Factors Affecting the Adoption of Information Communication Technology for Educational Support Activities in Secondary Schools in Vihiga County

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Abstract

Information Communication and Technology (ICT) plays an important role in education institutions by facilitating and improving the teaching and learning process to be in line with the information technology age. ICT has also been credited with the potential to integrate world economies thus demolishing the barriers created by time and distance. However despite IT's role in improving effectiveness and efficiency in service delivery, its adoption in most of the secondary schools has remained low and limited. This study sought to assess the factors affecting the adoption of ICT for education support activities in secondary schools in Kenya through a survey of Vihiga County. The study was guided by Diffusion of Innovation Theory. The study used a total sample of 69 respondents selected from secondary schools in Vihiga County. Questionnaire method was used to collect primary data from the study respondents. Study data was analyzed using the Statistical Package for Social Sciences (SPSS) version 22.0 for windows whereby descriptive statistics such as frequency distributions and percentages and inferential statistics such as Pearson Product Moment Correlation Coefficient were utilized. The survey established user's attitude, IT literacy, cost and policy issues in information technology as the major factors affecting the rate of ICT adoption in secondary schools in Kenya. However the study found that the said aspects have strong association with pace of ICT adoption and their effect is similar across schools. The study recommends that the government through its relevant agencies does intensify ICT in-service programs, e-learning workshops and conferences for teachers to enhance their integration capability. Government should coordinate the integration and subsidize the costs as well as monitor the implementation of a well-focused frame work in line with the national education ICT adoption strategy for learning institutions.

Keywords: Information and Communication Technology; Secondary Schools; ICT Adoption; Education adoption

Introduction

Information Communication and Technology (ICT) is a generic term that was coined by Library Scientists to refer to a diverse set of technological tools and resources used to create, disseminate, store and manage information (Primo, 2003). It includes computers, radio, television, mobile telephony, internet, networking and data processing capabilities and the software for using these technologies. Kwapongo (2007) says ICTs provide the capacity to harness, access, apply information and disseminate knowledge in all kinds of human activities. Oxford Advanced learners" dictionary defines ICT as an abbreviation for Information Communication Technology which is the study of the use of computers, the internet, video and other technology used in communication, Hornby (2008). Instruction is a step by step presentation of knowledge and activities by a teacher usually within a school environment. It is the interpretation, presentation of knowledge, attitudes and skills to learners. It deals with methods, materials and media used in implementing the curriculum (Otunga et al 2011). This term also refers to modern innovative materials used as mediators in instruction, research and management of educational institutions (Richey 2008). Instructional technology includes all kinds of hard and soft media which are used to make communication in the classroom easier for the teacher and learner. It is a form of non-textual material that a teacher may use in the instructional process (Garrison and Anderson 2003). According to Aggarwal (2004) educational technology is a system where machines, materials, media, men and methods are interrelated and work together to fulfill specific educational objectives. He further says it is the practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources. A good educational system recognizes the role and place of technology.

Information is a basic resource in today's society. We are living in an emerging global information intensive society with a global economy that is dependent on creation, management and distribution of information resources. This is made possible by interconnected global networks like the internet. Knowledge workers including executives, managers and professionals spend most of their time creating, using and distributing information. This trend points to a strong impact of IT (Information Technology) in schools, individuals and society, (Crane 2009).

ICT is a powerful tool in presenting information in different ways like texts, pictures, tables and graphs. Changes on information can be shown dynamically such as in mathematics or visualization of complex processes in science (Cobb and MacClain, 2002). The use of media for instructional purposes is traced back to the early 20th Century with the introduction of educational films and mechanical teaching machines. Modern ICT makes it possible to expand the walls of the classroom and enable the integration of resources such as scientific data, library collections, video and film archives from across the globe. A good example is the virtual classroom education. This is a form of distance learning in which course content is delivered by various methods like course management applications, multi – media resources and video conferencing. Students and instructors communicate via these technologies (Kurbel, 2001).

Statement of the problem

Educational reforms, trends and innovations are always made to improve the quality of education, facilitate access to relevant education and reduce poverty. All these will in turn improve a country's economic prospects (Robinson, 2008). According to GoK (2005) the use of information communication technology (ICT) in secondary schools is meant to widen access to secondary education, since it has a direct role to play if appropriately used. ICT's can bring many benefits to the classroom, teaching and learning process including offering opportunities for more student centred teaching, greater teacher-to-teacher, teacher-to-student and student-to-student communication and collaboration, lead to access to a wider range of courses and increased learning enthusiasm due to delivery of multiple technologies to teachers. The ICT can be harnessed to improve the efficiency, accessibility and quality of learning process by enabling increased access to knowledge, more collaborative as well as interactive learning techniques. Additionally ICT data repositories, networks and school curricula can be developed collaboratively, education materials can be procured more cost effectively; staff and student time can be scheduled more efficiently as well as monitor individual student performance more closely. Successful integration and use of ICT's in schools will play a critical role in disseminating skills to wider society, improve quality of curriculum, avoid duplication of effort and create positive impacts in the economy (GoK, 2004).

However, most secondary schools with computers use less than 40% of the available infrastructure and very few actually use ICT as an alternative method for the delivery of the curriculum. Kenya ICT survey, (2007) observed that many schools teachers are ill equipped to effectively integrate ICT in classroom due to inadequate number of computers, educational applications, training and acquisition of sub-standard, unfit or nearly obsolete equipment for use while teachers are left at the mercy of external partners for determining what they learn and how. Absence of adequate funding to purchase ICT equipment, retraining and developing requisite human capital for the whole sector, are critical indicators of technology lag and the process pace which is very slow and may lead to all benefits of ICT integration in schools to remain a pipe dream. It is upon this backdrop that the study sought to determine the factors that affect the adoption of Information Communication Technology for educational support activities in Secondary Schools in Vihiga County, Kenya.

Literature review

The study reviewed related theoretical as well as empirical literature.

Theoretical Review

The study was anchored on the diffusion of innovations theory. This theory was put forth by Rogers (1962) and seeks to explain the rate at which new technology diffuse within cultures. The theory also explains why and how technologies and new ideas are adopted in different cultures and societies. In the theory, diffusion is defined as the process through which a technology or new idea is communicated and accepted in a social system. In the diffusion of innovations theory, three types of decisions are made in a social system about adoption of an idea or technology. The first is the optional innovation-decision which is made by an individual, whether to adopt or not to adopt the technology. The second is the collective innovation-decision which is made collectively by all individuals in the social system. Lastly, is the authority innovation-decision which is the decision made for the entire social system by individuals who have power or influence in the social system. This explains the reasons that lead to higher education institutions to adopt the different training and learning technologies. The social, political and economic aspects of the adoption decision are explained by this theory.

Diffusion of innovations theory on the other hand provides an in-depth view of how the social, political,

economic and cultural factors enable or hinder adoption of technology. The theory explains that organizations or institutions adopt new technology through authority innovation decisions and collective innovation decisions. The collective innovation decision in the context of this study is where the adoption of technology as a training or learning tool is made by the faculty and students of a higher education institution. In this case, the decision is not formal and both the students and faculty agree to use technology as a learning or training tool. The authority-innovation comes to play where the decision to adopt any new technology in a higher education institution is made by the administration of the institution. This means that the few people who have a position of power in an institution can make the decision to adopt the technology or not (Rodgers, 2005). This theory also explains that in reaching the decisions, the benefits and costs of the innovation is considered. This theory therefore gave an insight into the political, social and economic factors that can enable or hinder adoption of technology in higher education institutions in Kenya.

Empirical Review
There are many definitions for ICT and the most elaborate version by Blurton (1999) defined ICT as the: *"… diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information. These technologies include computers, the Internet, broadcasting technologies (radio and television), and telephony".* Information and Communication Technologies are a networked system comprising data processing and storage and retrieval of information (Herselman & Britton, 2002).

It is true that the use of ICT has now become an integral part of daily life for a large percentage of people in both developed and developing countries (Kirkwood & Price, 2006). Kozma (2002) believed that ICT is becoming the heart of preparing students and teachers for participation in the teaching and learning society. Punie, Zinnbauer and Cabrera (2006) argued that "*it is difficult and maybe even impossible to imagine future learning environments that are not supported, in one way or another, by ICT*" .

Information and Communications Technology is not a cure for all educational dilemmas, even though today technologies are obligatory tools (Guri-Rosenblit, 2006; Jung, 2005). Information and Communications Technology when effectively incorporated into teaching and learning ensures interaction between learners and teachers, thus advancing cognitive skills development (Jones & Cress, 2001; Punie et al., 2006).

The importance of technology in education and in other aspects of life has been a subject of debate for many years. Some theorists see technology as a neocolonialism tactic while others see it as necessary in advancing education goals and aims. Kitcharoen (2007) observed that technology is credited as a significant factor in productivity improvement in various industries. Some people believe that if technology is used effectively in educational institutions, this could improve educational quality and opportunities. Kitcharoen (2007) is of the opinion that there should be no question on whether technology should be used in educational institutions but emphasis should be on ensuring that technology is used effectively to create new opportunities for learning and to promote student learning. From this perspective, it s seen that technology use should be an integral part of the educational institutions technology plan or an overall improvement plan. Various authors (e.g. Magambo, 2007; Hosman, 2010; Tai & Ting, 2011; Zacharis, 2012; Kregor et al., 2012) have however indicated that technology is an important tool to be incorporated in the educational environment to make the process more effective.

However, not all see technology as development or as necessary advancement. This critical development school of thought questions the hidden assumptions of the development policies of the developed countries. The critical development school of thought views that these countries who originate with development agenda have hidden motives top on the agenda being to advance their own selfish interests such as profit motive or desire to rule or governance. Duffield (2007) remarks that development is more about governance and less about advancing the needs of the developing nations. Duffield also views development aid and technological developments as a part of the imperial ambitions of the developed countries to govern and control the poorer nations.

There is an increasing realization among various political and educational stakeholders that the educational challenges we face today cannot be overcome with traditional means alone. There is therefore an increasing advocacy of ICTs in various policy and strategic documents in Kenya (including vision 2030) as an important contributor to the solution of the problems in education in Africa. These problems include the problems of low access, poor skill set in graduates and poor quality. Education and political policy makers have seen the need for teachers, professors and technical and administrative staff to be provided with requisite capacity that enables them to integrate new ICTs in their teaching programs.

Digital technology allows more interactive pedagogy by supporting online learning communities (Lai, 2011). Conventional libraries are no longer merely places for storing printed materials, and accessing various digital libraries is now the new practice in tertiary institutes (Hefzallah, 2004). These new online collections contain printed works like textbooks, journals, illustrations, maps, photographs, 3D models, animations and audio files (Blurton, 1999). These technological developments and the rise of online databanks are leading to an

increase in learning outside the traditional classroom (Hefzallah, 2004). Students and teachers can use the Internet as an important informative tool for research, document searches and other academic work.

Methodology
The study adopted a case study design which enabled the realization of an in-depth investigation of the study constructs. The population of the study comprised of school management and the teachers involved in ICT adoption and implementation in secondary schools in Vihiga County. The target population included all the head teachers or deputy head teachers, the heads of curriculum, heads of ICT department and the IT teachers in the secondary schools in Vihiga County. The study used purposive sampling technique to select 69 respondents comprising of 20 head teachers, 20 deputy head teachers, 10 heads of ICT departments in secondary schools and 19 ICT teachers. A standard questionnaire was used for purposes of data collection. Both structured and unstructured items were included in the questionnaire. The data obtained from the field was organized, edited to ensure completeness, comprehensibility and consistency, classified and coded according to research hypothesis and objective for analysis. Both descriptive and inferential statistics were computed by the use of the Statistical Package for the Social Sciences (SPSS) version 22.0 for windows. All statistical measurements were computed within 95% confidence interval.

Findings
This section is divided into descriptive and inferential statistics. Descriptive statistics include frequencies and percentages and have been used to summarize and describe study data. Inferential statistics were used to investigate the direction and magnitude of relationship between study constructs.

Respondents were asked to indicate their academic qualifications and findings presented in table 1.

Table 1: Academic Qualifications of Respondents

Academic Qualification	Frequency	Percentage (%)
Diploma	6	8.70
Degree	51	73.91
Masters	11	15.94
Doctorate	1	1.45
Total	**69**	**100.0**

Findings in table 1 reveal that 73.91% of the respondents had bachelor's degrees while 15.94% had masters degrees. It was also observed that 8.7% of respondents were diploma holders while a further 1.45% of the respondents were PhD holders.

Respondents were also asked to state their ICT qualifications and findings presented in table 2.

Table 2: Respondent's ICT Qualifications

ICT Qualification	Frequency	Percentage (%)
Certificate	37	53.62
Diploma	21	30.43
Degree	9	13.04
Masters	2	2.90
Total	**69**	**100.0**

Study results in table 2 reveal that 53.62% of the respondents had certificate level qualifications in ICT while 30.43% had diplomas. A further 2.9% of the study respondents had masters degrees in ICT.

Respondents were asked to indicate how often students used internet in their respective schools and findings presented in figure 1.
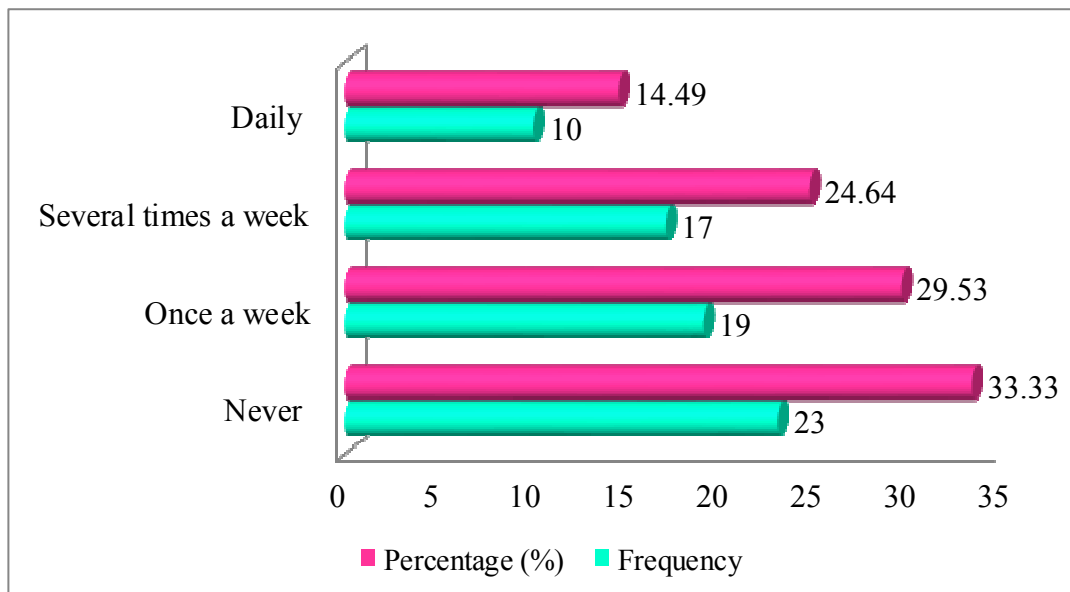
Figure 1: Frequency of usage of internet by students

Study findings in figure 1 reveal that majority of respondents never used internet in schools with very few respondents indicating that internet was used daily in their respective schools.

Respondents were asked to state the types of ICT resources used by students in their schools and findings presented in figure 2.
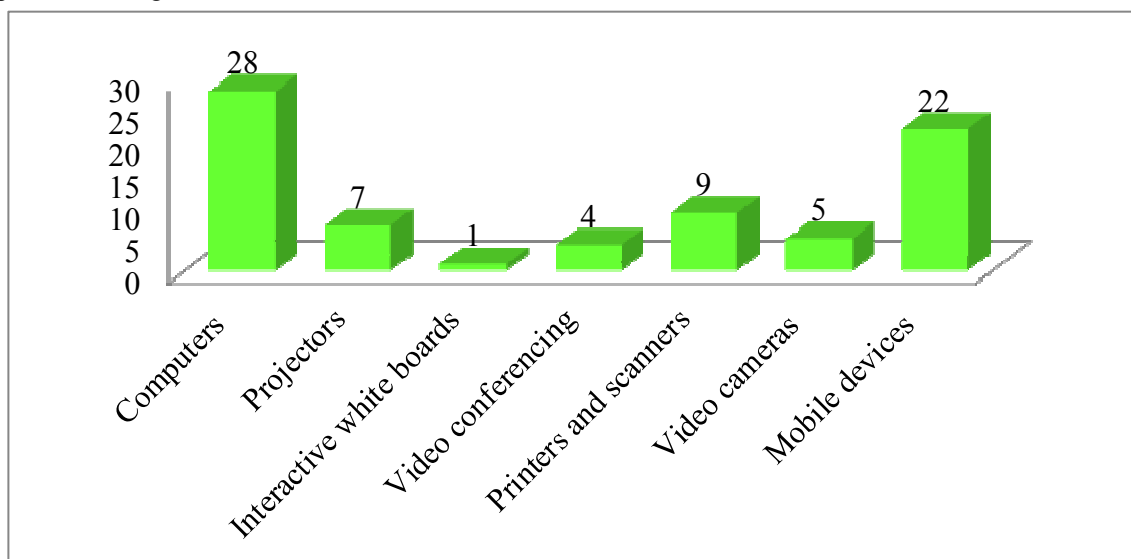

Figure 2: ICT Resources used in Schools

Study findings in figure 2 reveal that computers were the most used in schools followed by mobile devices while interactive white boards were the lead used ICT resources in secondary schools in Vihiga County.

Correlation for factors influencing adoption of ICT in Secondary schools

Pearson Product moment Correlation Coefficient was used to determine the relationship between study constructs and findings presented in table 3.

Table 3: Pearson Product Moment Correlation Coefficient for key study constructs

		ICT Adoption Pace	Deduction
User attitude	Pearson Correlation		Negative
	Sig. (2-tailed)		
	N	69	
ICT Cost	Pearson Correlation	-.475(**)	Negative
	Sig. (2-tailed)	.000	
	N	69	
ICT Literacy	Pearson Correlation	.585(*)	Positive
	Sig. (2-tailed)	.010	
	N	69	
Policy	Pearson Correlation	-.309(*)	Negative
	Sig. (2-tailed)	.002	
	N	69	

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).
Source: Study data, 2016.

Study findings reveled a statistically significant and a strong positive correlation between pace of ICT adoption and IT literacy in secondary schools in Vihiga County (r=0.585; P<0.05) implying that high levels of IT literacy increase the rate of ICT adoption. In addition, there was a significant and negative correlation between ICT adoption and ICT cost, User attitude, and policy in secondary schools in Vihiga County. This shows inverse relationships between the study constructs and adoption of ICT in secondary schools implying that that high cost of funding ICT programmes, negative user attitude and absence of ICT policy were negatively affecting ICT adoption.

Conclusions and Recommendations

Regarding the study findings, the study concludes that the pace of ICT adoption in secondary schools in Vihiga County is very slow, as characterized by inadequate IT literacy, high cost of funding ICT programmes, inadequate infrastructure as well as insufficient policy guidelines. This study recommends to the ministry of education to do more in order to improve the current ICT strategy for education to make it a three tier policy frame work to address specific needs of individual levels of institutions; with the first tier being the policy for secondary schools. This level in the education sector has different needs, both in its core duties, infrastructure and human capacity requirement and thus need to have specific targets, mechanisms and timelines addressed separately for Education Sector to attain any tangible and observable ICT diffusion levels.

It is also recommended that the government increases the ICT budget to address adoption challenges in secondary schools as the study found that high cost of funding ICT programmes is negatively influencing ICT integration. Adequate ICT budget should be provided to empower the operations of ministry of information and communication as well as the ministry of education with a focus of bringing down the cost of ICT adoption. The study found that negative user attitude hinders timely realization of ICT potential and it was also observed that there is very low IT literacy levels in secondary schools, thus study recommends the government through its ministries, agencies and other stake holders do more to improve the ICT infrastructure in schools especially in relation to; educational support software, ICT interconnectivity, internet connectivity speed, and policy guidelines regarding ICT workshops and conferences as well as retraining programmes for secondary school teachers to enhance its adoption in schools. This will ensure both psychological and technical skill readiness of teachers are addressed so as to reverse the slow rate of ICT adoption trend and improve the pace of diffusion in the secondary schools in Vihiga County, Kenya.

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