The Influence of Availability of Internet Connectivity on Teachers' Integration of Information Communication Technology in Teaching and Learning in Public Primary Schools in Kenya

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ABSTRACT

The study sought to investigate the influence of availability of internet connectivity on teachers' integration of information communication technology in teaching and learning in public primary schools in Kakamega County, Kenya. The study objectives sought to determine the influence of the degree of internet connectivity in various categories of schools on integration of information communication technology in teaching and learning and in public primary schools in Kakamega County, Kenya and to establish the influence of internet accessibility on integration of information communication technology in teaching and learning in public primary schools in Kakamega County, Kenya. The study used Technological Pedagogical Content Knowledge theory. The study used descriptive survey design. The target population of the study was 1County Director of Education, 356 public primary school head teachers and 3204 public primary school teachers. The sample size for the study was 1 County Director of Education, 189 public primary school head teachers and 356 public primary school teachers who were selected using purposive sampling, proportionate sampling, simple random sampling and census sampling techniques. The sample frame for the study consisted of 546 respondents. Data was collected using questionnaires and interview schedule. Data for this study was presented in frequency tables. Both a quantitative and a qualitative analysis of the results was performed. In order to determine the degree of relationship between internet connectivity and teachers' integration of information communication technology in teaching and learning in public primary schools, the Chi-square (X^2) test was utilized. It was anticipated that, the planners and policy makers will use the study's findings as a basis for revamping the country's present internet strategy in order to address the problems impending teachers' integration of information communication technology in teaching and learning in public primary schools, students would graduate with knowledge and abilities that are competitive on a worldwide scale and go on to play an important role in the development of their country. The results of this study showed that, 76.12% of the sampled public primary boarding schools were connected to internet while 23.88%were not connected to internet. 12.84% of the public primary day schools were connected to internet while 87.16% of these categories of schools were not. The Chi-square (x^2)test results showed that internet connection in public primary schools was not significantly different in public boarding primary schools than in public day primary schools ($X^2 =14.249, P Value =0.512$). These findings indicate that, most public primary schools were not connected to internet and therefore, teachers' integration of information communication technology in teaching and learning in public primary schools in Kenya was minimal. The study therefore recommends that, the government of Kenya through the Ministry

of Education should offer broadband internet connection packages to teachers at fair installment and payment terms.

Key words: Information Communication Technology, Integration, Internet, Kenya, Public Primary Schools, Teaching

INTRODUCTION

The best way to integrate ICT into classroom teaching and learning is through the usage of the internet. Internet accessibility, management system and infrastructure have a significant positive impact on the integration of ICT in education (Abdullah, 2021). Due to the growth of internet services, the traditional methods of disseminating information through leaflets and other printouts are becoming obsolete. The internet has improved access to education. It is the best medium for programs including distance learning. Students can receive tutoring, consultations and course offerings online. The learning materials are accessible for download, the educational program is delivered by email and regular evaluation is carried out.

A study by Hua and Chen (2023) reveals that, internet connectivity operates as a gateway to a wide range of knowledge resources and innovative learning opportunities, crossing geographical barriers. According to GoK (2011) students who have computer access to the internet are exposed to a wealth of resources and are better able to network with other students in their subject matter through websites like wikis, google groups, web 2.0 technologies (classroom 2.0), Facebook, classroom blogs, Twitter and Ning, among other educational social networks. People favor well-known search engines like Google and Yahoo over others because they give them rapid, simple access to a wealth of information. Kajal (2023) adduced that, there is no room for uncertainty in the modern era because everyone favors Google for their queries, problems or uncertainties. Additionally, using various computer-mediated learning methods like blended learning and e-learning is possible when there is an internet connection. Students are required to utilize the internet to research information regarding exams, courses and learning outcomes. Kajal (2023) further noted that, students may now revisit previously studied materials and undertake online research more easily as a result of the internet. Due to these significant uses, the majority of schools have internet access, which has an impact on how teachers in schools integrate information communication technology in teaching and learning. The academic standards of students are also impacted by their access to the internet. Schools which have internet access perform better than those who do not. However, it should be noted that, different internet usage has minimal effect on academic achievement. Similar to this, having multiple sources of internet connectivity does not ensure that you can instantly access them all. The head of institutions should network with other stakeholders in order to give management assistance for internet infrastructure. Further, teachers should teach students on how to use search engines like Google to find online academic resources and that school ICT laboratories be fully furnished with internet access to support students' academic endeavors.

According to Oghenetega and Mercy (2014) large proportion of experienced computer users routinely visited cybercafés to access the internet. The most popular online materials used by students are e-books and journals and most students give internet academic activities an average evaluation. Students may also have internet access to pertinent academic resources. They also augured that internet has improved students' exam preparation. However, power outages, slow internet connections, a shortage of computer terminals, information overload brought on by too many hits and a lack of computers prevented effective internet access in higher educational institutions. A backup in case of a power outage should be provided and institutions should purchase strong generators. Cyber management needs to understand that, opening such and performing effective maintenance both require significant investment. Cybercafés should be equipped with wireless connection points so that students can explore the establishments and have better access to information, especially that which is necessary to raise academic performance. To ensure that students can

satisfy their information demands, institutions should ensure that each of their individual libraries has enough internet connectivity.

Internet connectivity in learning institutions has remained a challenge in integrating ICT in teaching and learning. A study by Surbhi (2023) on online education and its effect on teachers during COVID 19: A case study of India revealed that, COVID 19 pandemic exacerbated the existed widespread inequality in access to internet connectivity required for an effective transition to an online mode of education. The study further revealed that teachers often struggled to stay connected because of substantial differences between states in the availability of internet. Of the respondents, 52% reported that internet was stable and reliable, 32% reported it satisfactory and the rest reported to be poor. Consequently, many teachers with access to advanced smart devices were unable to use them due to inadequate internet connection.

Michael (2023) conducted a study on online learning in Nigerian universities during COVID 19 pandemic, the experiences of nursing and radiography undergraduate students. The findings of statistical analysis with significance level set at $p < 0.05$ revealed that, internet access at 22.2%, $n = 120$ was one of major challenges that influenced online learning of undergraduate nursing and radiography students in Nigeria. The study further found that, there weren't enough internet-connected computers for students to utilize and the university's campus lacked enough connection points. Most students were aware of the advantages of using the internet for learning but others did not have the required knowledge, resources or access to the internet. According to the report, the government through the Ministry of Education make sure that schools have adequate ICT infrastructure, particularly computers and internet connections.

Internet accessibility continues to be a barrier to ICT integration in teaching and learning in Africa and other developing continents. In most educational institutions in Africa, there are no internet access points. According to Bukky (2013) report, there was a sizable portion of the internet in the University of Uwolowo in Ile-Ife in Nigeria. Though access to the internet was available to students, they were still unable to use it at the university library. The study recommended that, students should set up internet access points and the university library should keep working to secure sufficient financing from donors and the government in order to permit students to access the internet at the library and incorporate it in its course on library education.

Miima (2016) investigation on the use of ICTs in teaching and learning Kiswahili in public secondary schools in Kakamega County, Kenya revealed that, most secondary schools lacked suitable network infrastructure and connection. Although a small number of schools had direct access to high-speed internet connectivity through an internet service provider. The survey also found that, natural telecommunications infrastructure had a limited penetration into rural and low-income communities. As a result, there was little access to high-speed e-mail and internet connectivity as well as dedicated phone lines.

Internet access by teachers enables them to use it in various activities during integration of ICT in teaching and learning process. According to Frank (2011) study, majority of Ghanaian schools had internet access and teachers used in various activities. Less than 15% of teachers, according to the research, used the internet in creative ways to enhance teaching and learning. More than 30% of the teachers, according to the report, used computers as their main research instrument. Less than 25% of the students used it for learning and research, compared to less than 40% who did so for entertainment. Additionally, it was discovered that using computers and the internet had simplified finding answers to questions, finishing tasks and learning about the histories of various cultures. In order to encourage teachers to integrate internet in teaching and learning process, the study suggested that schools be connected to the internet. Moreover, Musa (2018) who conducted research on the availability and use of the internet for teaching and learning at two distinct teacher training institutions in Tanzania found that, most teachers used the internet for academic purposes. This was followed by those who use it for searching news. An average amount of respondents used the internet for communication, while slightly more than half used it for gaming. A very small percentage of

teachers used social networks on the internet. The research concluded that, by ensuring that there is easy access to ICT facilities that provide internet services, the Ministry of Education and Vocational Training, in collaboration with college principals should promote internet access and use of teacher colleges. According to Sekiguchi (2011) research on a case study of how education changed in Japan's information society, only 10% of the schools had internet access. This was a very low percentage and it could be said that, it was one of the biggest obstacles to teachers integrating ICT in classroom instruction.

Kakamega County is one of the 47 counties in Kenya that have given some schools computer facilities and internet connection to integrate ICT into teaching and learning. Despite these efforts by the Kenyan government, the influence of internet connectivity on teachers' integration of ICT in teaching and learning in public primary schools in Kakamega County is minimal (Laaria, 2013; Luhombo, 2015; CDE, 2021; CDE, 2022). There is any clear evidence of this, including inadequate curriculum coverage, low student achievement as seen in the results of the Kenya Certificate of Primary Education (KCPE) examination, and low computer literacy among the pupils. It is unclear where this problem came from. It is essential to investigate into the causes of this problem if teachers in public primary schools are to integrate internet in teaching and learning and provide high-quality instruction. This study was therefore carried out to investigate the influence of availability of internet connectivity on teachers' integration of information communication technology in teaching and learning in public primary schools in Kakamega County, Kenya.

Research Objectives

This study was guided by the following objectives:

1. To determine the influence of the degree of internet connectivity in various categories of schools on integration of information communication technology in teaching and learning in public primary schools in Kakamega County in Kenya.
2. To establish the influence of internet accessibility on integration of information communication technology in teaching and learning in teaching and learning in public primary schools in Kakamega County, Kenya.

METHODOLOGY

This study used descriptive survey research design. The study's target population was: 1 County Director of Education officer, 3,204 public primary school teachers and 356 public primary school head teachers from 356 public primary schools that have integrated ICT in the teaching and learning in Kakamega County (Kakamega County Education Office, 2022). The study used purposive sampling, simple random sampling, proportionate sampling and census sampling as sampling techniques. The sample frame of the study was 546 respondents. In order to arrive at the sample size of the study, the study used Slovin's formulae. Data for the study were collected using questionnaire and interview schedule.

The data was analyzed both qualitatively and quantitatively. The data was then summarized in frequency tables. Interviews' open-ended questions and data were recorded, transcribed and organized. The Chi-square (x^2) test was used to establish the relationship between internet connectivity and integration of internet connectivity in teaching and learning in public primary schools. This approach was also used to gauge how strongly the independent and dependent variables were related. Cronbach alpha (α) (0.05) served as the significance criterion.

RESULTS

The study collected data from teachers on the influence of the degree of internet connectivity in various categories of schools on integration of information communication technology in teaching and learning in

public primary schools in Kakamega County in Kenya. The information in this section was provided to determine whether or not public primary schools in Kakamega County were connected to internet in order to integrate ICT into teaching and learning. From table1, 76.12% of the sampled public primary boarding schools reported that, their public primary schools were connected to internet for teachers' integration of ICT in teaching and learning while 23.88% of them said that their respective public primary boarding schools were not connected to internet. 12.84% of the public primary day school teachers reported that, their respective public primary schools were connected to internet while 87.16% of these categories of schools were not. Further computation indicated that, internet connection in public primary schools was not significantly different in public boarding primary schools than in public day primary schools ($X^2 =14.249$, P Value =0.512). The results are summarized in table 1.

Table 1: Teacher responses on whether or not their respective various categories of public primary schools were connected to internet for ICT integration in teaching and learning

Category of public primary school	Connected to internet	Not connected to internet	Total
Boarding	51 (76.12%)	16 (23.88%	67 (100%)
Day	28 (12.84%)	190 (87.16%)	218(100%)

$X^2=14.249$

P Value =0.512

The head teachers report also mirrored teachers' responses. Table 1 responses demonstrate that,73.81% of the public primary boarding school head teachers reported that, their schools were connected to internet for teachers' integration of ICT in teaching and learning while 26.19% of them reported that their respective public primary boarding schools were not connected to internet. 27.72% of the public primary day school head teachers reported that, their respective public primary schools were connected to internet while 72.28% of this category of schools were not. The findings are summarized in table 2.

Table 2: Head teacher responses on whether or not their respective public primary schools were connected to internet for teachers' integration of ICT in teaching and learning

Does your school have an internet connection?	Yes	No	Total
Boarding	31 (73.81%)	11(26.19	42 (29.37%)
Day	73 (72.28%)	28(27.72%)	101 (70.63%)
Totals	104(72.73%)	39(27.27%)	143 (100%)

Further analysis was computed on the influence of internet accessibility on integration of information communication technology in teaching and learning in public primary schools. Teacher responses on this variable were as shown in Table 3.

Table 3: Teacher responses on the influence of internet accessibility on integration of information communication technology in teaching and learning in public primary schools

School Category	Teachers accessibility to internet for integration in teaching and learning		
	Yes	**No**	**Total**
Boarding	53 (79.10%)	14 (20.90%)	67 (100%)
Day	28 (12.84%)	190 (87.16%)	218 (100%)

$X^2 =21.013$

P = Value =0.426

Table 3 shows that, 79.10% of the public boarding primary school teachers reported that, they accessed internet for integration in teaching and learning process whereas 20.90% of this category of public primary schools did not. 12.84% of the public primary day school teachers accessed internet for integration in teaching and learning while 87.16% of the public primary day school teachers reported that, they were not accessing internet for integrating it in their teaching and learning. Chi square (X^2) test computation showed that, the degree of accessing internet for integrating it in teaching and learning in public primary schools was low as indicated by the respondents from both the teachers in day and boarding public primary schools (X^2 =21.013, df=0.005, P Value =0.426). With regard to this variable, head teacher responses are summarized in table 4.

Table 4: Head teacher responses on the influence of internet accessibility on integration of information communication technology in teaching and learning

School Category	Teachers accessibility to internet for integration in teaching and learning		
	Yes	**No**	**Total**
Boarding	41 (28.67%)	21 (14.69%)	62 (100%)
Day	18 (12.59%)	63 (44.06%)	81 (100)

The head teachers' report in table 4 shows that, 41 constituting 28.67% of the public boarding primary school head teachers reported that, their respective teachers accessed internet for integration in teaching and learning process whereas 21 (14.69%) of this category did not. 18 (12.59%) of the public primary day school head teachers reported that, their respective teachers accessed internet for integration in teaching and learning. 63 (44.06%) of head teachers in this category of public primary schools reported that, their respective teachers were not accessing internet for integration in their teaching and learning process.

DISCUSSION OF THE RESEARCH FINDINGS

Internet connectivity correlates with integration of information communication technology in teaching and learning. There must be an internet connection in the classroom for teachers to integrate ICT in teaching and learning. In schools with internet connectivity, teachers are encouraged to integrate ICT in both teaching and learning. The internet exposes students to a wealth of knowledge and motivates teachers to accomplish their jobs. According to the study's findings in tables 1 of teachers' and 2 of head teachers' reports, a substantial number of public primary schools in Kakamega County were not connected to internet. This shows that, teachers' integration of internet in teaching and learning was relatively little. Compared to sampled public primary boarding schools, the situation at public primary day schools was worse. Further computation using Chi square (X^2) test revealed that, there was no significant difference between public primary boarding schools and public primary day schools in terms of internet connectivity (X^2 = 14.249, P Value = 0.511).

These findings are consistent with those of Surbhi (2023) who found that, COVID 19 pandemic exacerbated the existed widespread inequality in access to internet connectivity required for an effective transition to an online mode of education. The study further revealed that teachers often struggled to stay connected because of substantial differences between states in the availability of internet. Of the respondents, 52% reported that internet was stable and reliable, 32% reported it satisfactory and the rest reported to be poor. Consequently, many teachers with access to advanced smart devices were unable to use them due to inadequate internet connection. Sekiguchi (2011) study also support the findings of this study. According to the findings, just 10% of Japanese schools had internet connectivity, which is a relatively low number and may be considered to be one of the major barriers to teachers integrating ICT in teaching and learning in primary schools.

Miima (2016) reported that, majority of secondary schools lacked sufficient network infrastructure and connections, despite the fact that a small percentage had direct access to high-speed internet connectivity through an internet service provider. The survey also showed that natural telecommunications infrastructure penetration was particularly low among rural and low-income groups. As a result, access to dedicated phone lines, fast e-mail and internet connectivity was constrained.

Michael (2023) study further support the findings of this study. The findings of statistical analysis with significance level set at $p < 0.05$ revealed that, internet access at 22.2%, n = 120 was one of major challenges that influenced online learning of undergraduate nursing and radiography students in Nigeria. The study further found that, there weren't enough internet-connected computers for students to utilize and the university's campus lacked enough connection points. Most students were aware of the advantages of using the internet for learning but others did not have the required knowledge, resources or access to the internet.

Although internet access influences integration of information communication technology in teaching and learning schools, it should be noted that, internet access is not a requirement for teachers to integrate ICT in teaching and learning. It may come as a surprise that teachers in schools with good internet access may not be integrating it in teaching and learning due to other factors. The study's findings in table 3 and 4 of the teachers' and head teachers' responses respectively clearly demonstrated that, most public primary school teachers did not integrate internet in teaching and learning. Chi square (X^2) test analysis of the responses from teachers at day and boarding public primary schools revealed that, the degree and type of internet integration in teaching and learning in these schools was low (x^2 =21.013, df= 0.005, P Value =0.426).These findings back up the assertions made by Bukky (2013) who found that, the undergraduate students at Uwolowo University in Ile-Ife, Nigeria, were allowed to access and utilize the internet in cyber cafés but were still unable to use the university library. According to Oghenetega and Mercy (2014) large proportion of experienced computer users routinely visited cybercafés to access the internet.

CONCLUSION

Based on the results obtained, the study affirms that, internet connectivity significantly influences integration of ICT in teaching and learning in schools in Kenya. However, the results revealed that, majority of schools face a challenge of internet connectivity. This negatively impact on teachers' integration of ICT in teaching and learning in schools in Kenya. These impacts are exacerbated by inequalities in internet connectivity between day and boarding schools in Kenya.

RECOMMENDATIONS

The government should offer broadband internet connection packages to teachers at fair installment and payment terms. This is due to the fact that, they do not have enough time during the school day to prepare for ICT-related content; if they did, they could do it when they got home. ICT should be included as a fundamental subject in the primary school curriculum by policymakers because it is crucial to achieving the Millennium Development Goals and Vision 2030. Because the schools will serve as ICT centers, the entire nation will be equipped with internet connectivity. This will foster good teacher impressions of integration of internet in teaching and learning.

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