

An Investigation of the Relationship of ICT Access of Principals and ICT integration in Management Public Secondary Schools in Kenya

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Abstract

The purpose of this study was to find out whether there exists a relationship between ICT access of principals and ICT integration in management of public secondary schools in Kenya. Descriptive survey design was used in Nairobi County where quantitative and qualitative research strategies were applied for the collection of data using questionnaires. The target population comprised of 75 secondary schools in Nairobi County at the time of data collection. Simple Random sampling was used to select the public secondary schools with 7(10%) principals participating in the pilot study. Data collected by questionnaires from 68 principals out of 75 principals were analyzed using Pearson's chi square with the help of Statistical Package for Social Sciences (SPSS) programme. The findings of the analysis of data revealed that there was a significant relationship between the principals' educational level and ICT integration in management of public secondary schools in Kenya. Out of this study recommendations were made to the county government and secondary schools in Nairobi County and Kenya in general.

Key Words: - ICT Access of Principals, ICT integration and Management

Introduction and background to the study

The incorporation of Information Communication Technology (ICT) in school management has been promoted as a key step in bridging the digital divide (Han, 2002). Information Communication Technology (ICT) shows the way of distributing information in the school and is being used in management of school affairs to change education outcomes (Asan, 2003). The main ICT tool to be used in management and administration is likely to be the computer, together with basic software packages especially MS Word, Excel, PowerPoint, or the equivalent open source packages, and access to email and the internet. In addition there are software packages designed specifically for school management and administration, including timetabling, databases for learner records, systems for the recording of school development plans, syllabus completion reports, test data, school based assessment records and financial records.

This is a comprehensive study on the use of Information Communication Technology (ICT) in the educational environment and integration of computer-based applications into management of public secondary schools. Information Communication Technology (ICT) includes the use of the computer as a tool for management. It addresses the impact of the different computer modalities, use of the Internet and integration issues of educational technology in management. Information Communication Technology (ICT) includes computer tools for word processing, spreadsheet and database management.

Though many people believe and perceive ICT to be a new phenomenon, history has shown that humans have been storing, retrieving, manipulating and communicating information during the times of Sumerians of Mesopotamia (Reddy, 2013). The term information technology was first used and appeared in a 1958 in the Harvard Business Review (Reddy, 2013). The proponents of ICT terminology in the business and management world were Leavitt and Whisler whose work appeared in 1958 (Nwosu, 2003). Based on the storage and

processing technologies employed, it is possible to distinguish four distinct phases of IT development: pre-mechanical (3000 BC – 1450 AD), mechanical (1450–1840), electromechanical (1840–1940) and electronic (1940–present) (Roblyer, 2005). The first and earliest mechanical analogue computer (geared mechanism) referred to as the Antikythera mechanism was used at the beginning of the first century (Magni, 2009). However, it was not until 1645 when the first mechanical calculator capable of performing the four basic arithmetical operations was developed (Maki, 2008). It was not until 1940s when electronic computers, using either relays or valves began to appear for use in business and as a tool for management of organizations with electromechanical (Zuse Z3) completed in 1941 as the world's first programmable computer, and by modern standards one of the first machines that could be considered a complete computing machine.

The use of ICT innovation in school management can be tracked back to the 1970s when the computerization of schools gained momentum (Pang, 1995). However, a visible presence of this was evident to the customers since 1980s when some schools in Kenya could communicate to the outside world without necessarily the use of letters. The early decade of the 1990s saw the emergence of automated voice response (AVR) technology. The 1990s is a period in Kenya when the policy allowed the teaching of computer science in secondary schools as a subject though with challenges in terms of trained personnel and lack of power for most schools especially in the rural areas. Through the pledges by the current president and deputy president of Kenya during their campaigns, the teaching of Computer literacy is supposed to commence in standard one in all Kenyan primary schools. Before 1979, computers existed primarily in tertiary level educational institutions. Then, in the eighties, microcomputers began to be distributed to schools, and teachers began to grapple with the question of how to use computing for education rather than simply educating about computing. Starting from the mid-nineties, the use of ICTs in schools rapidly expanded in developed nations through curriculum support, networking, the professional development of teachers and software improvements (Aston, 2002).

In recent years, bandwidth has greatly increased and user familiarity with the Web and ICTs in general has evolved, contributing to an evolution of the Web. Some are referring to this evolution as numbered “versions” or “generations” (Web 1.0, 2.0 and 3.0). Web 1.0 refers to the first implementation of the Web which mainly allowed users to search for information and read it. The main goal of organizations creating such Web sites was to establish an online presence and make information available to anyone at any time. The Web as a whole hasn't moved beyond this stage yet. Web 2.0 refers to the trend in social networking, user-generated content and software as a service rather than a product. Many of the social networking tools have been around for a number of years (forums, chats, etc.) but there are new trends in communication and collaboration tools which are emerging (e.g., folksonomies, wikis, blogs, tools like Facebook, twitter, whatsapp etc.). More recently, the focus has shifted from the information society to the knowledge society and policies promoting, connectedness, the ability to take advantage of information resources (Ungerleider & Burns, 2003).

This research was guided by the following objective:

- to assess whether the level of access in Information Communication Technology (ICT) is related to their level integration of Information Communication Technology in management of public secondary schools in Nairobi County, Kenya;

This study answered the following research question:

- What is the relationship between the principals' level of access and the level of integration in information communication technology in the management of public secondary schools in Nairobi County in Kenya?

The null hypothesis that guided this study was:

H₀₁: There is no significant relationship between the principals' level of access in ICT and integration of information communication technology in management of public secondary schools in Nairobi County, Kenya.

Review of Related Literature

Access of ICT by Principals and Level of Integration of ICT

Pernia (2008) reported that the access dimension of ICT is characterized by a user's awareness of ICT and availability and the relevance of these ICT in both their personal and professional life. Access to digital content includes user accounts, personal file storage and communication tools such as e-mail and discussion forums. It is explained further that these services include network accounts, network-based file storage, access to e-mail, shared folders for learning and teaching materials. In this study, ICT access means awareness and availability in terms of acquisition of hardware and software. Awareness and acquisition state is that condition wherein the person becomes aware and conscious of the technology, analyses its significance, reflects on its value and subsequently, desires and decides on skills. She adds that, in the case of developing countries, the levels of ICT literacy are not all applicable because the levels of ICT availability in these countries vary. According to Albirini (2006), access to computer resources has often been one of the barriers for technology integration in both developed and developing countries. Kirsch and Lennon (2005) show that there is no statistically direct relationship between the ICT skills of more experienced workers and the less experienced workers.

In Spain, familiarity with computers and years of experience with ICT correlate positively with levels of institutional management (Selwood, Fung & Mahony, 2003). This result suggests that principals who had access to computers and the Internet were more likely to use them than those who did not have adequate access to equipment and network connections. Therefore, access to hardware and software is factor related to computer use. The ICT facilities considered in this research are similar to those in a study done in a West England school where access to word-processing, spreadsheets, and databases, Internet/e-mail and PowerPoint among teachers was considered (Selwood et al., 2003). Similarly the current study considers the following hardware and software equipments. The hardware equipments are as follows: Electricity infrastructure, Computer, Printer, Scanner, Internet/e-mail infrastructure, School telephone, Digital/video camera, Fax machine, Copier, Surveillance camera, Projector. The softwares are: Word processing, Spreadsheets, Databases, Power Point and Internet/e-mail

Methodology

The study was conducted using descriptive survey design. The target population for this study consisted of 75 principals in public secondary schools in Nairobi County at the time of study. In this study the researcher choose census survey and all the 75 principals of public secondary schools in Nairobi County were selected for the study. Further nine principals, one from each district were randomly chosen for interview. The nine principals were interviewed after they had filled the questionnaires. Questionnaires were used to collect data. In the current study, one principal from each of the nine divisions was interviewed once during visits to schools using the interview schedule to allow opportunity for probing and clarifying collected data from the questionnaires. The number of respondents involved in the pilot test was seven public school principals from Nairobi County. The pilot test was carried at the schools with similar characteristics to those sampled. The instruments used for the study were subjected to scrutiny by experts in the areas of educational management. Their corrections on

ambiguities, length, structure and wording of the questionnaire and interview schedule were used to modify and restructure the instrument. Cronbach alpha (α) was used for estimating internal consistency.

The primary data was collected from the principals who were the respondents through use of questionnaires and interview schedules. The data obtained from this study were both qualitative and quantitative. Analysis was conducted to provide structure to the gathered data and allowed for triangulation between the various research instruments used. The data for the questionnaires were entered carefully and accurately into Statistical Package for Social Sciences (SPSS) version 20.0 after it had been arranged and coded. Frequency distribution and percentages were computed for all items. Descriptive statistics used included the frequencies and percentages. The analysis of the hypothesis the researcher used Chi Square test (χ^2) to test the relationships and the level of integration of ICT for management of public secondary schools in Nairobi County. Data for each hypothesis were tested at the 0.05 level of significance. The analysis of data collected by interview was done using focus by question analysis strategy. Data was presented in percentages and frequencies. The researcher also recognized objectivity as vital during data analysis to ensure that the collected data is interpreted correctly. Saunders et al. (2007) explain that researchers must try to minimize risk to participants and society while attempting to maximize the quality of information they produce. Therefore ethical measures were observed throughout the investigation.

Findings of the Study

Principals’ Access to ICT and Integration of ICT for School Management

Most secondary schools administrators have moderately embraced the use of ICT to perform administrative tasks. Table 1 shows the level of access to ICT.

Table 1
Extent of Using ICT on School Administration.

	High		Moderate		Low	
	N	%	N	%	N	%
School Administration	25	37.9	34	51.5	7	10.6

School administration: Maki (2008) stated that ICT could play major roles in reducing operational inefficiency and improving decision-making in many areas of governance in schools and school administrative subsystems. The findings of this study show that 51.5% of the principals of secondary schools moderately make use of ICT (computer) for schools management, 37.9% use it highly while 10.6% minimally use it. Administrators use ICT in preparing, administering, and compiling and analyzing students’ tests marks and for keeping records. It was revealed that they use ICT for in the Kenya Certificate of Secondary Education (KCSE) registration. However, it was observed that principals need to use ICT in making logical decisions and seeking information on school rules and policies both for teachers and students. The educational management information system (EMIS) can allow effective management of financial and human resource. Application of ICT shows that data can be stored, retrieved and disseminated online with the use of MIS provided ICT is available and applicable(Oguta,Egesa and Musienga, 2014)

Table 2
Extent of Using ICT to Manage Curriculum Instruction.

	High		Moderate		Low	
	N	%	N	%	N	%
Curriculum Instruction	28	42.4	32	48.5	6	9.1

Information Communication Technology can be an effective tool in supporting teaching and learning. However, it is now firmly established that its introduction into schools does not by itself improve the quality of education or raise attainment (Watson, 2001). Encouragingly, there is growing and widespread awareness that the pedagogical and technical expertise of the teacher is absolutely critical here. Effectively introducing technology into schools is also largely dependent upon the availability and accessibility of ICT resources (e.g. hardware, software and communications infrastructure). Tella, Toyobo, Adika & Adeyinka (2007) agree that there is universal emphasis on teaching basic skills and research studies indicate that integrating ICT into subject learning is far more effective for students. The skill emphasis is reinforced by the lack of technology located in classrooms and a corresponding concentration on purpose-built computer labs. In this study results, revealed that 48.5% moderately use ICT for Curriculum Implementation, 42.4% are high users while 9.1% were low - users. Principals revealed that they use ICT for posting students’ marks, grading their performance and timetabling. Information Communication Technology when used in the classroom becomes a catalyst for change in teaching styles and learning approaches (Watson, 2001).

Table 3
Extent of Using ICT to Manage Financial Management.

	High		Moderate		Low	
	N	%	N	%	N	%
Financial management	26	39.4	33	50.0	7	10.6

Majority of the principals of secondary schools (50.0%) moderately use ICT to do their financial management, 39.4% highly use it while 10.6% are low-users. This shows that though not at a very high level, ICT is playing a great role in financial record keeping of the secondary schools in Nairobi County. Principals of secondary schools use ICT for fees payment records in computer files, preparing staff salaries and payment processing along with fee analysis. Table 9 shows the extent of using ICT to manage guidance and counseling.

Table 4
Extent of Using ICT to Manage Guidance and Counseling.

	High		Moderate		Low	
	N	%	N	%	N	%
Guidance and Counseling	3	4.6	46	70.8	16	24.6

The importance of guidance and counseling programme in secondary schools, include bringing to the students an increased understanding of the educational, vocational and social information needed to make wise choices (Oye, Obi, Mohd, and Bernice, 2012). In our society there are many influencing forces responsible for the gradual recognition of formal guidance to young people in various educational levels (Lorelei, 2010). The essence of incorporating guidance and counseling into the public secondary school system in Kenya was to eliminate overwhelming ignorance of many young people on their choices of career prospects and personality maladjustment among adolescents. The role of ICT in guidance can be seen in three ways: as a tool, as an alternative, or as an agent of change. This study revealed that a high proportion (70.8%) of the secondary schools moderately use ICT facilities for guidance and counseling, 4.6% highly use it while 24.6% are low -

users. The principals had a positive attitude towards the use of ICT in guidance and counseling. School guidance can benefit much from ICT in terms of record keeping and communication. Further insight from the interview showed that cost, confidentiality and security were issues that were identified as needing to be addressed since school guidance is an integral component of education that benefits a lot from ICT usage. Table 5 shows the extent of ICT usage in management of school resources.

Table 5
Extent of Using ICT to Manage School Resources.

	High		Moderate		Low	
	N	%	N	%	N	%
School resources	17	25.8	36	54.5	13	19.7

The researcher sought to establish use of ICT in management of store ledgers and stores balance in secondary schools. Findings of this study revealed that 54.5% of the public secondary schools principals’ moderately use ICT for management of school resources, 25.8% highly uses it while 19.7% low -users. The study revealed that principals use computer applications such as Excel, Word and Access in managing of school resources. This has an impact in record keeping and retrieval of information whenever needed especially for auditing purposes. Table 6 shows the principals’ level of integration of ICT.

Table 6
Principals’ Level of Integration of ICT.

Level of integration of ICT	Frequency	
	N	Percent
High	22	33.3
Moderate	39	59.1
Low	5	7.6
Non response	2	3.0
Total	68	100.0

Table 6 indicates the level of principals’ level of integration of ICT in management of secondary schools. The table indicates that majority of the principals have moderately (59.1%) integrated ICT in management of secondary schools, However, 33.3% of the principals have highly integrated ICT in the day to day management of their schools. Only a few indicated that they have lowly used or did not respond (9.6%). Generally although many of the principals have indicated that they have integrated ICT in management of secondary schools, their level of use of ICT is still at basic level.

Relationship between Principals’ Access to ICT and Level of Integration of ICT in Secondary School Management

The researcher was interested in establishing the relationship between principals’ access to ICT and the level of integration of ICT in public secondary schools in Nairobi County. Table 26 shows the relationship between principals’ access to ICT and level of integration of ICT in secondary school management. From Table 22, it can be noted that 45.5% of the respondents who had moderately integrated stated that they had inadequate access to computers and 26.4% who had highly integrated ICT stated that they inadequate access. This examination revealed that principals do not have adequate access to computers.

Table 7

Principals' Access to ICT and Level of Integration of ICT in Secondary School Management.

Access to computer	Level of ICT integration						Total	
	High		Moderate		Low		N	%
	N	%	N	%	N	%	N	%
Adequate	3	4.4	8	11.7	0	0.0	11	16.1
Inadequate	18	26.4	31	45.5	1	1.4	50	73.6
Not available	0	0.0	3	4.4	4	5.9	7	10.3
Total	21	30.8	42	61.7	5	7.3	68	100.0

Table 8 shows the results of Chi square tests on access to ICT of principals.

Table 8

Chi Square Tests on Access to ICT of Principals.

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	12.481 ^a	3	.032	.122	
Likelihood Ratio	14.528	3	.069	.084	
Fisher's Exact Test	10.823			.141	
Linear-by-Linear Association	3.562 ^b	1	.059	.071	.035

Table 27 indicates the results of the chi square (χ^2) testing of the hypothesis on relationship between access to information communication technology of principals and the level of integration information communication technology in management of secondary schools. The null hypothesis (H_0) was tested using chi square statistic (df=3, Pearson $\chi^2=12.48$, p= 0.032 at 0.05 level of significance) indicated that the finding was highly significant and therefore the null hypothesis (H_0) was therefore rejected. Access to information communication technology to the principals is therefore significantly related to the level of integration of information communication technology in management of secondary schools. This result is expected. It is expected that the higher the level of access to ICT a principal has, the higher the information communication technology exposure and use. Therefore principals with higher level of access to ICT are expected to highly integrate information communication technology use in management of secondary schools compared to those with low level of access to ICT. There is an apparent relationship between access to ICT by principals and integration of ICT for management by principals of secondary school in Nairobi County.

Answering interview questions a(1,2,3) b,c (derived from research question 5) which was seeking information on whether there was a relationship between

Principals ICT access and the level of ICT integration in secondary schools, 5(55.5%) out of the 9 interviewees agreed that training matters while 4 (44.4%) out of 9 disagreed. The results of the analysis are presented in

Table 9

Table 9

Responses from Interviewees on Principals' ICT access in ICT Integration in Public Secondary Schools Management in Nairobi County

Principals views on ICT access	% responses from the 9 sampled principals
Level of ICT usage	3(33%)
Have you benefitted from ICT	4(44%)
Frequency of using ICT	2 (22%)
Duration of using ICT	1(11%)
Total	9 (100%)

Results of the Chi Square test based on hypothesis 5 and research question 5 (interview items a1,a2,a3,b,c) are in agreement that ICT access is paramount for ICT integration in management of public secondary schools in Nairobi County. Principals through interviews were asked to give their views on ICT access in ICT integration in management of public secondary schools in Nairobi County. Their opinions showed that 3 (33 %) out of the 9 indicated that level of ICT usage by principals was mainly with timetabling and financial management. Responses from 4 (44 %) indicating that principals benefitted from ICT in terms of efficiency, accuracy, confidentiality and timeliness. Results indicate that 2 (22%) of the principals indicated that they use ICT frequently in management of public secondary school. On the other hand, 1 (11 %) of the principals indicated that more time was spent on ICT for management of public secondary schools in Nairobi County. (See Table 9)

Findings of this study from interview and observation checklist indicated that Nairobi county secondary school principals are lacking in proficiency on database, spreadsheet, presentation/ multimedia software, the Internet, and information seeking as compared with other technology competencies. Hence, the government needs to provide professional development for principals to become proficient in all the competency areas. Also, they should implement an evaluation system that ensures school principals are working with the technologies at a proficient level.

Therefore, access to ICT is a key element to successful integration of ICT in secondary schools. A study by Yildirim (2007) found that access to technological resources is one of the effective ways to ICT integration. In another study on ICT integration among faculty members in higher education in Turkey conducted by Usluel, Askar & Bas (2008) it was revealed that majority of the respondents 81.2 percent reported having access to ICT

Discussions

This part of the investigation attempted to establish the link between ICT access, which included hardware and software, and use of ICT in management of secondary school. The most available ICT hardware to principals consisted of a computer. The results indicate that Pearson $\chi^2 = 12.48$, $p=0.032$ at 0.05 level of significance e ($df=3$). The null hypothesis (H_{04}) was therefore rejected. It was not accepted. The level of access of ICT of the principal is therefore significantly related to the level of integration of information communication technology in management of secondary schools. The integration of ICT is expected to promote principals access to ICT. It is important to provide enough ICT equipment both hard and software and maintenance to secondary schools in Kenya. This will give principals ample time to manage the schools effectively. This task lies with the ministry of education and all the stakeholders of the schools.

The results from checklist observation revealed that one school did not have electricity at the time of the study. The school was constructed by CDF funds. It is clear that there were less ICT equipment and infrastructure in

most of the schools. In conclusion, it is evident that generally there were inadequate equipment, infrastructure and security as there were no surveillance cameras. Only ten schools had internet connection.

Conclusions

From the findings of the study, it was concluded that access to ICT was significantly related to their level of integration of ICT in management of secondary. This study revealed that the available ICT facilities in the Nairobi county schools were not adequate and their utilization was low.

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