

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/359730289>

Lessons from online learning during Covid-19 pandemic for building education resilience in secondary schools in Kenya: A case study

Article · March 2022

DOI: 10.15739/IJEPRR.22.006

CITATIONS

0

READS

22

2 authors, including:



Florence Kisirko

Maasai Mara University

24 PUBLICATIONS 34 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Curriculum [View project](#)



Teacher Education [View project](#)



Original Research Article

Lessons from online learning during Covid-19 pandemic for building education resilience in secondary schools in Kenya: A case study

Received 10 January, 2022

Revised 30 February, 2022

Accepted 9 March, 2022

Published 31 March, 2022

Florence Kisirkoi^{*1}
and
Angela Kamanga²

¹Senior Lecturer Maasai Mara University, Kenya

²Education Officer Ministry of Education Taita-Taveta, Kenya

*Corresponding Author's Email:
kisirkioiflorence@gmail.com

Tel.:+254 739668315

Online learning was the preferred avenue to sustain learning during the COVID - 19 pandemic when all learning institutions closed globally. Lessons learnt could be used to build education resilience in times of education disruptions in Kenya. A case study of two public secondary schools was conducted anchored on connectivism theory and Technological Pedagogic Content Knowledge. The participants were 15 teachers and 154 form four candidates from two secondary schools, purposively selected as the candidate classes. The objectives were to find out: the technology devices used by teachers and students to learn; whether the teachers and the students had knowledge, skills and attitudes to engage in online learning; how teachers and students acquired knowledge and skills to use the technology devices and whether there were any interventions provided to support them. A questionnaire for teachers and another for students collected quantitative and qualitative data which was analysed and established that few students managed to engage in online learning without adequate support and other technology devices were used for learning.

Keywords: Online learning, resilience, lessons, figuring out

INTRODUCTION

Online learning was the preferred avenue to keep learning going on during the COVID - 19 pandemic when all learning institutions closed globally, lockdowns and social distancing restrictions were enforced. In March 2020, the president of Kenya ordered all learning institutions to close to avert further spread of COVID-19 (GOK, 2020), disrupting learning for over 18 million learners in the country. National examinations in form of summative evaluation for classes eight and form four were most affected. Teachers halted their usual strategies of preparing students for examinations. Globally there was great learning loss. Any lesson learnt could inform education resilience building against such future crises, never to be caught unawares again. In Kenya, the crisis intervention tended to test the effectiveness of the ICT integration in

teaching and the Kenya Education Cloud housed in the Kenya Institute of Curriculum Development (Government of Kenya, 2020). All other ICT tools for teaching faced with the crisis challenge call for reflection and improvement.

Online learning at the core of globalisation is highly encouraged for classroom pedagogical processes for purposes of creativity and innovativeness. In Malaysia, the Ministry of Education (Ghavifekr and Rosdy, 2015) in the Blue Print (2013-2025), articulates the great role technology - based teaching would play in the implementation of the national curriculum. Online learning is considered as the chief element to facilitate transformation of the country by upskilling the teacher to global requirements for teaching from the traditional methods (Ghavifekr and Rosdy, 2015). With embedded

creativity and innovativeness online learner- centred interactions between educators and learners is facilitated which promotes higher order thinking processes (Basar et al., 2021). Such interactions would have been ideal during the school closures when learners and teachers were in different locations (Islam and Habib, 2021). In addition, electronic learning platforms are easily adjustable during unexpected crises, such as COVID-19 to meet the special needs. According to Wargadinata et al. (2020), online learning can be effective through the utilisation of various technological applications such as Zoom, Google Classroom, Meet and Microsoft Teams among others, which have now come to be largely used in academic circles. However, internet access challenges, inadequate interaction between the teachers and learners and unavailability of technological facilities challenge the effectiveness of online learning (Muhammad and Kainat, 2020). These sentiments are echoed by Almahasees et al. (2021) who argue that during online learning students and teachers experience quite different challenges as they struggle to completely adapt to online environment, course content, loneliness and inadequate interaction between students and their tutors.

Online learning is internet based and can connect students and teachers in diverse geographical locations as long as they have the right devices such as smartphones or laptops and are internet connected with sufficient internet bundles in addition to electricity accessibility; all which have cost implication. It can't be entered into suddenly without prudent preparedness at high levels. Online learning requires a learning Management System, knowledge and skills to navigate the lonely online environment, appropriately log into platforms such as Zoom, Google Meet, classroom, Microsoft Teams; follow steps and utilize the tools such as discussion forum, blogs, wikis, break out room, jam boards, clickers and many others which allow for learner- centred interactive learning using both synchronous and asynchronous learning (Dhawan, 2020). It also requires ability and self-discipline to follow the required procedures and to keep up the pace without deviating to other pop-up programmes. Online learning therefore, requires preparation to deliver learning remotely over the internet through web - based software and a two -way communication between the learner and the teacher where the teacher remains in control of the learning environment (UNICEF, 2021). Therefore, both the teacher and the learner should be well skilled and ready to manipulate the technology tools and navigate the online lonely environment for learning. This was not the case at the height of COVID-19 pandemic for majority of learners and their teachers where online learning was a response to emergency and was entered into in haste. Though very promising, online learning if not well managed could expand education inequalities and exclusion. During the COVID -19 school closure, the reality on the ground was that use internet and to some extent electricity was a preserve of privileged few, any technology tool for learning available was utilized by others. This was regardless call for online, remote and digital learning.

This study concentrated on technology- enabled learning which includes online learning, remote learning, digital learning, computer- based learning and media resources such as television and radio, among others that work well with integration of ICT in education. Effort was made to leverage technology for teaching and learning. It is therefore crucial for both the teachers and learners to embrace sustainable technology - enabled learning solutions through increased access to knowledge and skills on use of technology in teaching and learning process. They could be used in times of crisis for education resilience which enables learning without disruptions. Through utilisation of Information Communication Technology (ICT) integration in the classroom, learners would be able to engage in collaborative tasks with a broader variety of information and knowledge during their learning (Barakabitze et al., 2015). Effective use of technology in teaching, as a teaching learning tool is associated with significant increase in student learning achievement gain (Grabe and Grabe, 2007) which is an added benefit to continuing education in times of crises and makes it the approach to take at all times.

Barasa (2021) reported that Kenya has sophisticated ICT in education strategy and implementation which reflects similar argument by Nyambura, Ndung'u et al. (2017). Integration of ICT in teaching and learning is a primary focus of Kenya educational policy. The country also introduced New Partnership for Africa's Development (NEPAD) pilot e- schools (Nyagowa et al., 2012) which use technology for learning. Therefore, use of technology in teaching and learning should have salvaged learning in Kenya during COVID-19 pandemic but it tended not to do much as reported by UWEZO (2020) report which found that on average 20 out of 100 children were accessing digital learning 42 out of 100 accessed TV, 10 out of 100 accessed materials from KICD. This study brings out the state of technology - enabled learning which is a lesson on what to build on for resilience in difficult times.

The term 'resilience' is a concept borrowed from physics, where resilience is used to mean the ability of a body to recover its shape and size after being deformed (Serrano et al., 2021). This study uses resilience as a process that grows in the face of adversity based on reflection and it is constructed based on the skills that the individual puts into practice to overcome a trauma (Connor et al., 2003); it is more of a process that grows in the face of adversity (Luthar et al., 2000). In building education resilience context, the concern is to look at the lessons learnt from the adversity, reflect on what worked in technology - enabled learning which includes online learning or what failed and recommend technology - enabled paths which education may take in difficult times of crises of various types which hinder usual school attendance.

Statement of the problem and Significance of the Study

The COVID -19 pandemic in Kenya led to sudden closure of all learning institutions disrupting teaching and learning for

over 18 million learners from diverse home backgrounds, financial ability, attitudes, academic abilities, technology and electricity access levels. There was diversity in internet connectivity and parents and care givers' education levels; some of them were illiterate. The level of adequacy of teachers' and students' knowledge and skills in use of technology for teaching and learning was not clear as well as interactive and navigation challenges. Whether all students managed to navigate the virtual environment during the school closure and the lessons learnt by their access or failure to access was not clear. The interventions put in place by different stakeholders was not clear too but it was clear that some learning took place by those who accessed technology- enabled learning tools and finally the national examinations were sat and students progressed to next level of education. There was therefore need for this study to establish the lessons learnt from learning during the COVID -19 pandemic on how teachers and learners acquired knowledge and skills on online teaching and learning and the tools they mostly used, any support interventions during the difficult COVID-19 pandemic times. These lessons could contribute to building education resilience in such difficult times and enable learning to continue without creating and expanding inequalities and exclusion.

The objectives guiding the study were to find out: the technology devices used by teachers and students to learn online, whether the teachers and the students had knowledge , skills and attitudes to engage in online learning; how teachers and students acquired knowledge and skills of using the technology devices and whether there was any support interventions provided to them to work in the online environment during the Covid -19 pandemic and to establish lessons learnt which could contribute to building education resilience during times of crises for education to continue undisrupted without creating inequalities and exclusion.

This study sought to answer the following questions: What technology devices were used for learning during the pandemic; did teacher and students have sufficient knowledge to teach and learn online? How did they acquire knowledge and skills on use for technology for teaching and learning during Covid-19 pandemic? What interventions did the teachers and students receive to support them in use of technology for teaching and learning during the Covid -19 pandemic. The answers to the questions would generate lessons learnt which could be used for building education resilience during times of crises and other sustainable measures could be put in place.

This study is significant in establishing how technology was used to enable any learning to continue during the COVID - 19 pandemic in public secondary schools in Kenya. It unravels the different ways in which teachers and students acquired knowledge and skills on use of technology for teaching and learning during Covid-19 pandemic, the challenges experienced, support interventions availed and their sustainability suggestions on in post pandemic period for building resilience without

creating and expanding inequalities and exclusions. This study focuses on finding out how those who succeeded in making learning continue despite the pandemic managed to do it and then use the lessons learnt to support learning to continue despite pangs of future pestilences.

Literature Review

Reviewed literature points to technology- enabled learning as the route to take going forward. (Kamar, 2021) in observes that the old normal was not normal, it concentrated most on face -to -face mode of learning and now we must look for a mix or blended learning. Going forward Kamar advises for virtual training to prepare teachers and learners for learning to be made accessible to all noting that technology - enabled learning allows interaction and deep learning through tools such as forum and building communities of learning. It also allows for real-time data on learning and human - centred learning, which Kamar sees as the route to take, going forward enabled by technology but reality on the ground shows majority of learners used TV for learning during COVID 19 school closure. The synchronous aspect of online learning, the live meetings and break out rooms could reduce the feeling of isolation of online learning but the effect can't replace in-person face- to -face interactions. Online learning allows students to access learning anywhere and interact with peers and teachers as long as they have the right technology devices and are connected to internet. Synchronous learning provides opportunity for social interaction and the connection between teachers and learners and learners with peers which offer instant response and possibility of watching recorded live sessions later; learners could attend live lessons in real time and interact with instant feedback and in asynchronous interact with course materials (Dhawan, 2020) in an ideal internet supported situation.

A study by UNICEF (2021) on reports disparities observed on access to internet and ICT at households' level due to differences in social economic standing which threatens to widen the severe existing learning inequalities despite existing policies. It advises that online learning can't be entered into suddenly; it requires preparation to deliver learning remotely over the internet through web - based software and requires two -way communication between the learner and the teacher where the teacher remains in control. It underscores that in order for remote learning to reach learners, their households need necessary remote learning technology resources. UNICEF further advises that where teachers and students have not had opportunity to develop digital literacy skills in usual process of teaching and learning circumstances, then digital tools should not be used during blended and remote learning. Rather, teachers and students should just use methods they are familiar with and are able to access until they are ready to go online (UNICEF, 2021). However, as a rapid emergency response to COVID-19 pandemic learning was hastily forced to go online. The UNICEF further advises that the expanding

digital coverage should be paired with efforts to facilitate synergy across all domains creating resilient and flexible systems. This seems to suggest that innovative means of creating learning resilience with available technology and not necessarily online learning should be the way to go.

Education is a human Right and Sustainable Development Goals (SDGs) and Kenya makes great effort to meet them, especially goal 4.1(UNESCO, 2015) which emphasizes that by 2030 countries should ensure that all girls and boys access complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes. Countries will have to get innovative ways of actualizing the goal in an education resilience environment. Boisvert, Bowen, Kayla and Weisenhorn (2020) conducted a study supported by USAID and suggested that return to learning during crisis could help education planners to plan, and make critical crosscutting equitable decisions that build resilience and identifies all inclusive considerations when returning to learning after crises. The pandemic seems to have subsided and strategies to return to learning if well thought of could promote equity and inclusion which could inform policy and education resilience to avoid future disruptions. When the pandemic struck people hoped it would just pass but it has persisted pushing education to a tight corner; now while returning to learning individuals have stories to tell which could bring about innovative ways for planning for the future equitable inclusive learning.

It appears that the efforts the government put in ICT integration did not seem to be reflected in use of technology as a teaching learning tool during COVID pandemic. Government of Kenya (2020) reports that Kenya developed COVID -19 Response Plan which aimed at provision of unlimited learning during the crisis. It gave a clear plan which included increased livestreaming of education content, strengthening Kenya Education Cloud housed in KICD, build capacity of teachers on interactive remote learning to equip them support remote learning. They planned for production of online and offline education resources; radio and TV to be supplied to needy schools, provision of adequate ICT infrastructure, educational radio and TV broadcast, linkages for provision of electricity in rural areas, establish partnership with mobile phone companies for continual and zero-rating use and establish regional free call service among other such good plans.

There tends to be contradictions between the great, admirable plans and ICT integration in teaching and learning and reports by studies conducted during COVID-19 pandemic. Ncube and Ondiege, (2013) reported that Kenya was leading in ICT innovation hub in Sub-Saharan Africa, second to Madagascar in internet country spread and has transited from 2G to 3G technology and is now finalizing adaption of 4G. Barasa (2021), with support from International Labour Organization (ILO), conducted a study which tended to confirm that Kenya prioritizes the use of Information Communication and Technology for teaching and learning at all levels of education but there was little online learning during the COVID-19 pandemic school

closures. The growth in technology is in apparent contradiction of the studies conducted during COVID pandemic by Barasa, (2021) and UWEZO (2020) which indicates that the efforts have not born much fruit in use of technology for teaching. The studies articulate hinderances such as battery failure, high electricity bills, lack of electricity, lack of internet connectivity theft of digital tools among others. Despite the reported efforts, Barasa goes on to report low access to online learning during COVID-19 pandemic. UWEZO (2020) study too found dismal access to online learning by learners. As an example, the report indicated low access to remote learning; 22 out 100 learners were able to access online learning, 42 out of 100 accessed televisions, 10 out of 100 accessed KICD digital materials and the Ministry of education directives and promises. The government of Kenya envisioned using education platform for equipping the nation with ICT skills (Barasa, 2021). This low use of technology in learning was regardless the existence of the Kenya ICT policy developed in 2006 and revised in 2019 which aimed at developing Kenya to a knowledge - based economy and a digital society. The reports concur with Gakuu and Kidombo (2011) who had reported that there was very little integration of ICT in curriculum delivery in many secondary schools in Kenya. The lesson here is that there is need to scrutinize what causes the discrepancy, reflect and solve the problem that bars the government's efforts leading to implementation on the ground.

UNICEF (2021) in their study on 'Ensuring equal Access to Education in Future Crises gives further contradiction. The findings of New Remote Readiness', placed Kenya as a country in 4 stars where 5 was the highest and one the lowest which had used household factors, policy response and emergency preparedness as the three key domains of study. As a country this may appear good but at individual households and school level the story may be different because a clear policy on use of technology for teaching when some households cannot access technology tools and with other competing family needs would not enable learners to learn, instead the existing socio - economic disparities become widened. Teachers just grappled with the new pedagogical approach and all respondents reported frustration with digital learning mode (UNICEF, 2021). Therefore, preparation for technology learning is vital. The UNICEF study further asserted that without an effective curriculum and actual use of remote learning system and tools, remote learning readiness cannot translate into actual learning and that is where the country needs to reflect genuinely and start from. Both the teacher and the learner should be ready and the curriculum should be suitable for online learning.

The further apparent contradictions serve as great learning areas and lessons to reflect on. The Ministry of Information Communication and Technology (2019) asserted that Kenya is currently one of Africa's fastest growing ICT markets which is reflected by the 4 stars from UNICEF Where 5 stars mark the highest level of performance and one the lowest, but the question is the

actual situation of individual learners and households' conditions and readiness for remote learning on the ground. Besides, Competency Based Curriculum includes digital literacy in one of the learning areas as one of the competencies to be developed (Government of Kenya, 2017). One would expect teachers to be skilled in use of ICT as teaching learning tool. Kisirkoi (2015) articulated that enough preparation must be in place for ICT integration in learning for it to succeed. It requires keen planning, effective teacher preparation and sustained teacher professional support. In addition, the teacher and the whole process need support from a visionary school leadership who is aware and supportive of 21st century demands and is agile enough to change with times and aspire to prepare learners to live and work in the dynamic technological 21st century global village. The success of ICT integration in teaching and learning also requires a teachers' attitude that is adaptive to change and understanding that use of technology in many ways enriches teaching and learning (Islam and Habib, 2021). In addition, Kisirkoi (2015) established that vast majority of teachers 83% reported that desire to teach better drove them as individuals to use technology for teaching. One wonders whether the teachers trained in use for ICT for teaching have that kind of personal drive.

The experiences that teachers and students had as they interacted with technology for teaching and learning during Covid-19 pandemic was also not clear. Major researches in Kenya during the pandemic such as UWEZO (2020) as mentioned earlier, found out that the Kenya government had played a significant role in supporting integration of ICT in learning but there was very little to be found saving the situation when COVID struck. The same situation was echoed by Barasa (2021) also mentioned earlier. One wonders whether the teachers had really learnt how to use ICT for learning. Barasa reported that only a small percentage of students used technology for learning. It is that percentage which will give us lessons to learn, reflect and contribute to building education resilience in times of future possible crises, COVID-19 was reported to have got worse with onset of Omicron; there is need to come up with resilience education.

This study also sought to find out any support interventions on online teaching and learning for the students and teachers during the Covid -19 pandemic and establish whether there was any sustainability of the online teaching and learning during and post COVID-19 pandemic. Studies such as by Bowen et al. (2020) among others have demonstrated that organizations such as USAID as development partners worked to support studies on education including technology-enabled learning and continue helping the Kenya government but it is not clear why much impact was not felt on the ground, at the implementation level.

Theoretical and conceptual framework

This study was anchored on connectivism theory which is a

new leaning theory for digital age heavily influenced by technology where knowledge is distributed across networks and connection and connectedness inform learning (Siemens,2004). Siemens views learning as process of connecting specialized nodes of information sources. Internet technologies make new avenues for learning and enable learning and sharing of knowledge across the world. Learners access content through network and technology becomes part of school's internal learning process. Technology supports learning process in a learner - centred learning environment and information are a fluid network continually updated and very dynamic. The ability to locate resources is as valuable as information itself. The connectivism theory is applicable for this study which finds technology as a route to enable learning continue in face of calamities and even in times where there is no calamity due to its quality of allowing interaction and activities which contribute to deep learning in learner centered environment and that boosts higher order thinking. Networking is crucial and the devices to support it are critical components necessary for success of technology learning (Siemens, 2004).

The Study was also guided by Technological Pedagogical Content Knowledge (TPACK). Mishra and Koehler (2006) identifies three types of knowledge necessary for use of ICT as teaching learning tool. These are Technological Knowledge (TK), Pedagogical Knowledge (PK) and Content Knowledge (CK). The teacher needs to be knowledgeable and skilled in use of technology, navigating the technology environment, the use of the hardware the software, applications and digital literacy. The teacher also needs pedagogical knowledge which is the knowledge of how to teach supported by technology and finally Content Knowledge, the knowledge of the subject matter to be taught, to be able to slice it up and deliver it supported by technology. The three knowledge are combined in instructing learners creating interaction between, technology, pedagogy and content for better understanding and deep learning of the subject matter. Any training for teachers to support them use technology for teaching must address the three knowledge areas. This theoretical framework is important in this study to shed light on how to make technology supported learning succeed and shed some light on what may be hindering integration of ICT in teaching and learning and why the outcome is low (Islam and Habib, 2021). It guided in identification of objectives for the study on knowledge, skills acquisition, experience and interventions for use of technology for teaching and learning during COVID-19 pandemic.

METHODOLOGY

This case study was conducted in two secondary schools in a semi urban, semi- arid rural county in Kenya. Form four class was purposively selected because it is usually a critical class where all attention is laid by the school to prepare the students for the terminal summative Kenya

Table 1. Percentage of use of technology devices during Covid-19

Objective	Participant	Smartphone	TV	Radio	Laptop	Did not access
To find out technology devices used by students and teachers to access learning	<i>Students:</i>	80/154 (51.94%)	31/154 (20.12%)	5 /154 (3.24%)	6/154 (3.89%)	32/154 20.77%
	<i>Teachers:</i>	12/15(80%)	0	0	3/15(20%)	0

National Certificate of Secondary Education. It was hoped that from an examination class the maximum effort of teaching and learning during the pandemic would be well represented. All the teachers and students in two form four classes in the two schools participated in the study. Therefore the 15 teachers teaching the classes and all the 154 form four candidates participated in the study with their parents' signed consent.

Quantitative and qualitative data was collected using two questionnaires, one for the teachers and the other for students. Questionnaire were the best research tools due to the COVID-19 infection safety restrictions at the time. Note is taken that data could not be collected online due to poor internet connectivity for use by the teachers, students and the researchers. The students were served the questionnaires by the teachers who had a way of accessing the students with their parents' consent. The questionnaires were filled in and returned to the teachers where they were then picked by the County Education officer and given back to the researchers observing the ethical considerations and COVID-19 safety measures. The data was analyzed, report written for dissemination.

FINDINGS AND DISCUSSIONS

The first objective of this study sought to find out the technology devices commonly used for learning during COVID-19 pandemic and how the teachers and learners connected. Table 1. gives a summary of the devices used for learning during the pandemic.

From the table, majority of teachers 12/15(80%) used smartphone and 3/15 (20%) were able to connect with students who used smartphone 80/154 (51.95%) and those who used laptop 6/154 (3.25%). The school used Google Meet learning management platform. Few 31/154 (20.13%) and 5 /154 (3.25%) who used TV and radio relied on ready programs from Kenya Institute of Curriculum Development (KICD) and may not have connected with the teachers. A large number 32/154(20.77%) did not access learning. This shows that there were students who did not access their teachers during the online learning during COVID. Teacher student access is very crucial for effective learning. It drives out feeling of isolation which impacts online learners negatively. The synchronous aspect of online learning, the live meetings and break out rooms could reduce the feeling of isolation of online learning. Students could attend live lessons in real time and interact with instant feedback and in asynchronous interact with

course materials (Dhawan, 2020). Failure for some students to access learning increased exclusion, escalating learning inequalities, which should be reduced.

The study by UWEZO found that television content provided by KICD with 42% users was the most used tool across the country during the COVID pandemic and this study cellphone was the most used. It appears that different schools used the tool appropriate to their situation. Therefore, different schools could be allowed to identify the tool most appropriate for them and use it for learning.

The lesson learnt in this study is that Smart phone was used more in technology-enabled learning by teachers and the students and the tool could be allowed in schools and used for learning with strict control by the school. The students could also be informed on dangers of misuse smartphones and other such tools. The teachers should also be supporting students learning through radio and TV because teacher presence is critical. The most worrying are the learners who failed to access learning. In future plans should be made before hand to ensure inclusion of all learners in learning at all times.

The second objective sought to establish whether the teachers and students had adequate knowledge and skills for use of technology for online teaching and learning. Both the teacher and the student were asked same question. 'Did you have adequate knowledge and skills for technology learning during the school closure? The percentage of type of responses are as summarized in Figure 1.

Note: Question: Did you have adequate knowledge and skills for technology learning during the school closure?

From the Figure 1, the vast majority of the students 121/154 (79%) did not have knowledge and skills to use the online technology for learning. Only 33/154 (21%) of students had adequate online learning knowledge and skills of online learning. Teachers on the other hand 8/15(53%) had adequate online teaching knowledge but almost half 7/15(47%) did not have knowledge and skills for online teaching and this courses great concern.

Those students and teachers who had the knowledge and skills create for this study a learning opportunity of learning how they managed to acquire it and how others could learn from them and form in a communities of learning for collaborative engagements to sustain learning resilience for any eventuality .

The majority of students could not use online technology for learning and also a large number of teachers could not

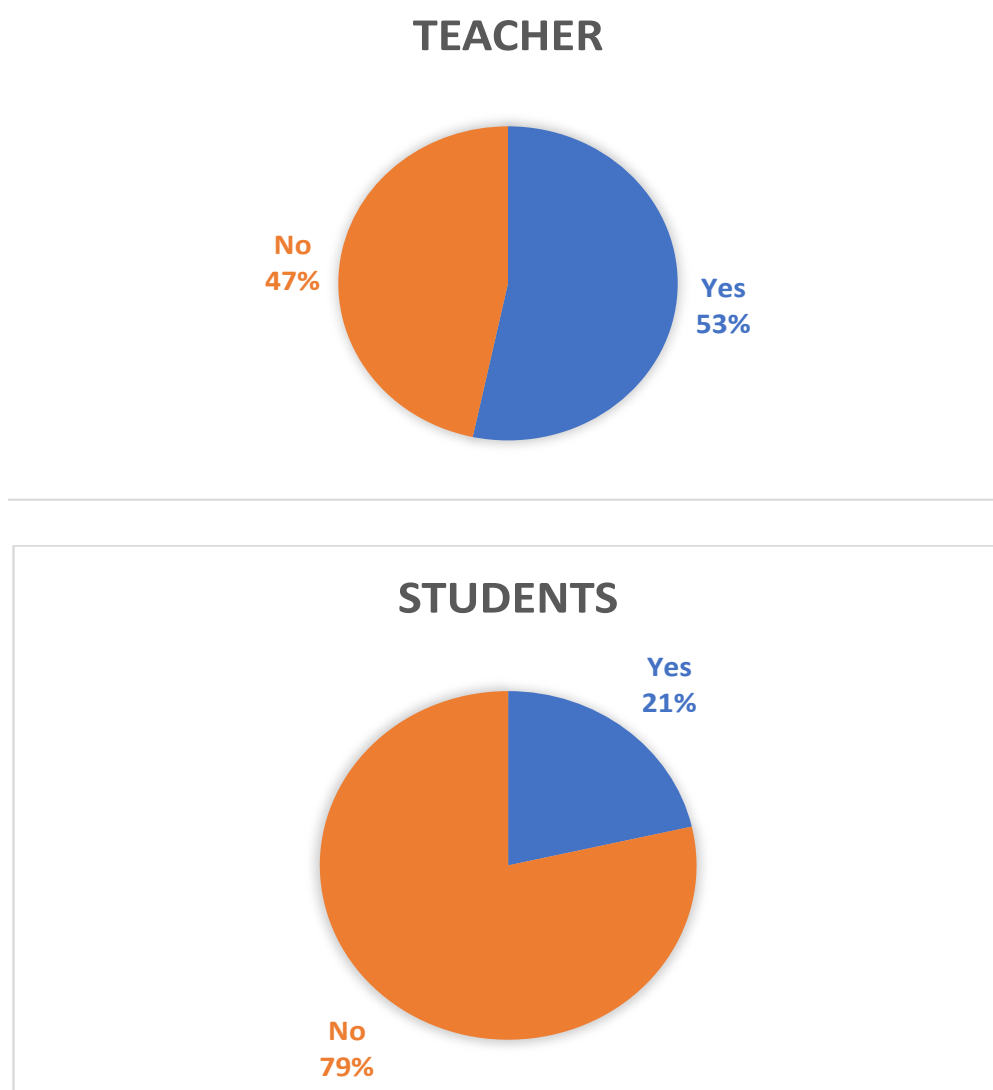


Figure 1: Knowledge of use of Online Learning Devices

use the devices for teaching which is cause for worry. In another study, Kisirkoi (2015) found that teachers need to be adequately prepared for ICT integration in learning to succeed in using technology as a teaching learning resource. The study also found that teachers personal desire to teach better motivated them to find out on their own how to use technology for teaching. Otherwise, technology for teaching and learning requires keen planning, appropriate curriculum, effective teacher preparation and sustained teacher professional support. Kamar (2021) advises that there should be virtual training to prepare teachers and learners in order to make learning using technology accessible to all. In agreement to Kamar UNICEF (2021) advised that online learning can't be entered into suddenly; it requires preparation to deliver learning remotely over the internet through web - based software and requires two -way communication between the learner and the teacher where the teacher remains in control. There is therefore need to prepare the learner

guided by the three different knowledge articulated in TPACK by Mishra and Koehler (2006).

Objective three sought to find out how the learners and teachers acquired and developed knowledge and skills on how to use technology for teaching. Figure 2 and 3 present the data.

Note: How teachers and learners learnt to use technology devices for learning during Covid -19?

Figure 2 indicate percentage of responses on the technology learning platform used for learning in the two schools when the study was conducted. The largest number of students 40% figured out how to use the google meet platform technology tool for learning and succeeded to navigate through, connect with the teachers online and use the tools to learn. They were able to log in, access the learning materials and learn. This is a great lesson that learners have capacity to figure out things which we need

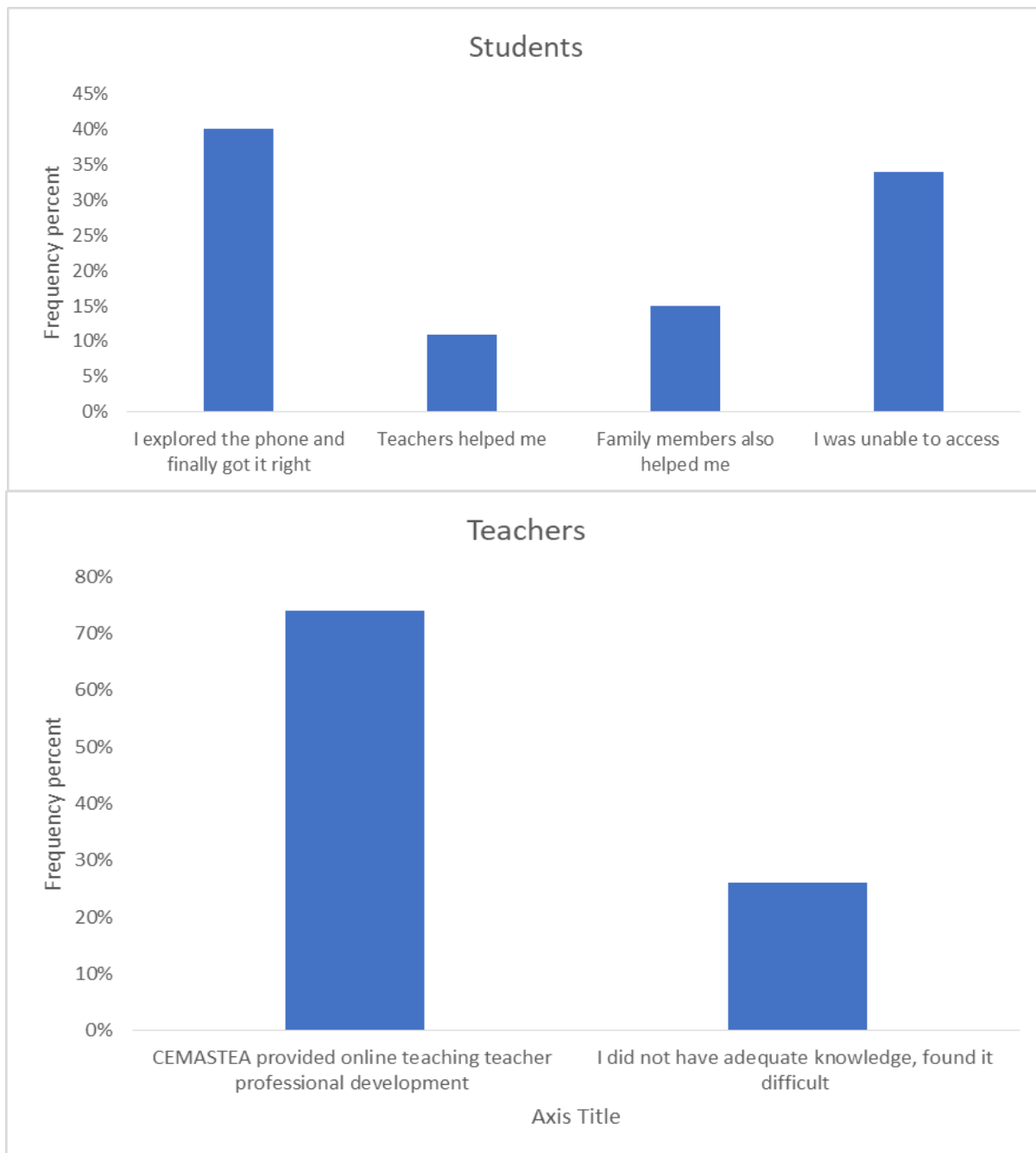


Figure 2 : How teachers and learners learnt to use technology devices for learning during Covid -19?

to leverage so that all learners could be supported to explore, find out things for themselves and use technology correctly for learning and the skill be transferred to life problem solving. Family involvement and student learning came out clear and should be encouraged at all levels. Of great concern is the 34% of those who failed to access learning and make up the group excluded and which increase education inequalities. The other critical finding was that CEMASTEAs supported 74% of the teachers to learn how to use google meet for teaching which call upon other organizations to support teachers in use of

technology for learning. Those who found it difficult could have been helped to support students learn. Teachers' role in going out of their way to share internet bundles with students is credible.

Note: Did you assess Learning?

Figure 3 presents percentage of teachers who assessed learners.

However, a large number 6(40%) of the teachers did not assess learning and therefore it was not clear whether

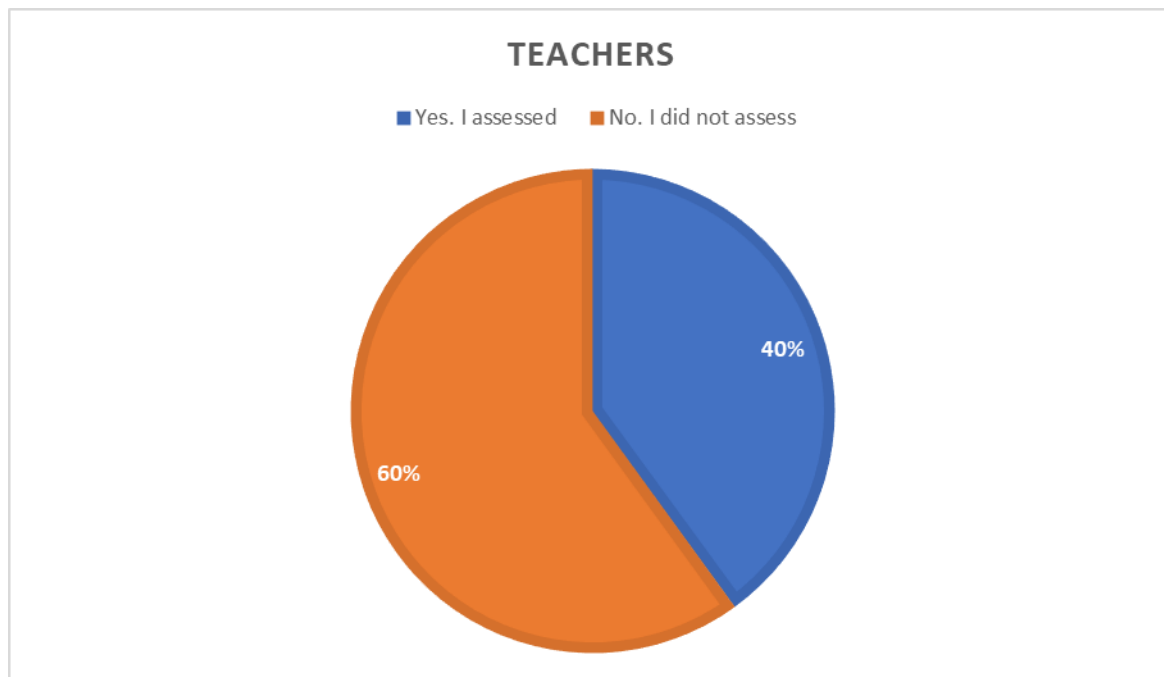


Figure 3: Whether teachers assessed Learners

learning took place or not. The lesson learnt here is that teacher preparation should concentrate in supporting teachers to assess online learning as they support online teaching and learning.

From the qualitative responses the challenges experienced reported by students included lack of internet connectivity and bundles; family, siblings' interference and family chores for girls, Poor network connectivity, inadequate knowledge and skills on online learning and inability to navigate the online platform. The suggested interventions provided, was that teachers were provided bundles and some parents and siblings helped

The teachers reported challenges such as lack of internet bundles or bundles were very expensive and the teachers had to share bundles with students. Some learners could not be accessed because they had no smartphones, no laptops. There was inadequate skill on online teaching and navigation intervention was provided by CEMASTEIA through teacher training and provision of bundles

Conclusions and Recommendations

There were critical findings that support learning resilience. Some students (40%) were able to figure out how to use technology for learning; that aspect needs to be encouraged and emphasized. This requires further research and great support for further development. There was parental and sibling involvement in supporting learning at home which should be encouraged and emphasized. Parents should be equipped with skills to enable children learn throughout.

Assessment is a critical factor of learning. It was affected

with a large number of teachers unable to use technology for assessment. There is need for more research on ways to support teachers to conduct reliable assessment and to curb cheating.

Majority of teachers and learners used smartphones to access learning remotely during COVID-19 pandemic and some students did not access learning hence excluded, expanding inequalities in education, some used television and radio content from KICD but they did not access their teachers. There is need to allow students to use smartphone for learning in schools but with restriction and moderation. Better teachers and students should use the technology they are comfortable to use.

There tended to be expansion of learning inequalities especially in use of online learning because of difficulties in accessing internet and other technology provision. It appears the way to curb it is to identify and innovate available technology to enable its use for teaching not just during lock downs but as norm and during other situations that may hinder in person school attendance.

Preparation for online learning and the practice of learning online should be ongoing for the teachers and learners to get used to using it, they should not only be used during difficult times. Teachers and students should be prepared to navigate the online environment and to use it with ease. Many teachers and learners did not have knowledge and skills to use online platform for learning. Both the teachers and students require to be prepared and to continually use online learning regardless of situation; they should not just wait for crises.

There was interventions which was commendable. The Centre for Mathematics Science Technology Education in

Africa (CEMASTE) supported teachers in online learning. Students were supported by family members and some teachers. However, from the findings and discussions both teachers and students require thorough preparation for online learning.

Investigation could be conducted to establish why integration of ICT in education does not seem to be taking route and why other government efforts in emphasizing use of technology in learning cannot be traced clearly in class, there is very little impact if any. Causes of teacher motivation and demotivation for use of online learning and teaching and other technology need, should be studied to establish clearly why technology integration in learning does not seem to have taken root effectively. The ongoing integration of ICT in Initial Teacher Education curriculum should be reexamined and refocused to ensure development of teachers' digital literacy competence; the students' digital literacy should be developed too to enable use of ICT for learning.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of the paper.

REFERENCES

- Basar ZM, Mansor AN, Jamaludin KA, Alias BS (2021). The Effectiveness and Challenges of Online Learning for Secondary School Students- A Case Study. *Asian Journal of University Education* 17(3):119-129.
- Almahasees Z, Mohsen K, Omer A (2021). Faculty's and Students' Perceptions of Online Learning During COVID-19 DOI:10.3389/educ.2021.638470.
- Barakabitze E, Kitindi C, Sanga G, Kibirige N, Makwinya (2015). Exploring students' skills and attitudes on effective use of ICTs: A case study of selected Tanzanian public secondary schools. *Universal J. Educ. Res.*, 3(6): 407-425.
- Barasa P (2021). Digitization in teaching and education in Kenya: Digitization, the future of work and the Teaching Profession Project. International Labour Organization. https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/sector/documents/publication/wcms_783665.pdf.
- Boisvert, Bowen J, Kayla & Weisenhorn. (2020). Returning to Learning during Crises: Decision-making and Planning Tools for Education Leaders. United States Agency for International Development (USAID).
- Connor K, Davidson L (2003). Spirituality, resilience, and anger in survivors of violent trauma: A community survey. *J. Trauma. Stress* 16:487-494.
- Dhawan S (2020). Online learning: A Panacea in Times of COVID-19 crisis. *J. Educational Technology Systems* 49 (1):5-22 .
- Gakuu CM, Kidombo HJ (2011). Closing the Chasm: Are the Secondary School Teachers in Kenya Using ICT Effectively to Deliver Curriculum Content? University of Nairobi School of Continuing and Distance Education. Government of Kenya. (2007). Kenya Vision 2030. Available at: https://kfcg.co.ke/wp-content/uploads/2016/08/vision_2030.pdf.
- Government of Kenya. (2017). Digital Literacy Programme for Schools. Use of ICTs to Enhance Learning. Available at <http://icta.go.ke/powerassets/uploads/2016/10/Learning.pdf>. Government of Kenya. (2020). Kenya Basic Education COVID-19 Emergency Response Plan Nairobi. Kenya. Ministry of Education.
- Grabe M, Grabe C (2007). *Integrating technology for meaningful learning* (5th ed.). Boston: Houghton Mifflin <https://www.amazon.com/Integrating-Technology-Meaningful-Learning-Grabe/dp/061863701X>
- Ghavifekr S, Rosdy WAW (2015). Teaching and learning with technology: Effectiveness of ICT integration in schools. *Int. J. Res. Educ. Sci.* 1(2):175-191.
- Islam MT, Habib TI (2021). Barriers of Adopting Online Learning Among the University Students in Bangladesh During Covid-19. *Indonesian Journal on Learning and Advanced Education (IJOLAE)*, 4(1):71-90.
- Kamar S (2021). ELearning Trends to Watch Out for 2022. ELearning Industry Published 13th January 2021. suresh@tesseractlearning.com|www.tesseractlearning.com.
- Kisirkoi F (2015). Integration of ICT in education in a secondary school in Kenya: A Case Study. *Literacy Information and Computer Educ. J.* 6(2):1904-1909.
- Luthar S, Cicchetti D, Becker B (2000). The construct of resilience. A critical evaluation and guidelines for future work. *Child. Dev.* 71:543-562.
- Ministry of Information, Communication and Technology. (2019). National Information, Communications and Technology (ICT) Policy. <https://www.ict.go.ke/wp-content/uploads/2019/12/NATIONAL-ICT-POLICY-2019.pdf>.
- Mishra P, Koehler M (2006). Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge. *Teachers College Record* 108(6): 1017-1054.
- Muhammad A, Kainat A (2020). Learning Amid The COVID-19 Pandemic: Students' Perspectives. *Pakistan. J. Pedagogical Sociology and Psychology*.
- Ncube M, Ondiege P (2013). *Silicon Kenya: Harnessing ICT Innovation for Economic Development*. African Development Bank.
- Nyambura M, Lewis C, Mothobi O (2019). After access: The state of ICT in Kenya (After Access Policy Paper No. 9, Series 5). Research ICT Africa. Retrieved from <https://researchictafrica.net/publication/after-access-the-state-of-ict-in-kenya>
- Nyagowa HO, Ocholla DN, Mutula SM (2012). Evaluation of Success of NEPAD's Pilot e-Schools in Kenya: An overview. <http://www.lis.uzulu.ac.za/research/2012/Nyagowa%20and%20Ocholla%20and%20Mutula%20SCEC%20SAL%202012,KPUC&UZ&UKZN%203.pdf>
- Serrano A, Sanz R, González R (2021). Resilience and COVID-19. An Analysis in University Students during

- Confinement. *Educ. Sci.* 11, 533.
- Siemens G (2004). *Connectivism: A Learning Theory for the Digital Age*. Retrieved from <http://www.elearnspace.org/Articles/connectivism.htm>.
- UNESCO. (2015). *Unpacking Sustainable Development Goal 4 Education 2030 Guide*. https://www.right-to-education.org/sites/right-to-education.org/files/resource_attachments/Unesco_Guide_to_unpacking_SDG4_2015_En.pdf
- UNICEF. (2021). *Practical Guide to Blended/ Remote Learning and Children with Disabilities*. New York. Education Section. www.unicef.org/education.
- United Nations Children's Fund. (2021). *Ensuring Equal Access to Education in Future Crises: Findings of the New Remote Learning Readiness Index* "UNICEF, New York, 2021
- UWEZO. (2020). *Are our children Learning/? The Status of Remote learning among School Going Children in Kenya During the COVID- 19 crisis*. www.usawaagenda.org
- Wargadinata W, Maimunah I, Dewi E, Rofiq Z (2020). Student's responses on learning in the early COVID-19 pandemic. *Tadris: J. Education and Teacher Training*, 5 (1):141-153.