of effective training.
Many teacher lack training in the proficiency of using computer assisted learning in Teaching and learning, such that the cannot be able to use basic devices like a computer and a projector to display or deliver a lesson.
Lack of access to technology.
Research indicates that teachers lack accessibility of technological devices and other resource in school and at home attributed to high cost of facilities like internet connection and computers.
School Administration barrier
If the school principal does ICT skills or interest in learning the Skills the research indicated that the support to purchase and implementation ICT related resources will get minimum support for the principal being the decision maker then the use cannot be achieved with minimum or no support.
In a summary these barriers can be listed follows.

1. Lack of in-service training
2. Lack of appropriate software/materials
3. Lack of basic knowledge/skills for ICT
4. Lack of hardware
5. Lack of knowledge/skills for ICT integration
6. Lack of technical support
7. Lack of appropriate course content and instructional programs
8. Lack of time
9. Lack of appropriate administrative support.

Conclusion.
The ICT policies in Kenya and Vision 2030 have the use of computer assisted learning clearly defined and the ministry of education is mandated to work with the stakeholders to achieve this goal. The challenges faced by the Kenya Institute of Education which is the only organ mandated to develop update or review education curriculum for both primary and secondary education, like content packaging in optical media, can be solved by the recent objective of creating a web based Learner Content management system where if possibly made to be accessed in the mobile phone platform where currently there a re over 4,000,000 mobile phone user in Kenya and there will be more confidence to access or to use the mobile phone as teaching or learning tool since there is more confidence is using the phone than computer. The cost of connection is also cheap in the mobile phone and also the charging power ratios can also be achieved easily, rather than where you need electricity connection to access the materials. The availability of open source programs like Moodle and Drupal can be used to develop simple and relevant Learner management systems for learning by independent schools and the materials can be exchanged and shared am schools for diversity and this will supplement the big load the Kenya Institute of Education and foster use of computer assisted learning in secondary schools in Kenya. The flexibility of accessibility of the connect will also foster more interest since the mobile phone connectivity network is now over 80% in the country.

Lastly the government should have a policy of supporting the digital content in other government institutions so that the culture can easily be adapted as a way of modern way of doing things for efficiency, time saving and good quality services

Acronyms
MoEST-Ministry of Education science and Technology
KIE-Kenya Institute of Education
ICT-Information and Communication Technology
CCK-Communication Commission of Kenya
EMIS-Education Management Information System
UNESCO-United Nation Education Scientific and Cultural Organization
NEPAD-New Partnership for Africa's Development
BOG-Board of Governor
PTA-Parent Teachers Association.
NGO-Non-Governmental Organisations
MOE-Ministry of Education

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