

Journal of Education and Practice (JEP)

Digital Platform Skills for Teachers in Public Primary Schools in
Homa Bay County, Kenya



CARI
Journals

Digital Platform Skills for Teachers in Public Primary Schools in Homa Bay County, Kenya

Dr. Ouma Omito,

School of Education, Bomet University College,
P.O. Box 701, Bomet, Kenya.

Cell Phone: +254722106659, Email: oumaomito@buc.ac.ke

Dr. Jane Kembo,

School of Education, Rongo University,
P.O. Box 103-40404, Rongo, Kenya.

Email: matieno73@yahoo.com

Abstract

Purpose: The purpose of this study was to establish the readiness of headteachers and teachers in integrating Digital Literacy Programme (DLP) in teaching and learning in public primary schools in Homa Bay County, Kenya. Digital Literacy Programme was a project that was introduced and funded by the Government of Kenya for all public primary schools in Kenya.

Methodology: The study adopted both qualitative and quantitative survey research designs. A population of 845 head teachers and 6529 teachers were involved in the study. Some 85 head teachers and 362 teachers were sampled for the study. Questionnaires and interviews were the main research instruments used for the study. The reliability coefficient for the piloted teachers stood at 0.96 while that of the head teachers' coefficient was reported at 0.95. The quantitative research data was analyzed using SPSS and presented in tables, frequencies and percentages. Interviews were recorded, transcribed, organized into main themes and reported.

Findings: Majority of the respondents who were teachers, (41.6%), could only write using a digital device. Most head teachers, (34.2%), preferred tablets contrary to the preference of the majority of teachers, 31.4%, who cited desktop computers for online teaching and learning. The study also revealed that the majority of teachers and head teachers felt insecure with the digital devices in schools.

Unique Contribution to Theory, Policy and Practice: Introduction of digital learning in the Kenyan education sector did not meet the required threshold but was timely. Challenges were met here and there. Both teachers and headteachers were struggling to cope with the modern teaching and methods that required the integration of technology in the teaching and learning process. However, with continuous practice, the digital gaps were set to close in Kenyan schools. In line with the Kenyan ICT Policy of 2006 on electronic learning, the promotion and development of

content to address the educational needs of primary, secondary and tertiary institutions in Kenya needed to be emphasized.

Key words: *Digital Literacy Devices, digital content, barriers, teaching, learning, schools*

INTRODUCTION

Before the introduction of DLP in schools, face to face teaching with hard copy textbooks used as the main source of educational content dominated the classroom work in many primary schools in Kenya. Teaching and learning were largely organized a long subject content and written around hard copy textbooks. That is, school teachers were teaching using print media with learning activities designed to test the achievement of content objectives (Noor-Ul-Amin, 2013).

The importance of digital content for various levels of education in Kenya was articulated in the Education Reform Framework (ERF) which was on education quality, delivery, governance and imparting of soft skills to learners (Oduor, 2015). Learners needed to be prepared for a successful adulthood in a world that is increasingly being saturated with digital technologies (Nyaundi, 2018).

With the introduction of Information, Communication and Technology (ICT) in many aspects of education, teaching strategy shifted and posted a great challenge that called for attitude change to many primary school teachers. School teachers needed to be exposed and trained thoroughly to implement digital content in class because the success of such implementation would be viewed as a product of the teachers' efforts. In support, Pew Research Centre (2013) also observed that the digital tools that are used in teaching and learning needed the attention of the teachers in learning process simply because both technology and the instructor are as valuable as the pedagogy being employed in classrooms. Teacher training and professional growth in connection to the use of ICT in a learning institution should emphasize more on pedagogy rather than the computer technical competences (National College of Ireland, 2009). DLP content in Kenya was treated as source of entertainment for the pupils instead of being used as a learning tool (Wanzala & Nyamai, 2018).

Teaching and learning in Kenyan learning institutions had no option but to struggle and remain relevant by embarking on ICT training and integration of the digital content. The Kenya Institute of Curriculum Development (KICD) and book publishers on the other hand jointly begun conversion of hard copy books into digital content for grade one and two learners in 2013 (Kenya. DLP Secretariat, 2016, p.17).

Statement of the problem

The introduction of Digital Literacy Programme needed preparedness of the teacher to handle the teaching and learning process digitally. The Government of Kenya responded to this call by supplying public primary schools with digital devices (laptops and tablets) loaded with digital contents in 2016. In addition, every public primary school had at least two teachers and a head teacher trained on how to facilitate learning using the provided digital contents. The question was: Did these teachers master all the required digital content skills and felt comfortable with the digital devices that were supplied by the government for the implementation of DLP?

LITERATURE REVIEW

About ninety percent of the people in the world who were educated in the past learnt how to read, write and do arithmetic by means of traditional learning tools such as blackboards, textbooks and classrooms. However, with the advent of powerful information and communication tools, the traditional perspectives of education have been greatly disrupted (Van Lieshout, Egyedi, & Bijker, 2018, p. 3). Educational technology is a branch of ICT which is displayed in form of books, writing, telephone, television, photography and databases, and is sometimes organized into one single package called digital content (Omanga, 2018).

In the United States of America (U.S.A), digital platforms had proven to be more effective in the provision of many opportunities for teachers and students to practice typing, editing, capturing information and publishing anytime anywhere. The Pew Research Centre (2013) observed that digital platforms were effective in teaching a number of subjects in a school set up. The Research Centre did an online survey of a non-probability sample of 2,462 middle high school teachers who were teaching in the U.S.A and found that 99% teachers could use digital platforms to teach writing, 86% could teach science and 78% could handle arithmetic (Pew Research Centre, 2013, p.20).

In comparison to the U.S.A., the developers of digital content such as Kenya Institute for Curriculum Development (KICD) in Kenya also needed to develop digital courses that constantly engage learners by giving them greater opportunities to manage their learning process. Already the KICD had, in conjunction with publishers, developed digital content for class one, two and three in all the five subjects taught in primary schools in Kenya and was ready for pre-loading to the computing devices (Kenya. DLP Secretariat, 2016, p.17; Republic of Kenya, 2015). Interactive animations, videos, audios, cartoons, exercises and quizzes have also been reported to have been included in the Kenyan DLP digital content by KICD to improve the learning experience (Oduor, 2015). In support, digital content could include text, simulations, animations, presentations, tutorials, collections, resources, subject and task-specific cognitive tools, references, assessments (quizzes/tests/exams), and readings (Burns, 2011), which could be integrated into graphics, audio, texts and videos into a single training package in a computer to form educational multimedia (Suryawanshi & Suryawanshi, 2015; Ciascai & Marchis, 2008).

In South Africa, some 52,000 educators from 820 schools who enrolled for the Intel® Teach Program that took place between 2003 and 2007 with the main aim of training teachers to incorporate the use of Information Technology (IT) in their teaching, successfully trained teachers to deliver online content (Hennessy et al., 2010). This called for readiness and awareness of the demands of an online education right from the preparation stage. Digital content should be similar in coverage and content as in traditional textbook courses currently used in Kenya. The DLP devices were preloaded with content and were supposed to be distributed to the learners in classes as per the numbers and streams (Kenya. DLP Secretariat, 2016, p.22). The main difference between the hard copy textbooks and the digital content is that digital content is organized in

multiple formats, use a variety of activities, and accessible through a number of technologies to allow for customized learning experiences (Hope, 2006). Wanzala (2015) added that digital content for DLP includes interactive animations, videos and audio, cartoons, puppets exercises and quizzes aimed at helping pupils learn.

But the organization of such digital content should be highly interactive by allowing a range of levels of learning, learner entry points, and experiences (Burns, 2011). Information should be chunked and moved sequentially in various formats such as video, audio, images and texts from simple to complex, concrete to abstract, and general to specific. Where there is text, it should be clear, concise and simple (Commonwealth of Learning, 2008).

According to Bates (2014) and Hennessy et al. (2010), a non-interactive audio content began as early as 1920 when the British Broadcasting Corporation (BBC) began broadcasting educational radio programs for schools in the 1920s. The first adult education radio broadcast from the BBC in 1924 was a talk on ‘Insects in Relation to Man’. This development was followed by the introduction of television for use in education in the 1970s which according to Bates (2014) was dominated by international agencies such as the World Bank and United Nations Educational, Scientific and Cultural Organization (UNESCO).

Television which could be used to pass audio visual content to learners quickly faded when its access in developing countries such as Kenya was limited due to lack of electricity, cost, security, resistance from local teachers, and absence of a local language for communities (Asiago et al., 2014). These barriers minimized the use of video content in developing countries, but equally promoted the use of radio since most radios are portable and use dry cells as their source of energy.

Recorded audio programs that are offered asynchronously were available in Kenya from 1960 in the form of Radio Broadcast to Schools (Asiago et al., 2014). The University of Nairobi in Kenya also practiced distance learning by use of recorded audio cassettes as carriers of digital content from 1986 which were offered to distance learners for distance education (Bowa, 2011).

The implementation of digital content in many developing countries faced numerous challenges. On one side, teachers were clustered as digital immigrants (Berk, 2009). On the other hand, resistance from the teachers who feared being rendered jobless as technology take their places was also noted (Kimuge, 2017), lack of steady power sources (Hennessy et al., 2010), high cost of laptop computers (Buchele et al., 2007; Hennessy et al., 2010) and insecurity of laptops in schools (Buchele et al., 2007; Kenya. ICTA, 2016). However, it was noted that even with these challenges, teachers and learners needed to change to be digital natives (Berk, 2009). In Kenya, the commitment was eminent because the government allocated the ICT Ministry Sh13.4 billion in 2017 /2018 financial year for deployment of the laptops in schools, development of digital content, building capacity of teachers and establishment of computer laboratories (Wanzala, 2017).

METHODOLOGY

Research design

In this particular study, both qualitative and quantitative survey research designs were used. Nsibirano (2009) supported the use of cross-sectional survey design by pointing out that it is possible for the cross-sectional survey design to show patterns of association in a single point in time when two or more variables are used in research. Survey designs that use structured interviews and questionnaires for data collections are necessary for the generalisation and triangulation of results (Creswell, 2011).

Population of the study

The entire population of teachers and head teachers in public primary schools was 7374. That is, 6529 teachers and 845 head teachers. The population was then stratified into six sub counties as follows:

Table 1. Population of teachers and head teachers

Sub-County	Head teachers N	Teachers N
Homa Bay	172	1482
Rachuonyo North	167	1172
Rachuonyo South	159	1318
Suba	89	625
Mbita	109	727
Ndhiwa	149	1205
Total	845	6529

Sampling procedure for teachers

Kothari and Garge (2014) formula was used to get the sample size for teachers. Based on the formula, a sample size of 362 teachers was realized from the population of 6529 teachers in public primary schools in Homa Bay County. The sampled teachers were then again stratified into six sub counties of Homa Bay based on the teachers' numerical strength in each sub county as shown below. In all cases, the sampled teachers were randomly picked for studies.

Table 2. Sample size for teachers

Sub-County	Teachers N	Teachers n
Homa Bay	1482	82
Rachuonyo North	1172	65
Rachuonyo South	1318	73
Suba	625	35
Mbita	727	40
Ndhiwa	1205	67
Total	6529	362

Sampling procedure for head teachers

Unlike in the case of teachers where a formula was used, the study adopted the argument of Singh (2010) that a sample size of between 10-20 % is reasonable and adequate in descriptive research. In this respect 10% of the population of 845 head teachers was used. A sample size of 85 head teachers in general was obtained. Like in the case of teachers, this sample size was stratified into six sub counties of Homa Bay based on the population strength of head teachers in each sub county. Random sampling was used in each sub county to pick the sampled head teachers.

Table 3. Sample size for head teachers

Sub-County	Head teachers N	Head teachers n
Homa Bay	172	17
Rachuonyo North	167	17
Rachuonyo South	159	16
Suba	89	9

Mbita	109	11
Ndhiwa	149	15
Total	845	85

Sampling procedure for interview schedules

Both teachers and head teachers were interviewed. To realize the sample size for interviews, the study was guided by Mason (2010) who spelt out that the researcher/study is free to interview participants in a range between 1 and 95. Twelve teachers were sampled from a population of 6529 teachers. On the other hand, six head teachers were sampled from the population of 85 head teachers. Each of the six sub counties had two teachers and one head teacher interviewed. Random sampling was used to pick the head teachers and the teachers who were interviewed.

Research instruments

The study adopted questionnaires and interview schedules for the sampled teachers and head teachers. The questionnaires for teachers were designed to gather data on teachers' abilities to perform digital content skills, headteachers and teachers' awareness of alternative digital devices for teaching and learning and possible barriers that could hinder both teachers and head teachers in the delivery of digital content to learners. The interview schedule questions were organized on the digital content and the recommended digital device for ICT integration in public primary schools. The same questions applied for both teachers and head teachers for data triangulation. In concurrence, Feeney, Grace and Brandt (2001) added that interview schedules allow for the collection of large amounts of data in a shorter time especially for a homogeneous group such as teachers and head teachers for this particular study.

Pilot study

Pilot study was carried out for teachers and head teachers. The study used 10% of the sample size for teachers and head teachers for piloting. All participants for the pilot study were randomly selected. A head teacher and a teacher were also picked for pilot interviews. Ambiguous and unclear questions were either structured or removed from the data instruments that were piloted. Piloting was mainly done by the lead investigator. The purpose of piloting was to find out flaws that existed in the data collection instruments (Srinivasan & Lohith, 2017).

Validity and reliability

The data collection instruments were validated by an expert in the relevant area of study. Both face and content validity were ascertained. The reliability coefficients for both the teachers'

and head teachers' questionnaires were obtained using Cronbach's alpha (α) with the support of Statistical Package for Social Sciences (SPSS). The interview questions were scrutinized and the misleading statements/questions removed.

Table 4. Reliability coefficient

Research instrument	Reliability coefficient
Teachers' questionnaires	0.96
Head teachers' questionnaires	0.95

Data collection procedures

The research activities were authorized by National Commission for Science and Technology (NACOSTI). The Ministry of Education, Science and Technology and County Commissioner of Homa Bay County ensured the participants and schools were safe and adequately informed of the research activities. Both the lead researcher and research assistants were involved in data collection exercise. Ethical considerations such as anonymity and confidentiality were observed.

Data analysis techniques

Statistical Package for Social Sciences (SPSS) was used to analyse quantitative data and presentation was done in tables, frequencies and percentages. Qualitative data from interviews were recorded, transcribed, treated, organized in main themes and reported.

FINDINGS AND DISCUSSIONS

Response rate

An overwhelming response rates were received from both teachers and head teachers. The questionnaire return rate for teachers was 97.5% while the head teachers response rate stood at 92.9%. The response rate for interviews was 100%.

Teachers' ability to manipulate digital content skill(s)

The study listed a number of basic skills that teachers were expected to perform while teaching using laptop computers. These skills were typing, drawing, simulation and doing basic arithmetic using laptop computers.

Table 5. Teachers' ability to perform digital content skill(s)

Digital component skill(s)	Frequency	Average %
----------------------------	-----------	-----------

Non-response	24	6.8
Typing	147	41.6
Drawing	24	6.8
Simulation	6	1.7
Basic arithmetic	22	6.2
Typing, drawing, simulation and basic arithmetic (All listed)	42	11.9
Typing and basic arithmetic	17	4.8
Typing, drawing and basic arithmetic	43	12.2
Drawing, simulation and basic arithmetic	7	2.0
Typing and drawing	13	3.7
Typing, simulation and basic arithmetic	2	0.6
Drawing and simulation	2	0.6
Drawing and basic arithmetic	2	0.6
Typing, drawing and simulation	1	0.3
Typing and simulation	1	0.3

n =353

The findings of the study revealed that 147 (41.6%) respondents, who were the majority, were only able to type using computer keyboards. 24 (6.8%) respondents could draw using laptop computers while 22 (6.2%) respondents were able to do basic arithmetic using laptop computers. Simulation was also another digital content skill that 6 (1.7%) respondents noted they could perform. 42 (11.8%) respondents could manipulate all the listed four listed skill: typing, drawings, simulation and basic arithmetic. 24 (6.8%) respondents did not respond. The following respondents could perform a number of operations: 17 (4.8%) could type and do basic arithmetic; 43 (12.2%) could type, draw and do basic arithmetic; 7 (2.0%) agreed that they could draw, simulate and do basic arithmetic; 13 (3.7%) thought they could type and draw; 2 (0.6%) could type, simulate and do basic arithmetic; 2 (0.6%) could draw and simulate; 2 (0.6%) also admitted they could draw

and do basic arithmetic; 1 (0.3%) respondent had the ability to type, draw and simulate; and lastly the remaining respondent (0.3%) could type and simulate. The findings, therefore, showed that majority of the respondents, 147 (41.6%), could only type when provided with laptop computers to teach with.

Discussion

The study was carried out among the 353 teachers to establish their ability to perform particular digital content skills. The digital content skills studied were typing, drawing, simulation and basic arithmetic. The study regarded such skills as basic for teaching and learning using laptop computers, especially in lower classes in primary schools in Kenya and was in line with the five subjects taught in primary schools. The study findings showed that 147 (41.6%) respondents, who were the majority, were only able to type using the keyboard of laptop computers. This actually proved that a majority of the respondents had gadgets such as mobile phones that engaged them in text (typing) such as sending and receiving short message services (SMS), but to some extent typing alone could not improve much the level of digital content readiness in schools since learners for DLP were supposed to be well acquainted with all subjects of the curriculum. In his observation, Wanzala (2015) noted that digital content skills should be centered on the school teaching subjects in lower primary classes in Kenya such as Mathematics, Science, Social Studies, English and Kiswahili. This argument was premised on the fact that as much as the respondents could type using laptop computers and tablets, it was important for respondents to have knowledge of other digital content skills such as drawing, basic arithmetic and simulation because the DLP was expected to be a full package that required a number of digital skills to operate. The findings were in agreement with Burns (2011) who noted that digital content skills were many and could be applied in text, simulations, animations, presentations, tutorials, collections, resources, subject- and task-specific cognitive tools, references, assessments (quizzes/tests/exams) and readings. In what seemed to be an approval by the teachers on the necessity of digital skills for teaching and learning, here below was a verbatim statement from one of the interviewee:

Mmm! Well! My feelings, aaah, it is good the world is moving forwards on that direction and so we as a country we should move together with the world. Today, many things are done digitally. Things are changing and so it is good that today teaching is done digitally and the children are going to learn using computers (Head teacher, Homa Bay Sub County).

Teachers needed digital content skills to be all round in social life and teaching. They needed to know how to simulate, do basic arithmetic and skills of playing games using laptop computers. Inbuilt computer games were vital for class one level children because they could spend a lot of time playing games since most of these children borrow a lot from their parents' mobile phones. In concurrence, Meirs et al. (2009) observed that facilitators who were teachers in schools should have essential knowledge of laptop computer skills in literacy and numeracy because the entry skill for any ICT driven study was considered important for its success. European

Commission (2011) was also in agreement that ICT was generally assumed to have a positive impact on learning with the benefits that were extending beyond the use of computers and the internet alone but spread to the use of other technologies such as digital cameras and mobile phones which can support users' personal development.

Based on the findings of this research, continuous digital device orientation and provision of laptop computers and tablets to schools for on-the-job training could improve the ability and awareness of the teachers on digital content skills. This could trigger the users of laptop computers to learn by making mistakes but continually improving their skills while improving their computer skills. European Commission (2001) in their observation proposed the provision of free computers to schools or individual trainees as a way of boosting teachers' morale and allowing them to practice computer skills anytime anywhere.

Head teachers and teachers' other recommended digital devices for digital content

A part from laptop computers, a number of digital equipment was also proposed by this study to be suitable for teaching and learning digital content. The proposed digital equipment included: radio, desktop computers, television, mobile phones and tablets. The findings were as shown in Table 6.

Table 6. Head teachers and teachers' awareness of other recommended digital devices for digital content

Digital Equipment Respondent	Radio	Desktop Computer	Television	Mobile phones	Tablets	Non-Response
Teachers (n=353)	72(20.4%)	111(31.4%)	25(7.1%)	37(10.5%)	106(30.0%)	2 (0.6%)
Head teachers (n=79)	13(16.5%)	25(31.6%)	4(5.0%)	10(12.5%)	27(34.2%)	0 (0.0%)

The findings shown in Table 6 revealed that 72 (20.4%) sample teachers and 13 (16.5%) head teachers preferred radio as a possible digital device to be used for teaching and learning of the digital content. 111 (31.4%) sample teachers, who were the majority, and 25 (31.6%) sample head teachers were for desktop computers as the other preferred digital device. Television was supported by 25 (7.1%) sample teachers and 4 (5.0%) sample head teachers. The research also showed that 37 (10.5%) sample teachers and 10 (12.5%) sample head teachers chose mobile phones. The findings further noted that 106 (30.0%) sample teachers and 27 (34.2%) sample head

teachers selected tablets. From the findings, it was observed that majority of the sample head teachers preferred tablets. On the other hand, majority of the sample teachers selected desktop computers.

Possible barriers to successful delivery of digital content

Successful implementation of laptop computers depended on elimination of possible barriers (Salehi & Salehi, 2012). The study proposed the following as possible barriers to delivery of e-content: lack of electricity, high cost of laptop computers, insecurity and resistance from the local teachers as shown in Table 7.

Teachers' responses on barriers to the delivery of digital content

As shown in Table 7, respondents selected on specific barrier(s) which in their opinion could lower the implementation of DLP in public primary schools in Homa Bay County.

Table 7. Teachers' responses on barriers to the delivery of digital content

Possible barriers	Frequency	Average %
Non-response	4	1.1
Lack of electricity	68	19.3
High cost of laptop computers	39	11.0
Insecurity of laptop computers in schools	80	22.7
Resistance from local teachers	18	5.1
Lack of electricity, high cost of laptop computers, insecurity of laptop computers and resistance from local teachers (All of the above)	26	7.4
Lack of electricity and insecurity of laptop computers in schools	37	10.5
Lack of electricity and high cost of laptop computers	8	2.3
High cost of laptop computers and insecurity of laptop computers in schools	18	5.1
Lack of electricity, insecurity of laptop computers and resistance from local teachers	18	5.1

Lack of electricity, high cost of laptop computers and insecurity of laptop computers in school	20	5.7
Insecurity of laptop computers in schools and resistance from local teachers	8	2.3
Lack of electricity and resistance from local teachers	4	1.1
High cost of laptop computers and resistance from local teachers	3	0.8
High cost of laptop computers, insecurity of laptop computers in schools and resistance from local teachers	1	0.3
Lack of electricity, high cost of laptop computers in schools and resistance from local teachers	1	0.3

n =353

The research findings from Table 7 shows that 4 (1.1%) respondents did not to respond, 68 (19.3%) respondents cited lack of electricity, 39 (11.0%) respondents noted the high cost of the laptop computers, 80 (22.7%) respondents chose insecurity, and 18 (5.1%) respondents mentioned resistance from local teachers. The number of respondents who selected lack of electricity, high cost of laptop computers, insecurity in schools and resistance from local teachers were 26 (7.4%). Insecurity in schools and lack of electricity were stated by 37 (10.5%) respondents. Some 8 (2.3%) respondents chose high cost of laptop computers and lack of electricity. 18 (5.1%) respondents mentioned high cost of laptop computers and insecurity in schools as the major barriers.

Lack of electricity, insecurity in schools and resistance from local teachers were reported by 18 (5.1%) respondents. Some 20 (5.6%) respondents were of the view that barriers to the successful implementation of DLP were lack of electricity, high cost of laptop computers and insecurity in schools. Insecurity of schools and resistance from the local teachers were also chosen by 8 (2.3%) respondents. 4 (1.1%) respondents mentioned lack of electricity and resistance from the local teachers as the main barriers to effective implementation of DLP in schools. 1 (0.3%) respondent cited high cost of laptop computers, insecurity in schools and resistance from the local teachers as the main threat to DLP. High cost of laptop computers and resistance from the local teachers as limiting factors to DLP were identified by 3 (0.8%) respondents.

Lastly, 1 (0.3%) respondent was categorical that lack of electricity, high cost of laptop computers and resistance from the local teachers could block the success of DLP in public schools. It was concluded that majority of the respondents cited lack of security as the main possible barrier of digital content delivery in public primary schools in Kenya.

Head teachers' responses on barriers to the delivery of digital content

The study generated responses from sample head teachers on possible barrier(s) of DLP at school level and presented the results as shown in Table 8.

Table 8. Head teachers' responses on barriers to the delivery of digital content

Possible barriers	Frequency	Average %
Lack of electricity	13	16.5
High cost of laptop computers	6	7.6
Insecurity of laptop computers in school	19	24.1
Resistance from local teachers	3	3.8
Lack of electricity, high cost of laptop computers, insecurity of laptop computers in school and resistance from local teachers (All of the above)	8	10.1
Lack of electricity, high cost of laptop computers and insecurity of laptop computers in schools	2	2.5
Lack of electricity and insecurity of laptop computers in school	14	17.7
High cost of laptop computers and insecurity of laptop computers in schools	8	10.1
Insecurity of laptop computers in schools and resistance from local teachers	2	2.5
Lack of electricity, high cost of computer and insecurity of laptop computers in school	3	3.8
Lack of electricity, high cost of laptop computers and resistance from local teachers	1	1.3

n=79

The research findings showed that 13 (16.5%) respondents who were the sample head teachers cited lack of electricity as the main threat to the implementation of DLP. 6 (7.6%) respondents stated high cost of laptop computers as a barrier to the success of DLP. Insecurity in

schools was recorded by 19 (24.1%) respondents, who were the majority. Some 3 (3.8%) respondents chose resistance from local teachers as a limiting factor to DLP in Kenyan schools. 8 (10.1%) respondents mentioned lack of electricity, high cost of laptop computers, insecurity of public primary schools and resistance from the local school teachers as the main threat to DLP. Lack of electricity, high cost of laptop computers and insecurity in public primary schools were selected by 5 (6.3%) respondents. 14 (17.7%) respondents were of the opinion that lack of electricity and insecurity in schools were the main challenges of the success of DLP.

Another 8 (10.1%) respondents chose high cost of laptop computers and insecurity of laptop computers in schools as limiting factors to the introduction of DLP in schools. 2 (2.5%) respondents argued that insecurity of laptop computers and resistance from the local teachers combined could contribute to the failure for the uptake and integration of laptop computers in public primary schools in Kenya. 1 (1.3%) respondent was of the opinion that lack of electricity, high cost of laptop computers and resistance from the local teachers could contribute to the failure of the DLP in schools. Based on the research findings, majority of the sample head teachers cited insecurity of laptop computers followed by lack of electricity as the main threats to delivery of digital content in public primary schools in Homa Bay County.

Discussion

A total of 353 sample teachers and 79 sample teachers participated in a study that investigated the other recommended digital equipment that the respondents could use instead of laptop computers and the possible barriers to the delivery of the digital content. It is shown from the research findings that majority of the sample teachers, 111 (31.4%), were comfortable with desktop computers being installed in public primary schools. On the other hand, 27 (34.2%) respondents who were the majority of the sample head teachers recommended tablets. The study based on such findings, therefore, found that the Government of Kenya's move that resulted in the distribution of tablets to the pupils in Kenya was welcomed by both teachers and head teachers. The study attributed this to sameness in functionality of tablets, laptop computers and desktop computers. Hernandez (2017) acknowledged that these modern technologies as mobile phones, television and others could also be as effective as computers. Njagi (2013) added that the speedy substitution of desktop computers with smart phones in the market and other portable small sized devices could not be ignored. And because desktop computers had been in the market for a long time, most respondents were aware of its history, stability when handling and security. Desktops are not easily stolen like mobile phones and tablets. Tablets looked popular to respondents because of government's publicity and due to the fact that some schools had received them at the time of this research (Kenya. ICTA, 2016; Wanzala, 2017). More so, the Government of Kenya also increased tablets' popularity when it changed its position from laptop computers to tablets because of financial factors (Kenya. ICTA, 2016).

However, smooth implementation of DLP could not take place without challenges. A number of possible barriers that could hamper the smooth delivery of the digital content to schools

were also noted by this study. The research findings revealed that the main barrier that was cited by both 80 (22.7%) sample teachers and 19 (24.1%) sample head teachers was insecurity of laptop computers and tablets in schools. The research findings showed that the Government of Kenya invested heavily on DLP, but seriously ignored the fact that most infrastructures in primary schools such as fencing, building of burglar proof rooms and employment of watchmen in these primary schools in Kenya had been left in the hands of poor parents whose efforts to secure the schools were wanting (Kubania, 2014). In addition, many public primary schools in the rural set ups of Kenya were reported to be dilapidated to the extent that they could not accommodate hard copy textbooks leave a lone tablets and laptop computers (Standard Team, 2019; Kenya. Ministry of Education, 2005; Kubania, 2014; Omanga, 2018). Based on the poor state of classrooms, most laptop computers and tablets in schools that had received them were kept in school offices that looked more secure than DLP classrooms.

In addition, a number of theft cases of DLP devices had been reported in different parts of the Homa Bay County. Notably some of the school offices which were not burglar proof had been broken into at the time of the study (Kenya. ICTA, 2016). The stakeholders in the education sector, therefore, needed to put emphasis on security of the already available or distributed DLP devices. In fact, security of learning institutions should not only be left in the hands of financially unstable public primary schools but should be an issue of national concern taken over seriously by the national government (Muriuki, 2017). Some schools had to take the gadgets to chiefs' camps and police stations for safe keeping (Standard Team, 2019).

Electricity as a barrier for laptop computers' implementation was supported by Eke (2011); Hennessy et al., 2010; Hernandez, 2017; Kubania, 2014 and Mulwa et al, 2012). On the other hand, insecurity and lack of steady power sources were serious implementation challenges that were mentioned by several respondents during the interviews. The findings were in concurrence with the comments of one interviewee who said:

There should be a way of having a power back-up. There should be a power back-up because in our area there is power surge. The power can even fail for a whole week so if you...come up with a plan... a project where this no...where power can fail the lessons may not go on for a whole week (Head teacher, Ndhiwa).

In conclusion, DLP faced numerous challenges in delivery of the course syllabus to learners. Wanzala and Nyamai (2018) reiterated that teachers were equally facing challenges of DLP implementation by arguing that use of DLP devices was dragging behind the syllabus coverage because it could not be wholly relied on due to numerous implementation challenges such as inadequate teacher skills, lack of power, lack of proper infrastructure and the slow pace of implementation. However, there are more merits than demerits of online education in any society in the whole world.

CONCLUSIONS AND RECOMMENDATIONS

It was concluded that Kenya headed its learning institutions in the right direction by introducing digital learning in schools. The digital gaps in schools were set to reduce and eventually close if the project was fully implemented. However, the study noted a number of challenges during the implementation process that needed immediate intervention measures. Some critical areas for teaching and learning such as simulation were poorly mastered by the teachers during their 5-day training provided by the government. Insecurity of schools posed threats to the already provided digital devices in schools. The study recommended steady supply and monitoring of digital devices to all learning institutions to help improve the teachers and head teachers' computer literacy skills through continuous practice.

REFERENCES

- Asiago, D., Mugambi, A., & Wanjala, G. (2014). Factors affecting use of radio broadcasting in public primary schools in Tharaka North Division, Tharaka District. *International Journal of Education and Research*, 2 (6). Retrieved from: <https://www.ijern.com/journal/June-2014/05.pdf>
- Bates, T. (2014). *A short history of educational technology*. Retrieved from Online and Distance Education Resources website: <http://www.tonybates.ca>
- Berk, R. A. (2009). Multimedia teaching with video clips: TV, movies, youtube, and mtvu in the college classroom. *International Journal of Technology in Teaching and Learning*, 5 (1), 1–21.
- Bowa, O. (2011). The relationship between learner characteristics and academic performance of distance learners: The case of external degree program of the University of Nairobi. *Journal of Continuing, Open and Distance Education*, 1(2). Retrieved from: https://profiles.uonbi.ac.ke/bowa/files/abstract_learner_characteristics.pdf
- Buchele, S. F., & Owusu-Aning, R. (2007). The one laptop per child (OLPC) project and its applicability to Ghana. *In Proceedings of the 2007 International Conference on Adaptive Science and Technology* (pp. 113-118).
- Burns, M. (2011). *Distance education for teacher training: Modes, models, and methods*. Washington, DC: Education Development Center, Inc.
- Ciascai, L., & Marchis, I. (2008). Multimedia in primary and secondary school curricula in Romania. *Acta Didactica Napocensia*, 1 (2), 76-85.
- Creswell, J.W. (2011). *Research design. Qualitative, quantitative, and mixed methods approaches* (3rdEd.). Boston: Pearson Education, Inc
- Commonwealth of Learning & Asian Development Bank (Eds.). (2008). *Quality assurance in open and distance learning: A toolkit*. Vancouver, BC: Commonwealth of Learning

- Eke,H.N. (2011). *Modeling LIS students' intention to adopt e-learning: A case from University of Nigeria, Nsukka*. Retrieved from: <http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1496&context=libphilprac>
- European Commission. (2001). *Information and communication technology in European education systems*. Brussels: Eurydice European Unit
- European Commission. (2011). *Key data on learning and innovation through ICT at school in Europe*. Brussels: Education, Audiovisual and Culture Executive Agency. Retrieved from: https://www.cseeetuce.org/images/attachments/ictkeydata_on_learning_and_innovation_through_ict_2011_summary.pdf
- Feeney, S., Grace, D., & Brandt, M. (2001). *Ready for success in kindergarten a comparative analysis of community beliefs: Preschool and kindergarten parents, teachers, and administrators*. Retrieved from Hawai'i Educational Policy Centre website: http://manoa.hawaii.edu/hepc/pdf/Reports/Readiness_Report.pdf
- Hennessy,S., Harrison,D., Ang'odi,E.K., Nemalefe,S., Naseem,A., & Wamakote,L. (2010). *Developing the use of information and communication technology to enhance teaching and learning in east African schools: Review of the literature*. Eastern Africa: Centre for Commonwealth Education and Aga Khan University Institute for Educational Development.
- Hernandez, R.M. (2017). *Impact of ICT on education: Challenges and perspectives*. A manuscript presented for publication Retrieved from: <http://dx.doi.org/10.20511/pyr2017.v5n1.149>
- Hope, A. (2006). *Factors for success in dual mode institutions*. Vancouver, BC: Commonwealth of Learning. Retrieved from: <http://www.col.org/>
- Kenya. DLP Secretariat. (2016). *Digital literacy programme management guidelines (2nd Version)*. Nairobi: Information Communication and Technology Authority.
- Kenya. ICTA (2016). *Homa Bay Digital Literacy Report*. Homa Bay County: ICT Authority
- Kenya. Ministry of Education (2005). *Kenya Education Sector Support Programme 2005 – 2010*. Nairobi: Ministry of Education
- Kimuge, S. (2017, June 22). Teachers hiding primary school tablets, official says. *Daily Nation*. Retrieved from:<https://www.nation.co.ke/news/education/teachers-hiding-tablets-official-says/2643604-3983128-8wq7q2z/index.html>
- Kothari, C.R., & Garg, G. (2014). *Research methodology. Methods and techniques (3rd Ed)*. New Delhi: New Age International Publishers.

- Kubania, J. (2014, March 19). Sorry state of infrastructure in Kenya's primary schools. *Daily Nation*. Retrieved from: <https://www.nation.co.ke/lifestyle/dn2/Sorry-state-of-infrastructure-in-Kenyas-primary-schools/957860-2249632-13jxnc4z/index.html>
- Mason, M. (2010). Sample size and saturation in PhD studies using qualitative interviews. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, 11 (3). Retrieved from: <http://www.qualitative-research.net/index.php/fqs/article/view/1428/3027>
- Meiers, M., Knight, P., & White, G. (2009). The Digest edition 2009/1: The use of ICTs in schools in the digital age: what does the research say? Retrieved from: <http://research.acer.edu.au/digest/6>
- Mulwa, A., Kyalo, N., Bowa, O., & Mboroki, G. (2012). Influence of ICT infrastructure on readiness to adopt e-learning in secondary schools in Kitui District, Kenya. *Journal of Continuing, Open and Distance Education of the University of Nairobi*, 2(1). Retrieved from: <https://distanceeducation.uonbi.ac.ke/index.php/node/103>
- Muriuki, K.M. (2017, February 9). Government starts investigations into theft of 46 tablets. *Daily Nation*. Retrieved from: <http://www.nation.co.ke/news/education/Theft%20of%20computers%20interrupts%20earning%20-%20Daily%20>
- National College of Ireland. (2009). *Digital literacy: New approaches to participation and inquiry learning to foster literacy skills among primary school children*. Retrieved from National College of Ireland website: https://www.researchgate.net/.../32963274_Digital_Literacy_New_Approaches_to_Participation
- Njagi, M. M. (2013). *Assessment of the status of e-learning as course delivery method in public universities in Kenya*. (Unpublished PhD theses). Kenyatta University, Kenya.
- Noor-Ul-Amin, S. (2013). An effective use of ICT for education and learning by drawing on worldwide knowledge, research, and experience: ICT as a change agent for education. *Scholarly Journal of Education* 2(4), 38-45. Retrieved from: <http://www.scholarly-journals.com/sje/archive/2013/April/pdf/Noor-Ul-Amin.pdf>
- Nsibirano, R. (2009). "Him and her" - gender differentials in ICT uptake: A critical literature review and research agenda. *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 5 (5), 33-42.
- Nyaundi, L. (2018, January 24). Laptops to be updated with new content. *The Star*. Retrieved from: https://www.the-star.co.ke/news/2018/01/24/laptops-to-be-updated-with-new-content_c1702638

- Oduor, A. (2015, December, 15). Content for pupils' digital literacy programme to be launched. *Standard Digital*. Retrieved from: <https://www.standardmedia.co.ke/article/2000185379/content-for-pupils-digital-literacy-programme-to-be-launched>
- Omanga, D. (2018, February 24). Is Jubilee's laptop project headed for a collapse? *Standard Digital*. Retrieved from: <https://www.standardmedia.co.ke/article/2001270947/jubilee-s-laptop-pledge-doomed-from-the-start>
- Pew Research Centre. (2013). The impact of digital tools on student writing and how writing is taught in schools. Retrieved from National Research Writing Project website: https://www.nwp.org/afnews/PIP_NWP_Writing_and_Tech.pdf
- Republic of Kenya. (2015). *Digital Literacy Program [press release]*. Retrieved from: Information, Communication and Technology Authority of Kenya website: http://www.icta.go.ke/downloads/digital_literacy_program_launch.pdf
- Salehi, H & Salehi, Z. (2012). Challenges for using ICT in education: Teachers' insights. *International Journal of e-Education, e-Business, e-Management and e-Learning*, 2(1). Retrieve from: <http://ijejee.org/Papers/078-Z00061F10037.pdf>
- Singh, K. Y. (2010). *Research methodology*. New Delhi: A. P. H Publishing Corporation
- Srinivasan, R., & Lohith, C. P. (2017). *Pilot study—assessment of validity and reliability. In Strategic Marketing and Innovation for Indian MSMEs* (pp. 43-49), Singapore: Springer. Retrieved from: https://link.springer.com/chapter/10.1007/978-981-10-3590-6_6
- Standard Team. (2019, March 3). Elusive dream: Tablets gather dust in stores as project stalls. *Standard Digital*. Retrieved from: <https://www.standardmedia.co.ke/article/2001315065/tablets-gather-dust-in-stores-as-project-stalls>
- Suryawanshi, V., & Suryawanshi, D. (2015). Fundamentals of e-learning models: A review. *IOSR Journal of Computer Engineering (IOSR-JCE)*, 107-120. Retrieved from: <https://pdfs.semanticscholar.org/30ca/6fb0ad3c0fa33c8d2453b7bcec5a46826f56.pdf>
- Van Lieshout, M., Egyedi, T. M., & Bijker, W. E. (2018). *Social learning technologies: The introduction of multimedia in education*. New York: Routledge.
- Wanzala, O. (2015, December 16). Education CS Matiang'i unveils digital content for pupils. *Daily Nation*. Retrieved from: <https://www.nation.co.ke/news/Digital-content-for-pupils-unveiled/1056-2998358-uu5qriz/index.html>

Wanzala,O. (2017, April 16). Govt to continue with laptop project as 700,000 benefit. *Daily Nation*. Retrieved from: <https://www.nation.co.ke/news/Govt-to-continue-with-laptop-project-/1056-3891240-my0ox0/index.html>

Wanzala,O., & Nyamai, F.(2018, July 23). Big hurdles thwart Jubilee’s laptops plan. *Daily Nation*. Retrieved from: <https://www.nation.co.ke/news/Big-hurdles-thwart-Jubilee-s-laptops-plan/1056-4676332-9w2jndz/index.html>