Evaluation of ICT Preparedness in Public Secondary Schools: A Comparative Study of Public Boarding and Day Secondary Schools in the South Rift Region in Kenya

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Abstract

It is now widely acknowledged that a fundamental role for schools is to prepare learners with skills relevant to the challenges of the 21st century through acquisition of suitable knowledge and skills. The centrality of Information and Communication Technology (ICT) as an essential skill in the new world order cannot be gainsaid. In view of this, majority of developing countries are reviewing their education policies to align instructional curricula offered in schools with knowledge and skills that incorporate competencies in ICT. However, despite the acclaimed centrality of ICT, there are indications that public secondary schools in the South Rift Region of Kenya, are slowin putting in place the necessary infrastructure to support implementation of ICT. The purpose of this study was to evaluate ICT preparedness in public day and boarding secondary schools in the South Rift Region in Kenya. The study was guided by the following objectives, to; find out if public secondary schools have trained ICT personnel and find out the infrastructural preparedness in the implementation of ICT in public secondary schools in the South Rift Region in Kenya. The target population for the study comprised 69 teachers in public secondary schools in the South Rift Region of Kenya who were attending a Strengthening of Mathematics and Science in Secondary Education (SMASSE) training. The study employed the census technique to include the entire population into the study because the universe was a manageable number. Data was collected using a questionnaire and analyzed using descriptive and inferential statistics. The study established that availability of trained ICT teachers in public secondary schools in the study locale was average and availability of ICT technicians was low in public secondary schools in the South Rift Region. It had been hypothesized that there was no statistically significant difference in the level of ICT preparedness in boarding and day secondary schools in the South Rift Region in Kenya. One way Analysis of Variance (ANOVA) was computed and yielded a p-value = .261 which was more than the alpha value α > 0.05 indicating that the differences in ICT preparedness in the two school categories were not statistically significant. Therefore, the null hypothesis was accepted and it was concluded that the preparedness of schools to implement ICT infrastructure in boarding, and day secondary schools were largely the same. The study recommends the need to promote the use of ICT in all school categories and in particular the day secondary schools. This implies the need for sensitization of all stakeholders and provision of resources to develop ICT infrastructure and training of personnel in public secondary schools in Kenya.

INTRODUCTION

Information and Communication Technologies (ICT) has become an integral part of life in the 21ˢᵗ Century. ICT is the use of digital technology to manage, process and communicate information. ICT has become increasingly important in Education and it is now a prerequisite that students, teachers and principals all over the world be prepared for the 21ˢᵗ century through acquisition of suitable knowledge and skills in using ICT. In view of this, many developing countries are reviewing their education policies to align instructional experiences offered in schools with knowledge and skills that incorporate competencies in ICT (NCREL, 2000). Information and Communication Technology (ICT) refers to technological tools and resources used to communicate, create, organize, disseminate, store, retrieve, and manage information (Edefiogho, 2005). ICT does not only mean computers, rather it encompasses computers, the Internet, multimedia technologies, mobile phones, WhatsApp, and telephones, among others. This implies that ICT is a combination of computer and telecommunication applications. Effective ICT integration should focus on pedagogy design which considers the fact that teachers need to learn about technology in the context of their areas of specialization. Adoption of ICT can increase organizational efficiency by removing needless bureaucratic procedures in school management. ICT facilitates a school principal to discharge official responsibilities using the internet and computers in finding solutions to problems in the school and also in discharging daily assignments. In particular, ICT can reduce the workload of teachers and administrators in a school especially relating to adherence to records of learners, including marks, attendance, personal details, health, discipline, and fee payments. When integrated into the instructional process, ICT can be a powerful tool in supporting instruction and facilitating overall learning (Newby, Stepich, Lehman, Russel and Leftwich, 2011). ICT in education can not only improve student engagement but also improve access to education.

Yilmaz, (2011) highlights the importance of ICT in schools noting that it is important to make schools ICT savvy through provision of hardware, software, and internet connection. In addition, it is vital that schools are provided with practical backing with regard to maintenance and repair of ICT facilities. A study carried out by Gyamfi (2016) confirmed that breakdown of ICT hardware such as computers and projectors was a major challenge faced by teachers in using ICT in teaching and learning. Similarly, a report by the World Bank established that the lack of maintenance and repair of ICT hardware was a key challenge faced by educational institutions in developing countries (World Bank, 2017). Earlier studies by Becta (2004) and Tong and Trinidad (2005) emphasized that absence of technical maintenance of ICT devices in schools, leads to breakdowns and can render the entire ICT unreliable or useless and that technical faults might discourage the use of ICT in schools because fear of equipment breaking down and losing vital information affects the willingness to adopt ICT.

The use of information and communication technology (ICT) in education requires strong leadership to ensure effective integration and utilization. According to Schiller (2003), leadership in a school is central to promoting the consumption of ICT through transformative leadership, as well as providing opportunities for professional development and initiatives in using ICT in performing workplace assignments. A study by the Kenya Institute of Curriculum Development (KICD) found that effective school management was crucial in promoting the use of ICT in schools. The study identified adequate funding, access to ICT infrastructure, teacher training, and support as key factors in ICT integration in schools (KICD, 2016). Atyang, Gathumbi and

Babusa (2018) recognized the need for school managers to involve stakeholders in the decision-making process and in ensuring that ICT policies are in place, and provide adequate funding and support. Tonui, Kerich and Koros. (2016) hold the view that school managers are important in creating a positive attitude towards ICT among teachers and students, and in providing the necessary training and support. School leaders are therefore key drivers in creating a culture of innovation and promoting the use of technology for teaching and learning and should prioritize investments in ICT infrastructure and provide ongoing professional development for teachers (Trust, 2018).

when used appropriately, ICT can help to strengthen the importance of education in an increasingly networked society and raise the quality of education by making learning and teaching an active process connected to real life. ICT can support pedagogical, curricular, and assessment reforms, which intend to support the process of knowledge creation (Kozma, 2005). The infrastructure involves the identification of baseline needs for buildings as well as software and hardware for the ICT implementation process (Afshari, Bakar, Su Luan, Samah, & Fooi, 2009). Earlier studies recommended that infrastructure should be considered in terms of availability, access, location, and organization and that managers must know the school infrastructure in order to allow them to make decisions as to whether or not to implement new innovations. (Cuban, 2001; Rogers, 2003; Kovalchik and Dawson, 2004).

For ICT implementation to effectively take place, school principals need to make efforts to adopt and adapt to changing trends. They should adopt new strategies to support infrastructure in their schools in order to meaningfully implement ICT. Kischner (2003) conducted a study on teachers' preparation in deploying ICT and found that preparation of teachers is essential when introducing ICT innovations in a school. Flanagan and Jacobsen (2003) noted that the school principal might assist or hinder technology use in their decision to implement ICT. In support of this view, Jhurree (2005), opines that successful incorporation of ICT in schools warrants meticulous preparation and hinges fundamentally on solid understanding and appreciation of ICT by educational policymakers. The principal's understanding, attitudes, perceptions and strategies towards ICT should be taken seriously as these may influence the use of the technology in school. School principals also need appropriate knowledge and skills in order to be able to integrate ICT in school activities. It is expected of them to keep track of the latest developments in curricula in order to maintain high educational standards, thus, training of school principals is important in order to develop appropriate skills and knowledge regarding effective use of computers to support teachers and learners in their schools (Newhouse, 2002). As established by Owston (2006) school principals have therefore been identified as having a major influence on the training and support of staff during ICT implementation.

Successful implementation of ICT in schools also hinges on policy. Hepp, Hinostroza, Laval and Rehbein (2004) note that in order to have long lasting effects, an ICT policy should preferably not be designed in isolation. Rather it should be part of more comprehensive efforts toward improving the equity of an educational system. Another vital variable of ICT integration in schools is the availability of ICT infrastructure. Yildrin (2007) reveals that one fundamental problem facing ICT integration in schools is the lack of computer infrastructure. In a related study, Norris (2001) asserts that appropriate access to technology infrastructure is another key factor in the effective technology integration process that reveals the substantive correlation between technology access and use. On the other hand, technical support involves actions taken

as a result of contact initiated by users to assist them to get more out of the ICT systems, for example, help desk, initial technical training and provision of after sales service. ICT implementation requires maintenance services such as lubricating, adjusting and replacing minor parts to be done regularly. In Namibia, the MoE established the National Education Technology Service and Support Centre (NETSSC) in order to ensure access to technology for all education institutions by overseeing the sourcing, refurbishment, installation and support of ICT in schools (Katulo, 2010). In Kenya the Ministry of Education appreciates and recognizes that an ICT literate workforce influences a country's economy, however, schools need to be prepared in terms of infrastructure in order to realize this noble objective.

Statement of the Problem

The Ministry of Education has put in place several policy papers supporting projects involving the implementation of ICT in education across the country. In addition, donor organizations, the private sector and philanthropists continue to channel resources into secondary schools in an attempt to promote consumption of ICT in schools. However, despite the various efforts made, the use of technological tools and resources to communicate, create, organize, disseminate, store, retrieve, and manage information in secondary schools in the South Rift Region of Kenya, remains dismally low. There seem to be factors that derail the process of ICT usage in curriculum delivery and school administration. This raises concern as to the underlying causes of this trend. In addition, literature on ICT preparedness in the South Rift region of Kenya is limited. It is for this reason that this study sought to investigate schools' ICT preparedness in public secondary schools in the South Rift Region in Kenya.

Objectives of the study

1. To find out if public secondary schools in the South Rift Region in Kenya have trained ICT personnel.
2. To find out the infrastructural preparedness in the implementation of ICT in public secondary schools in the South Rift Region in Kenya.

Research hypothesis

Ho1: There is no statistically significant difference in the level of ICT preparedness in boarding and day secondary schools in the South Rift Region in Kenya.

METHODOLOGY

The study adopted a descriptive survey research design. The target population for the study comprised 69 teachers in public secondary schools in the South Rift Region of Kenya who were attending a Strengthening of Mathematics and Science in Secondary Education (SMASSE) training. The study employed the census technique to determine the subjects to be included in the study. This method was found to be most suitable because the entire population of the study was a manageable number. According to Surbhi (2016), census refers to a procedure of gathering, recording and analyzing information regarding all members of the population. It involves the complete count of the universe, whereby each and every unit of the population is included in the study. Australian Bureau of Statistics (2013) observes that the census technique provides a true measure of the population, and captures detailed information about small sub-groups within the population which may be unlikely to be available.

RESULTS AND DISCUSSION

The results and discussion are presented in accordance with the objectives and hypothesis of the study.

a) To find out whether public secondary schools in the South Rift Region had trained ICT teachers and technicians, the respondents were provided with seven items on a four-point Likert scale ranging from strongly disagree (1), disagree (2), agree (3) and strongly agree (4). The scores obtained were used to compute a mean score and a standard deviation for each statement and a global mean score for availability of trained teachers and technicians ICT in the schools. Table 2 provides a summary of the findings.
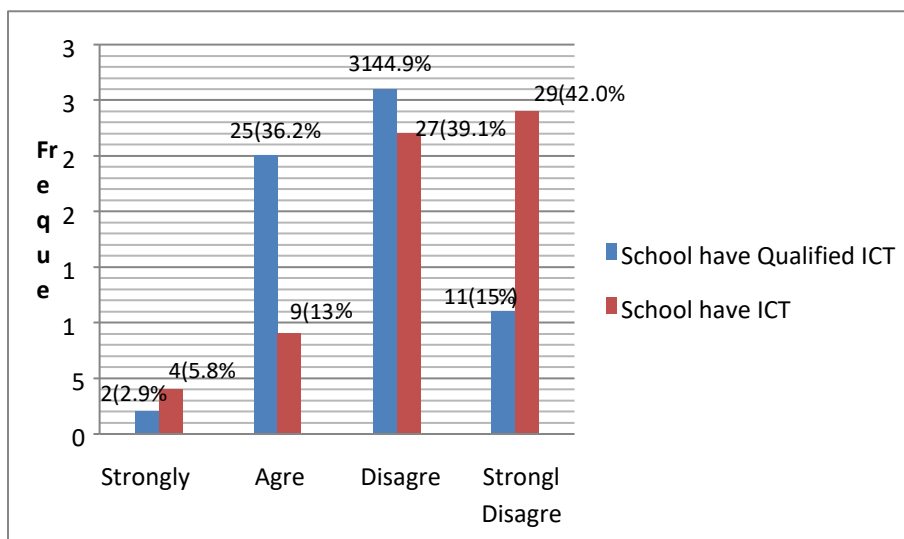

Table 2: Responses of Availability of Trained ICT Teachers and Technicians of ICT

Analyzed data provided in Table 2 shows the responses of availability of trained ICT teachers and technicians in public secondary schools in the South Rift Region of Kenya. Only 2(2.9%) of the respondents strongly agreed that their school had qualified ICT teachers, 25(36.2%) agreed, 31(44.9%) disagreed and 11(15.9%) strongly disagreed. On availability of ICT technicians' majority (42.0%) strongly disagreed that their schools had ICT technicians, this was followed by 27(39.1%) who disagreed, 9(13.0%) agreed and 4(5.8%) strongly agreed. The computed mean score and standard deviation on availability of trained ICT teachers in schools were ($\bar{x}$=2.26, s=.80) while the mean and standard deviation for availability of ICT technicians were ($\bar{x}$=1.82, s=.95) on a scale of 1-4. The minimum score was 1 while the maximum was 4. The score below 2.0 was interpreted to indicate a low level of the attribute being measured, 2.0 – 2.9 indicated a moderate level and scores of 3.0 and above were considered an indication of a high level of the attribute. According to this scale, the study established that the respondents were of the opinion that the availability of trained ICT teachers in public secondary schools in the study locale was moderate. Additionally, the study further established a low level of availability of ICT technicians in public secondary schools. These findings indicated public secondary in the South Rift region of Kenya have not designed a comprehensive ICT infrastructure. The indication of lack of qualified ICT teachers suggests that uptake of ICT is bound to remain poor while the shortage of ICT technicians raises concern about the reliability of the installed ICT

infrastructure in schools. These findings concur with Becta (2004) who emphasized that if the absence of technical maintenance of ICT devices in schools is not addressed, then breakdowns can render the entire ICT unreliable or useless. Arguing in the same vein, Tong and Trinidad (2005) state that technical faults might discourage the use of ICT in schools because the fear of equipment breaking down and losing vital information affects willingness in the adoption of ICT. This is supported by Yilmaz, (2011) who observed that for functional ICT systems in schools, it is important that schools are provided with practical backing with regard to the maintenance and repair of ICT facilities. Furthermore, according to Gyamfi (2016) breakdown of ICT hardware such as computers and projectors is a major challenge faced by teachers in using ICT in teaching and learning.

b) The second research objective sought to find out the preparedness in the implementation of ICT infrastructure in public secondary schools in the South Rift Region in Kenya. Preparedness to implement ICT infrastructure was measured by means of five items on a four-point Likert scale that sought information on schools' ICT policy, presence of computer laboratories, ICT vote head, power and internet connectivity. The researchers computed a mean score and standard deviation for each statement and also a global mean score for ICT preparedness. The maximum score was 4 and the minimum was 1. Scores in the range of 1-2 indicated a low level of preparedness, 2-3 an average level while a score of 3-4 indicated a high level of preparedness. The findings are presented in Table 3.

Table 3: Public Secondary Schools Preparedness to Implement ICT Infrastructural

	Strongly Agree	Agree	Disagree	Strongly Disagree	n	$\bar{x}$	s
1. School has an ICT policy	9	27	18	15	69	2.57	.98
2. School has computer laboratories	11	25	18	15	69	2.54	1.01
3. School has a vote head to support ICT integration	2	15	29	20	66	3.02	.81
4. School is connected to power	32	32	1	4	69	3.07	.78
5. School is connected to the Internet	5	9	31	24	69	1.67	.88
$\bar{x}$ =2.56 s=.52							

Analyzed data presented in Table 3 shows the mean scores and standard deviations of the responses of teachers in relation to preparedness of schools to implement the ICT infrastructure. The findings of whether schools have an ICT policy were ($\bar{x}$=2.57, s=.98) indicating that majority of the respondents disagreed. On whether schools had computer laboratories the responses were ($\bar{x}$=2.54, s=1.01) which indicated the respondents disagreed with the proposition. The study found that majority of respondents agreed that schools have vote heads to support ICT integration ($\bar{x}$=2.54, s=1.01). Most of the respondents agreed that their schools had electricity connectivity ($\bar{x}$=3.07, s=.78), however, they also disagreed that they were connected to the internet ($\bar{x}$=1.67, s=.88). These findings indicate that public secondary schools in the South Rift region of Kenya had an average level of preparedness to implement ICT infrastructure. Cuban (2001) asserts that ICT infrastructure should be considered to be more than a question of availability, access, location and organization. Leaders and managers must understand the school infrastructure in order to enable them to make appropriate decisions as to whether or not to implement new innovations (Rogers,

2003). Jhurree (2005) observed that the successful incorporation of ICT in schools warrants meticulous preparation that hinges fundamentally on a solid understanding and appreciation of ICT by educational policymakers. The infrastructure involves the identification of baseline needs for buildings as well as software and hardware for the ICT implementation process (Afshari, et al, 2009). Additionally, Trust (2018), posits that school leaders are key drivers in creating a culture of innovation and promoting the use of technology for teaching and learning and should prioritize investments in ICT infrastructure and provide ongoing professional development for teachers Consequently, in this study, the low level of preparedness could be a result of failure by education stakeholders to fully understand or appreciate the ICT policy.

Hypothesis

In order to establish whether significant statistical differences existed in ICT preparedness in the two categories of schools, the researcher tested the following null hypothesis;

Ho1: There is no statistically significant difference in the level of ICT preparedness in boarding and day secondary schools in the South Rift Region in Kenya.

One-way Analysis of Variance (ANOVA) was computed to test the statistical relationship between the differences in preparedness of ICT implementation in day and boarding public secondary schools was presented as shown in Table 4.

Table 4: ANOVA of Schools' Preparedness to Implement ICT Infrastructure

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.737	2	.369	1.371	.261
Within Groups	16.936	63	.269		
Total	17.673	65			

Table 4 shows that the results yielded a p-value = .261 which was more than the alpha value α > 0.05 indicating that the differences in preparedness in ICT implementation in the two school categories were not statistically significant. Therefore, the null hypothesis was accepted and it was concluded that the preparedness of schools to implement ICT infrastructure in boarding and day secondary schools was largely the same.

CONCLUSION

According to the findings of this study, the availability of trained ICT teachers in public secondary schools in the study locale was moderate. In addition, the study established a low level of availability of ICT technicians in public secondary schools. The study further established that the level of preparedness to implement ICT infrastructure in public secondary schools in the South Rift Region was average. These findings indicated that public secondary schools in the South Rift region of Kenya have not designed a comprehensive ICT infrastructure. The indication of lack of qualified ICT teachers suggests that uptake of ICT is bound to remain poor while the shortage ICT technicians raise concerns about the reliability and maintenance of the already installed ICT infrastructure in schools. The study concludes that despite the apparent benefits of the use of ICT in schools, many schools were yet to effectively and meaningfully implement it, thus depriving learners and the school community from accessing this valuable opportunity.

RECOMMENDATION

The study recommends the need to promote the use of ICT in all school categories and in particular the day secondary schools. This implies the need for sensitization of all stakeholders and provision of resources to implement ICT infrastructure as well as training of personnel in ICT in public secondary schools in Kenya.

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