

Analysis of Challenges Facing ICT integration in Managing Public Secondary Schools: A Comparative Study of Day and Boarding Secondary Schools in the South Rift Region, Kenya

Johannes Njagi Njoka¹, Perminus Githui², Lucy Wanjira Ndegwa³

^{1,2,3} School of Education and Social Sciences, Karatina University, Kenya

ijnjoka@karu.ac.ke

Abstract

The uptake of information communication technology (ICT) by secondary schools is beset by a complex of challenges that are not clearly understood and documented. In order to facilitate effective and efficient implementation of digitalization in schools in Kenya, there is need to map out the diversity of challenges that bedevil its adoption. The purpose of this study was to analyze the challenges facing integration of information communication technology (ICT) in the operations of public day and boarding secondary schools from the south rift region of Kenya. The objectives of the study were to; assess the challenges facing ICT integration and compare the levels of ICT integration in boys, girls and co-educational secondary schools from the south rift region of Kenya. The study adopted the descriptive survey research design. The target population for the study comprised of all the 141 teachers from the public secondary schools in the south rift region of Kenya enrolled in the Strengthening of Mathematics and Science in Secondary Education (SMASSE) program. The study employed census sampling technique since the target population was small, easily accessible and manageable. Data was collected by means of a questionnaire. Data analysis was conducted using the descriptive and inferential statistics with the aid of Statistical Package for Social Sciences (SPSS) version 21.0. The study tested the hypothesis that there was no statistically significant difference in challenges facing integration of ICT in boys, girls and co-educational secondary schools from the south rift region of Kenya. To test this hypothesis the One way Analysis of Variance (ANOVA) statistics was computed which yielded $p\text{-value} = .000$ which was less than the alpha value $\alpha > 0.05$ indicating that the differences in challenges facing ICT integration in boys, girls and co-educational schools were statistically significant. Therefore the null hypothesis was rejected. This led to the conclusion that challenges facing ICT integration from the three categories of schools were significantly different. From the findings of the study, it is recommended that there is need strengthen in service training of teachers in ICT and perform widespread upgrade of ICT software since these were the most serious challenges that faced integration of ICT in schools.

Keywords

challenges digitalization;
information communication
technology, ICT integration



I. Introduction

The critical need for institutions and enterprises in the digital era to embrace and institutionalize use of ICT in the execution of their functions cannot be overemphasized. Information communication technology (ICT) is increasingly playing an instrumental role in infusing efficiency and effectiveness in service delivery in public and private enterprises

(MCT, 2006). Kozma (2011) states that entrenchment of ICT in society has the potential to enable restructuring of organizations, promotes collaboration, increases citizens participation and makes education more accessible to the larger population. ICT greatly fosters cultural integration of people who hail from different cultural backgrounds. Advancement in ICT enables teachers to access and acquire extensive knowledge, best practices and experience at the mere touch of a button within the convenience of their offices or houses. Adoption and integration of technology in schools is largely dependent upon the availability and accessibility of ICT resources comprising of hardware, software and communications infrastructure. Mwale, Chilala and Kumar (2011) observe that several countries around the world are deepening implementation of ICT policies in order to catalyze growth in a variety of sectors and help steer their economies towards attainment of various platforms as demonstrated in the Sustainable Development Goals (SDGs). UNESCO-UIL (2014) report that many developing countries have neglected expansion of their national electricity and internet connectivity infrastructure in the rural and remote regions which inadvertently renders such regions to lag behind in ICT uptake. Even when schools are connected to the electrical grid, power surges and failures are common in both rural and urban areas further impeding the reliable usage of ICT (Mudenda, Johnson, Parks and van Stam, 2014). A survey conducted by the New Partnership for Africa's Development (NEPAD) established that in the first phase of the NEPAD e-schools initiative, most schools reported no experience whatsoever with computers. Most schools did not provide learning opportunities or teacher training in ICT and computer availability across sub-Saharan Africa remained poor (Adomi & Kpangban, 2010). UNESCO (2015) report that although data on ICT integration in schools from sub-Sahara Africa is scarce, computers are very unevenly spread within African countries. ICT resources are progressively concentrated in relatively few schools that already have basic infrastructure to support them. In many developing countries, computers may not be utilized to their full potential or might even be stored away due to a number of factors such as weak school infrastructure, limited ICT teacher training or general anxiety related to their use (Konyana & Konyana, 2013). Manduku, Kosgey and Sang (2010) inform that ICT integration in schools has remained elusive owing to lack of electricity connectivity, infrastructure, unenthusiastic school leadership that do not encourage adoption of innovations and technology. Majority of teachers may be critically deficient in computing skills. As a consequence, despite the immense benefits and value associated with ICT integration in education, many schools are slow in embracing it. This deprives learners and the school community opportunities to nurture their full potential in ICT and the related careers.

Research indicates that ICT when fully utilized can radically reduce the cost of education, increase efficiency and effectiveness of teaching and learning processes. Aguyo (2010) point out that ICT in schools can be viewed as a cost effective strategy especially in terms of manpower since one teacher can reach many learners through internet, interactive white board and video conference technologies. Parents are also spared the agony of buying many textbooks because many of them would be available online. Study and teaching materials are extremely inadequate in many schools in developing countries. The usage of Information and communication technology (ICT) in education is very broad, teaching and learning process becomes more creative and does not use the same teaching materials. The use of ICTs makes teaching materials more varied and develops in accordance with the times (Harianja, 2019). ICTs can play a significant role in providing teachers and students with access to educational content and upto date resources. The usage of ICT by students helps develop future workforce that can effectively participate in the

increasingly networked world and the emerging knowledge economy. Hennessy (2010) point out that many schools in developing countries rarely have the prerequisite supportive infrastructure, free classrooms or suitable building to hoist the ICT facilities. More importantly, operationalization of digital learning requires establishment of special ICT rooms and the accompanying accessories which demands heavy capital investments. Additionally, implementation of ICT calls for the purchase of new, and sometimes, specialized fixtures and furniture which may be beyond the financial resources available in a school. Consequently, the costs of acquiring adapted furniture for ICT purposes and the related hoisting requirements may be an impediment to its adoption by schools without adequate funding, linkages and partnerships for support.

Globally in the 21st century, use of ICT in education is lowest in Africa especially in the Sub Sahara-Africa (SSA), where it lags behind most of the countries in the developed world. Assessment of the utilization of ICT in Africa is hampered by insufficient empirical data on impact of ICT on sector productivity and lack of cross-country evidence. In some cases the evidence has been non-existent due to recent developments, the rapid revolution of ICTs and methodological challenges that include a deficiency of assessment variables and models of causality. Most of the studies undertaken have focused on information infrastructure issues, while few have been undertaken to measure the extent of ICTs in Africa, particularly in education (Kenya School Net, 2009). Clearly if technology cannot be accessed by the teacher, as in so many educational settings in SSA, then it will not be used. Hennessy and Onguko (2012) observe that despite the Kenya Government having developed a number of policies to guide the integration of ICT into the economic, social and educational programmes in majority of schools in the country, the process has been painfully slow. However, KICD (2006) adds that schools are increasingly being equipped with computers for teaching, learning and administrative purposes. The network Connectivity is improving and students are enthusiastic about using computing devices for learning, despite the inadequacy of equipment.

The government of Kenya recognizes implementation of ICT in secondary schools will contribute to knowledge production, information and communication sharing among the school community. This view stems from assertions in the literature regarding the importance of ICT in schools (Manduku, Kosgey & Sang, 2010). The government of Kenya through sessional paper no. 1 of 2005 noted that ICT has a direct role to play in schools (Republic of Kenya, 2005). When used properly, ICT can bring many benefits to schools as well as to the community. It was noted that ICT presents new opportunities in teaching and learning by providing opportunities for teacher-to-learners, teacher-to-teacher and learner-to-learner communication and cooperation. This yields enhanced opportunities to access several technologies which create superior keenness and attention in learning among students as well as expanding access to a wider variety of courses (Republic of Kenya, 2005). Digitalization and automation of learning is believed to avail unlimited value and benefits in education to learners in terms of expanding access, relevance, retention, equity and quality in education. This way, the government is enabled to speedily move towards achievement of the sustainable development goals (SDGs) relevant to education.

In order to deepen and operationalize digitalization of education, the government of Kenya formulated the national ICT policy on education in 2006. The policy outlines the vision as, “A prosperous ICT-driven Kenya society,” while the mission states, “To improve the livelihood of Kenyans by ensuring availability of efficient, accessible, reliable and affordable ICT services” (Republic of Kenya, 2006). The policy emphasized that the

government will encourage implementation and use of ICT by schools in order to improve quality of teaching and learning. Manduku, Kosgey and Sang (2010) observed that despite the apparent benefits of ICT, school leaderships had not fully implemented the policies developed by the Ministry of Education. Laaria, (2013) assert that though most schools had developed guidelines on how to implement ICT, little attempt was made to implement them. Owing to the dismal and ad hoc implementation of ICT in schools in Kenya, there is compelling need to conduct a study to unravel what could be hindering actualization of this very important venture. This prompted the need to conduct a study on the challenges that hindered efficient implementation of ICT in public secondary schools in the south rift region of Kenya. The outcome of the study would be instrumental in mapping out the diverse bottlenecks and pitfalls that confront ICT integration and institutionalization in the execution of diverse functions by the schools in Kenya.

1.1 Statement of the Problem

The government of Kenya has made deliberate efforts to encourage and provide resources for integration of information communication technology in the country. Emphasis is placed on promoting e-government and automation of education yet schools continue being analogue in their operations. The Government envisions transforming Kenya into an information and knowledge-based society and economy supported by consistent development and pervasive access to ICTs by all citizens. As a result, the ICT policy with regard to education aims at integrating ICTs in the education system, including secondary school education. Consequently, there have been efforts to promote and facilitate integration of ICT in the operations of public secondary schools in the country. However, the integration of ICT in secondary schools in the south rift region of Kenya remains low. This raises concerns regarding possibility of existence of impediments towards implementation of the ICT policy in secondary schools. There is compelling need to analyze the challenges that have produced the dismal level of ICT uptake in secondary schools in the region. Analysis of the challenges that complicate effective integration of ICT in secondary schools would help in mapping out strategies necessary to circumvent the pitfalls and bottlenecks which results in the realization of knowledge-based economy and digitalization of education.

1.2 Objectives

The study was based on the following objectives, which were to;

- a. Assess the challenges facing integration of ICT in public secondary schools in the south rift region of Kenya.
- b. Compare the extent of integration of ICT in boys, girls and co-educational secondary schools in the south rift region of Kenya.

1.3 Hypothesis

The study tested the following null hypothesis;

Ho1: There is no statistically significant difference in challenges facing integration of ICT in boys, girls and co-educational secondary schools from the south rift region of Kenya.

II. Research Method

The study adopted the descriptive survey research design. The target population for the study comprised of all the 141 teachers in public secondary schools in the south rift region of Kenya enrolled in the Strengthening of Mathematics and Science in Secondary Education (SMASSE) program. The study adopted the census sampling technique since the target population was small, easily accessible and manageable. Hence, all the subjects were included in the study. This technique was appropriate because a complete count of the universe whereby each and every unit of the population is included in the study provides accurate and highly dependable findings. According to Surbhi (2016), census refers to a procedure of gathering, recording and analyzing information regarding all members of the population. Australian Bureau of Statistics (2013) observes that census technique provides a true measure of the population since there exists no inherent sampling error. The technique enables to capture detailed information about small sub-groups within the population which maybe unlikely to be available in case a different method was used. The target population is presented on table 1.

Table 1. Population and Sample Size

Type of School	No. of Schools	No. of Teachers Accessed
1. Day	41	85
2. Boarding	24	47
3. Day and Boarding	4	9
Total	69	141

III. Discussion

The results and discussion are presented in accordance with the stated objectives and hypothesis of the study. The results are presented as follows;

- a. The first objective sought to assess the challenges facing integration of ICT in public secondary schools from the south rift region of Kenya. Respondents were presented with 8 items contained in a dichotomous Yes (1) and No (2) scale. The findings of the study are presented on Figure 1.

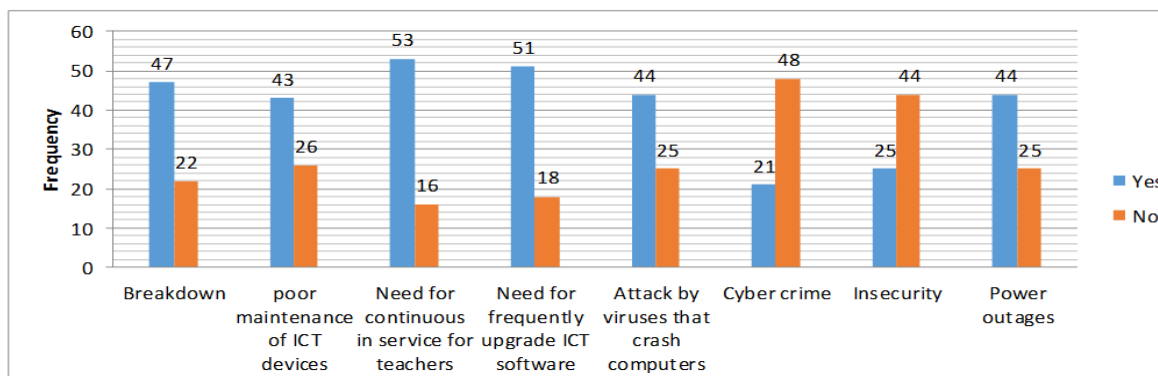


Figure 1. Challenges Facing Integration of ICT in Public Secondary Schools

Results of data analysis presented in Figure 2 revealed that Breakdown of ICT devices was 47(68.1%) of the respondents, poor maintenance 43(62.3%), need for continuous in-service of teachers 53(76.8%), need to frequently upgrade software 51(73.9%), attack by viruses 44(63.8%), cybercrime 21(30.4%), insecurity 25(36.2%) and power outages was 44(63.8%). The findings of the study revealed that the need for continuous in service of teachers and upgrade of ICT software were the most pronounced challenges facing teachers in integrating ICT in teaching and learning. On the other hand the least encountered challenges were cybercrime and insecurity.

The findings are in agreement with Mingaine (2013) on challenges in the implementation of ICT in public secondary schools in Kenya which revealed that the major impediments towards implementation of ICT in public secondary schools included cost of infrastructure and lack of in-service ICT training opportunities in a situation where only a few teachers had functional ICT skills. The study recommended the need to employ qualified teachers with ICT skills and provision of in-service courses designed to train the teachers already in service. Remarkably, Kibet (2017) established that a positive and significant relationship existed between the level of training and ICT integration in teaching. The study recommended that teachers need to be encouraged to acquire ICT literacy through training to enable them integrate ICT in teaching hence enhancing content delivery.

- b. The second objective sought to compare the extent of integration of ICT in boys, girls and co-educational secondary schools in the south rift region of Kenya. Extent of ICT integration in schools was measured by means of seven items in a four point likert scale, ranging from strongly disagree (1), disagree (2), agree (3) and strongly agree (4). Scores obtained were used to compute a global mean score for extent of integration of ICT in each school category. The mean scores ranged from 1 to 4, which were divided into high, moderate and low. The maximum score was 4 while the minimum was 1. A score below 2.0 was interpreted to indicate a low level of ICT integration, 2.0 – 2.9 indicated moderate level and scores of 3.0 and above were considered an indication of high level of the attribute. The findings of the study are contained on table 2.

Table 2. Level of ICT Integration in Schools

School Type	n	Mean	Standard Deviation
1. Co-educational	48	1.71	.30
2. Girls only	9	2.18	.31
3. Boys only	12	2.33	.21

Results of data analysis presented in table 2 shows that boys' only schools had the highest level of ICT integration ($\bar{x} = 2.33, s = .2$), Girls only schools followed with ($\bar{x} = 2.18, s = .31$) while the Co-educational schools came last with ($\bar{x} = 1.71, s = .30$). These findings indicate that on a general scale the level of ICT integration in co-educational schools was low while the level of ICT integration in boys' and girls' only schools had a moderate level of ICT integration.

Muriithi (2017) established that the government Free Day Secondary School Education (FDSE) subsidies were not only inadequate but were also not disbursed in time. This directly resulted in inadequate resources across different school departments. The shortage of funds in day secondary schools compromises ICT integration due to poor infrastructure, computer hardware and software and training opportunities in day schools. This could be among the variables contributing to differences in ICT integration in different school categories.

Hypothesis

To test whether there were significant differences in challenges facing integration of ICT in boys, girls and co-educational schools, the null hypothesis was tested. The hypothesis stated that there was no statistically significant difference in challenges facing integration of ICT in boys, girls and co-educational schools in the south rift region of Kenya.

The One way Analysis of Variance (ANOVA) was computed to test the null hypothesis. The results of ANOVA calculations are presented on Table 3.

Table 3. Results of ANOVA on challenges facing ICT Integration in Schools

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.452	2	2.226	25.991	.000
Within Groups	5.653	66	.086		
Total	10.106	68			

Results of one way ANOVA presented in Table 3 yielded p-value = .000 which was less than the alpha value $\alpha > 0.05$ indicating that the differences in challenges facing ICT integration in the boys, girls and co-educational secondary schools was statistically significant. Therefore the null hypothesis was rejected. This led to the conclusion that the challenges facing ICT integration in the three school categories was significantly different. Ihmeideh (2010) points out that integration of ICT requires heavy capital investments in setting up the infrastructure, maintenance and support facilities. Schools differ in terms of resource endowments hence the differences in the challenges facing them. Goktas, Yildirim and Yildirim (2009) agree with this view and add that ICT integration depends on availability of hardware, software and having access to resources by teachers and students and administrative staff.

Most of the computers in schools are as a result of donations or projects from private companies or foreign donors. Donor supported ICT projects in schools includes both the maintenance of computers as well as support for the teachers. Upon the exit of the donor or the facilitating agency, the government or the institutions concerned are expected to take over the management of the project. It is at this stage of exit of donors when challenges commence to ravage ICT initiatives. This approach is likely to bring a lot of discrepancies which may result in the observed differences in the challenges facing secondary schools.

IV. Conclusion

The study revealed the need for continuous in-service of teachers and upgrade of ICT software as the most manifest challenges facing integration of ICT in teaching and learning. On the other hand, the least encountered challenges were cybercrime and insecurity. It was also found that the level of ICT integration was lowest in co-educational schools while the level of ICT integration in boys' and girls' only schools was moderate. Hypothesis testing indicated that the challenges facing ICT integration in the three school categories were significantly different. It is hence concluded that there is need to deepen ICT integration in schools by deliberately providing budgetary provisions to support the digitalization initiatives in schools in Kenya.

From the findings of the study we recommend the need to conduct in-service training of teachers in ICT and upgrade of computer resources in schools in Kenya. These were the most

apparent challenges that faced ICT integration in schools. The low level of integration of ICT in co-educational schools should be investigated further with a view to unravel the mystery.

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