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Challenges and Issues of Online Education in Sub-Saharan Africa amid the Covid-19 Pandemic

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Abstract**—** *In this paper, the researchers investigated various challenges and issues of online education in secondary schools during the Covid-19 pandemic. The study was conducted in one of the secondary schools in Sub-Saharan Africa (SSA). The participants were female students, teachers and parents. Feedback of teachers and students from other schools in SSA was also considered. The study adopted a mixed method approach for data collection and analysis. Instruments for data collection included observation, records and questionnaires, followed by a documentary review. A number of challenges and issues faced during online learning were identified and discussed. Possible solutions to these challenges were also suggested. High dropout rate was identified as the main issues of concern about online education in SSA. A large number of students did not participate in online education. The most prevalent challenges leading to high dropout rate were access to ICT and internet access. These challenges affected both teachers and students. To achieve equity and inclusivity in online education, governments in SSA should invest in providing internet access and distributing learning devices to all students and teachers.*

Keywords**—** *Online learning, Online education, Challenges, Issues, Covid-19 pandemic, Sub-Saharan Africa, Dropout rate.*

I. INTRODUCTION

In mid-February 2020, Countries in Sub-Saharan Africa (SSA) began reporting COVID-19 - a highly contagious viral infection caused by the SARS-COV-2 virus (Osseni, 2020). The first case of the virus was reported in Wuhan China in December 2019, before it began spreading to other nations across the world. The pandemic brought radical changes in the way people lived. It affected the political, social and economic activities not only in SSA but in the whole world. By the end of March 2020, at least 769 confirmed cases of corona virus in 37 countries across Africa were recorded (Mahona & Mkulu, 2020). As a measure aimed at curbing the sudden upsurge of COVID-19 cases, majority of SSA state governments including Kenya, South Africa, Nigeria, Uganda, Rwanda and Ghana announced a closure of all learning institutions. Consequently, millions of learners were sent home, and the academic institutions had to devise new ways to deliver online lessons to learners. Such a hurried transition from the traditional physical classroom to the incorporation of ICT in online education gave rise to a myriad of challenges and issues affecting both teachers and students. Schools were not adequately prepared with the right infrastructure, resources and skills required to conduct online learning. Students on the other hand, were not supplied with the digital tools and internet access, which some could not afford. There is a vast literature on challenges of e-learning in higher institutions of learning in Africa, for instance Mathew and Ebelelloanya (2016) and Musingafi at al (2015) presented a number of challenged faced by open and distance learning students in higher education. Access to ICT, digital literacy and lack of learning resources were the most prevalent challenges reported. However, little has been done about online learning in secondary schools in Sub-Saharan Africa. Thus, this paper investigates challenges and issues faced in secondary schools while conducting online education during the Covid-19 pandemic in Africa.

Online learning is defined as the use of the internet to give instructions to learners (Malan, 2020). This form of learning is delivered virtually through computers, smart phones and tablets. The advancement in network technology has enabled the exchange of information between systems including learning institutions. Internet technology is utilized in transmission of digital information in the form of audio, visual and data files via various transmission channels. Adoption of network technology in education is becoming more reliable, flexible and portable, where the learners do not have to travel to institutions for their studies. Online learning has gained its popularity over the years in most institutions and different platforms emulating traditional setting have been developed to facilitate sharing and distribution of learning content (Downes, 2005).

Studies have shown that online learning has got both advantages and disadvantages. One of the major advantages is that students are able to learn at the comfort of their homes. This makes it possible to maintain social distance thereby reducing the risk of the upsurge of infection. Online learning can be flexible and cost effective as learners do not have to travel to schools while institutions can accommodate maximum number of learners without the need for extra buildings (Abaidoo & Arkorful, 2014). One teacher can also handle a large number of students compared to physical learning hence reduce teacher scarcity. In spite of these benefits, adoption of e-learning has its own limitations, for instance the most noticeable shortcoming is the lack of physical interaction not only between learners and teachers but also among learners (Young, 1997). Students used to face-to-face learning find it difficult to adopt e-learning because it limits the use of some instructional methods such as physical discussions and group work. Teaching science topics

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involving experiments is another limitation encountered in e-learning. Researchers have argued that online education is more effective in social sciences and humanities than in sciences because of the difficulties involved while teaching practical aspects and conducting experiments (Abaidoo & Arkorful, 2014). Piracy, plagiarism and exam cheating are other major issues of concern that have led to condemnation of e-learning. This makes evaluation of online education difficult because of the ease of copy and paste from the internet. Despite these limitations the onset of COVID-19 made it impossible for physical interaction without the risk of the upsurge of infection cases, and hence many states within SSA encouraged online learning.

However, in Sub-Saharan Africa online learning lags behind due to poverty, poor communication infrastructure and a high cost of internet for end users. Majority of the less privileged citizens cannot afford online learning as compared to their counterparts from rich families (Areba, 2020). The effects of Corona virus pandemic have worsened the situation by widening the gap between the rich and the poor as millions of households are pushed beyond the poverty line. Dube (2020) recommended the need for the governments to ensure inclusivity and equity in online education by providing all learners with the necessary digital tools and internet access. Otherwise, many students will not able to participate in online classes. UN (2020) estimated that an addition of more than 23 million learners in the globe may drop out of school due to the economic effects of the pandemic. Closure of schools combined with the impact of the pandemic is likely to increase cases of child labor, early marriages, early pregnancies and domestic violence. These issues decrease the likelihood of continuing with education. This paper analyses some of these challenges and issues faced in Africa during online learning in the context of the Covid 19 pandemic.

II. METHODOLOGY

This study employed a mixed method approach that coupled both quantitative and qualitative techniques for data collection and analysis of results. Data collection method involved combination of various techniques including; observations, questionnaires, attendance records and documentary review. Triangulation techniques were used to ensure reliability and validity of the results (Creswell & Plano, 2011). Following the closure of schools due to the Covid-19 pandemic, a number of schools in Sub-Saharan Africa, introduced online education to continue engaging their students. This study was carried out in one of the secondary schools in Kenya that introduced online learning. Teachers and students of this school were involved in the research. Comments of teachers and students from other schools that offered online learning were also considered. All students were required to join online classes to continue with their studies, despite being in different parts of the country and coming from different backgrounds. Teachers of various subjects were allocated classes in the timetable for a period of twelve weeks (May-August 2020). Each subject was allocated at least one lesson in a week per class. The number of lessons per day was three, each lesson going for one hour. Teachers were provided with weekly bundles to enable them offer online learning. The medium of instructions included; Zoom, Google meet, Google classroom and WhatsApp. Teachers were offered a brief introduction to the use these apps to ensure optimal learning. WhatsApp was majorly used for direct and official communication to students through their parents' WhatsApp groups. Each class had a WhatsApp group. Teachers used it to notify students about time schedule of the lessons. Links for online classes were also sent via WhatsApp. Google-meet and Zoom were used for live teaching. Some teachers preferred Google meet while others preferred Zoom. Google classroom was purposely used for assignments and examinations. Online learning ran for 10 weeks and two weeks for examinations. The participants were 488 girls aged 14-18 years from form 1 to form 4. Responses of 54 teachers and parents were also considered. The following instruments for data collection were utilized as described below.

Attendance records: The number of students who joined online classes per subject was recorded on daily basis. Teachers were required to take daily registers of attendance and report the number of students who joined their classes. This data was collected by the school administration and stored for future reference. The researchers were granted permission to use this data for this study. Attendance register for mathematics from form 1 to 4 was selected as a study sample. This data was exported to excel for analysis. Dropout-rate was calculated. This gave a clear picture on the turn up of students.

Observations: Researchers were directly involved in online learning where they conducted an observational study on students' behavior and responses, parents' feedbacks and opinions, together with teachers' remarks. Students took advantage of Google-meet chat and Zoom chat to discuss and express their feelings and opinions about online learning. WhatsApp groups were also used by both parents and learners to air out their feedback, opinions and experiences of online education. Chats, postings and message-threads were critically probed for extraction of the required information. Observational data, comments, opinions and feedback of all involved parties including students, teachers and parents were collected and a qualitative analysis done for descriptive identification of challenges and issues of online education.

Web-based Questionnaire: A questionnaire was issued at the end of the study. It comprised of three open ended questions for discussion. Google classroom was used to channel the questions. Students were voluntarily requested to respond to questions in the questionnaire. They were assured of the confidentiality of their responses. 22 students responded to the questions. Participants were asked: (1) to talk about their experience of online learning and the challenges they faced; (2) to give possible reasons that barred a number of their classmates from attending online classes and; (3) to suggest what can be done to improve online learning. The survey collected comments and views on online education, the challenges faced, the issues involved and possible solutions. The researchers performed a thematic analysis of the responses.

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Documentary review: There exists a significant literature on online education in higher learning institutions in Africa. However, little has been done about E-learning in secondary and primary schools. Search for the relevant literature was done in database like Web of Science, Google Scholar and ResearchGate using key words such as 'online learning', 'Sub-Saharan Africa' and 'Covid-19'. Selection of relevant papers was done by reviewing the title, abstract and the conclusion. The researchers performed a qualitative review of the relevant existing literature applicable in secondary schools. This was then compared with the observational data. These four data collection instruments complemented each other well to ensure validity of the findings.

III. Result and Discusion

In this section, various challenges and issues faced during online education in SSA in the context of Covid-19 pandemic are analyzed and discussed. Possible solutions have also been suggested. Comments quoted are original and no grammar or spelling mistakes have been corrected. Only a few relevant comments have been quoted.

i. Dropout rates

High dropout rate is a major issue of concern in SSA. It has not only affected face-to-face learning but also has been experienced in online learning. Figure 1 below shows the number of students enrolled in online classes for a duration of nine weeks. The first bar shows the total population of students during physical learning before the outbreak of Corona virus. The rest of the bars represent population enrolled during online classes. Figure 1 evidently shows that a large number of students did not participate in online learning. There was a drastic dropout between the total population and week 1 of online learning. The nine weeks of online learning were covered with more than half the number of students not participating.

Moreover, the number of students who participated in online learning kept on varying with time.

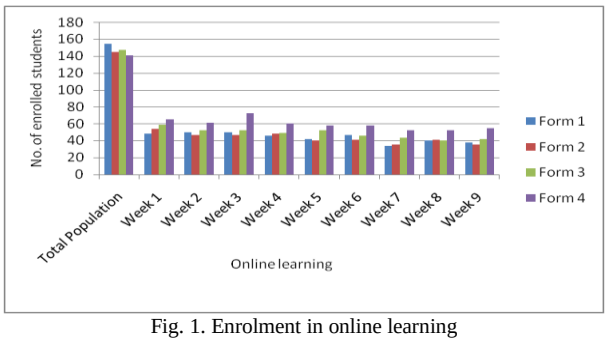

Fig. 1. Enrolment in online learning

Figure 2 shows the trend of online learning from week 1 to week 9. An increasing dropout rate from week 1 to week 9 was recorded. One of the teachers commented that:

> "Online learning is characterized by changing numbers of students participating in the lesson at a particular interval of time. At times there is a large number joining the class especially at the beginning. After some period of time this number reduces as some student exit from the class."

Another teacher added:

> "There is a big number of learners at the start and low at the end. I also had many students during the first week than I have now."

From this comments, it clear that online learning in SSA is not stable. It is characterized by dropout rates. This makes online learning inconsistent and majority of learners may experience difficulties in catching up in the next lesson. According to Hara (2000), the major causes of high dropout rates in online education included technical difficulties, communication breakdown, negative attitude and poor connections. The following challenges and issues could also be the reasons for high dropout rates.

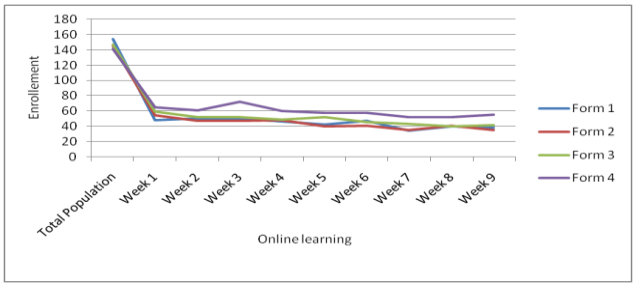

Fig. 2. The trend of online learning in SSA from week 1 to week 9.

ii. Access to ICT

Over the last few years, information Technology and Communication (ICT) has experienced robust growth in the SSA region. By 2025, online classes are predicted to be the main preferred form of learning throughout the world (Malan, 2020). Even though countries across the world are making significant steps in online learning, research by Malan (2020) found out that ICT in most states in Africa is still in infancy. To access online classes and lessons, learners need to acquire laptops or desktops, and/or internet-enabled mobile phones. These devices are expensive to acquire, and a huge population of learners is left out from online classes. In response to question 1 and 2 of the questionnaire, learners confirmed that access to ICT is an issue that barred many from participating in online classes. The following are some of the typical comments made by learners:

> "The main challenge may be not all students have access to the gadgets that are used to log in to the classes like laptops or phones. This may be because some parents are not willing or don't have money to buy smart phones for their children."
>
> "The main challenge we face is technical issues which results in interruptions during the lesson, then we don't get to hear what the teacher is teaching."
>
> "Challenges that make students not to join classes include; poor network connections and lack of data bundles."

TABLE 1. Dropout rate

Class	Dropout rate
Form 1	75.32%
Form 2	75.86%
Form 3	71.43%
Form 4	60.99%

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Furthermore, as of 2019, the average family size in SSA was 6.9, and therefore learners are forced to share smart-phones and other devices to access online classes (Alidou & Verpoorten, 2017). With the mobile internet penetration level at 23% (Ponelis & Holmner, 2015), internet access rate at 31% (Ndemo & Weiss, 2017), and high cost of gadgets in SSA, more than 70% of learners have no access to online classes. This is in agreement with our findings as seen in Table 1, where more than 60% of the students were excluded from online learning. For effective online learning, ministries of education in SSA should provide internet-enabled gargets to all teachers and students.

iii. Access to Electricity

Following a WhatsApp group discussion, teachers highlighted electricity as a fundamental issue of concern in SSA. Electricity plays a significant role not only in facilitating online learning but also in all areas of development. It influences the delivery and sharing of information through electronic gadgets. For effective online learning to be realized electricity must be available and reliable as the resources required for the learning process such as smart phones and computers, highly depend on electricity, otherwise they are rendered useless. This poses a great challenge in sub-Saharan African countries which lack sustainable and reliable electricity supply, (Arthur-Nyarko & Kariuki, 2019).

In addition, frequent power interruptions influence to great extents the learning process. For instance, one teacher commented that: "Zoom is consuming a lot of power, during blackout I cannot go for two lessons before my phone shuts down." This clearly shows that it is difficult for the learners and instructors to keep themselves present with timely deliveries as scheduled. Consistency in learning when not taken care of might lead to failure on what is intended. Other alternative sources of energy like solar panels are also not reliable simply because they depend on the weather pattern of a given geographical area. Governments in SSA should invest in providing stable electricity both in rural and urban regions.

iv. Network coverage and Internet access

Many Sub-Saharan African countries have the lowest levels of internet access and connectivity. According to the U.N Broad band commission report (2015), eight countries in SSA had the lowest levels of internet availability in the world. These countries were Ethiopia, Niger, Sierra Leone, Guinea, Somalia, Burundi, Eritrea and South Sudan. The report further argued that Internet access and connectivity penetration in these countries was less than 2 percent of the population. These reports complimented our findings. Many students and teachers mentioned a lot about network and internet issues. The following are a few comments made in response to the questionnaire:

> "I found online learning effective for me since it kept me occupied. One of the challenges I experienced was poor connection. Sometimes I can't hear what the teacher is saying."
> "I found online learning very beneficial but sometimes the connection was bad which was bit of a problem. Also, some of the students do not have an internet access so they cannot join classes."
> "The reason why some students don't participate at all in the classes may be lack of a wi-fi connection."

Poor network coverage leads to low internet speed hence poor connections making it difficult for learners to access educational materials, download and upload assignments, and for teachers to teach and mark examinations online. This disconnect is much felt in rural areas. For those connected however, are also feeling the pinch of the high cost of internet. Streaming educational videos and attending live classes come hand in hand with high consumption of data. This knocks out majority of students in SSA, simply because they cannot afford. Governments in SSA should provide cheap internet access for students.

v. Poverty

During the research, poverty was highlighted as an issue that limited the ability of the affected households to purchase the required gadgets and to access internet services required for online learning. Social, political and economic factors and other factors such as corruption and mismanagement of funds largely contribute to the high levels of income poverty in the SSA, (Nwagwu & Abanihe, 2006). Online learning remains as a mere dream to the less privileged and appear as a punishment to the affected. During a WhatsApp group discussion, a teacher commented that; 'The high rate of Poverty in most families who are unable to afford even the basic necessities creates a huge barrier in accessing of internet bundles and wifi connections due to its exorbitant cost.' With covid-19 directives of wearing mask, keeping social distance and avoiding crowded places, is bad news to the less privileged because the idea of pooling risks together and cost sharing towards sourcing these systems remains impossible. The measures to combat the spread of the Covid-19 have also seen massive job losses hence increasing the population affected by poverty. Poverty also denies the learners the free time to engage them in online learning since they could be tied up in family chores as dictated by their parents as opposed to their counterparts from privileged families.

vi. Digital literacy

Digital illiteracy is defined as a lack of knowledge in the use of ICT infrastructure to carry out a given task or assignment (Gaswaga et al, 2020). The lack of necessary or inadequate ICT skills on both learners and teachers has been a big hindrance to the effective delivery of online content. Before the onset of COVID-19, teaching lessons were predominantly delivered using physical teacher-student interaction (Moon & Villet, 2017). The transition from traditional face-face interaction to online classes was abrupt, and teachers were ill-prepared. At the onset of this research, teachers wondered which technology to use, how to use it, and how to teach it to students. Some of the senior (elderly) teachers were totally unable to cope up with online learning. One teacher asked; "I have never used a smart phone, how will I teach online?" Moon and Villet (2017) reported that before COVID-19 struck, most schools in SSA countries had not trained teachers on the use of ICTs. This makes it difficult

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for teachers to deliver online classes to learners. This research suggests that all teachers should be provided with some training on the use of smart phones and the teaching apps. Students and parents should also be trained via national TVs and radios on the use of online learning technology.

vii. Time Management

Time management is an issue that was evidently observed during online classes. Researchers observed a number of students attending online lessons late and others missing out. Teachers also commented that students were joining and exiting online classes at different times; some joining late and others exiting before time. Time management involves deliberate planning and setting measurable goals that are time-bound (Shazia & Saqib, 2015). Time management is an important asset for any student and dictates whether a student fails or passes in his academics (Adams & Blair, 2019). Learners who develop time management schedules create the right framework, which majorly sets the pace towards their career and academic objectives. During the COVID-19 period, students required time management frame-work more than ever before. This is because learners had to strike a balance between household chores, school work, personal goals, and hobbies (Adams & Blair, 2019). A learner should be able to make deliberate steps to plan to attend online classes, submit the assignment on time, as well as carry out their house chores. Accordingly, a student must envision the academic goal first and then develop periodic time-bound check-points that work as a compass towards the overall objective. As such, the student must have self-drive and inherent ability to plan and balance home chores and time for studies (Shazia & Saqib, 2015; Adams & Blair, 2019). However, balancing between online classes and home chores is very tricky. In most cases, learners have no sufficient time or resources to download materials, submit the assignment, and review the classes before the next class. With internet access, learners are more likely to be on social media than attending classes (Swan, 2017). It remains the responsibility of parents at home to guide their children on time management.

viii. Class Control

Control is defined as possessing the ability or power to manage and expectedly run a process. Class control in this context may be defined as the power to cause change or influence on the students' behavior. Ideally, class control is aimed at instilling good behavior among learners as well as ensuring an ambient environment for teaching (Postholm, 2013). It involves listing the accepted classroom behavior as well as explaining why particular conduct should not be allowed in the classroom. Unlike traditional class setup, teachers offering online classes are faced with the inability to control classes especially when the internet connection is poor. When the internet keeps fluctuating, teachers are forced to repeat the content when the learner rejoins after "internet break." During a WhatsApp discussion one teacher commented that:

> "I find it difficult to teach when students are joining and leaving at any given time. Others join while unmuted, so you get interrupted by the noisy background."

Another teacher added:

> "It is really very difficult to control online lessons; some of my students are not doing assignments. Others are sending incomplete or invisible work."

Following that discussion it is evident that class control is a challenge especially when students opt to leave or join class on their own. The student can choose to miss a class and cite internet challenges later – even if it was not the case. Moreover, assignments issued by teachers in most cases are not done on time and to the expected standard. Handling such indiscipline issues is a major challenge especially when the student uses unofficial names during online sessions. In such cases, it would be difficult to identify the student. Background noise and online interference is another issue that interrupts both the teacher and the learner. The teacher has to stop teaching to find out the person causing the interruptions. This issue is evident especially when the class is large.

ix. Attitude

Attitude is another issue mentioned by students while responding to question 1 and 2 of the questionnaire. For instance a student quoted that:

> "Some students did not attend classes due to apathy while others could be due to unavoidable circumstances."

Another student commented that:

> "Another challenge is that students may lack self-motivation and the right attitude, and will not attend the lessons unless they are forced and are under supervision by an adult."

A negative attitude towards online education may be a hindrance towards its realization. Some parents, teachers and students may find it difficult to embrace online education. This might be due to the high cost of purchasing online education. Digital illiteracy may also make students shy off from online learning. When students do not have the essential skills-social and technical skills they may develop a negative attitude. The inability of some learners to use adaptive tools may cause them to feel embarrassed and not contribute during the online learning in fear of ridicule. The learning environment brings out an overall negative attitude which has an impact on learners' performance and their concentration, (Ndume, Tilya & Twaakyondo, 2008). Online learning lack the connection experienced in a face-to-face classroom set-up. This may be a challenge to both the learner and the instructor as the learner may feel uncared for and the tutor lacks the continuous monitoring of the progress made by the learner. Parents or guardians may equally lack the right attitude towards the online learning. This is manifested when students lack the necessary motivation and support from home.

x. Practical and physical experiments

In response to question 3 of the questionnaire a student stated that: "Physics was not that effective. For example, it would have been better if teachers had something like a flip chart as physics is more of a practical subject". In addition to this, the researchers also observed that no single physical

experiment was conducted by students within the 9 weeks of online learning. Experiments are core in sciences and without them science is incomplete. For instance it will be very difficult to teach about dissecting a rabbit in biology to study the digestive system without the practical aspect of it. This calls for an experiment or a demonstration from the teacher. However, this can become a challenge when there are no resources or when the instructor lacks enough knowledge on the use of multimedia tools. This research recommends that teachers should take advantage of the learning videos in social media such YouTube and Google. Some of these videos have very good demonstrations for students to visualize.

xi. E-learning materials, content and curriculum

Most of the secondary schools in Sub-Saharan Africa rely on textbooks and other hard copies such as charts, and magazines for instruction. The outbreak of Covid-19 pandemic found schools not prepared for online learning. Teachers were wondering how to teach, when to teach and what to teach. This posed a big challenge due to undeveloped curriculum and learning materials for e-learning. Besides that, there was lack of proper guidelines on how to manage and conduct online learning. Effective teaching requires substantial syllabus coverage. However, with limited online student-teacher interaction, power interruption, and slow internet, most syllabi are barely covered (Pear, 2013). Online learning is subject to time limitation as teachers have to deliver the content under a strict timeline, thus making it difficult to cover the syllabi thoroughly. Ministries of education in SSA should invest in developing online curriculum and guidelines on how to go about online teaching.

xii. Interactivity to Learning activities

Learning activities such as discussions, debates, group work, experiments, clubs, games and exercises, reinforce the knowledge acquisition and content mastery. Online learning has greatly reduced interaction to these activities. According to Pear (2013), limited online interaction is the genesis of negative perception about the effectiveness of online education among the learners. Most of online classes are dominated by teacher with minimal participation from the learner. This might be due to time constraint, inadequate resources and lack of knowledge on how to make online lessons more interactive. In response to question 3 of the questionnaire a student quoted that: 'I think the teachers should be more interactive with the students to make the online class lively.' To support this argument, Muchiri and Njenga (2020) argue that learning activities such as group work enhance participation and collaboration in class, and overall student performance. Learners are able to share ideas, promote social interaction and embrace each other. Many students learn well when a student centered approach is used. This is when the learner is exposed to a variety of learning activities and instructional resources. Mawira and Muchiri (2020) suggested that a differentiated teaching method that combines several instructional resources and practices is more effective and more preferred by students. Learning activities have an overall positive impact on student's performance.

xiii. Online student differences

Learners, though in the same level of study have different abilities in understanding. In order for the instructors to meet the needs of each learner they first need to understand their differences. By paying careful attention, instructors should able to pin point these differences to understand and monitor learners as some appreciate teamwork while others thrive on individual efforts, (Arthur-Nyarko, & Kariuki, 2019; Muchiri & Mawira, 2020). Online education faces this challenge in the sense that the instructor may not able to identify the different abilities of the learners. Some learners end up being left behind and their performance is affected. Under such circumstances crafting a methodology to suit a certain group of learners so as to reach them at individual level becomes tedious or even impractical. Fast learners might feel that the teaching pace to them is slow, slow learners on the other hand might find it fast for them to catch up with the rest of their peers hence becoming less motivated.

Other differences observed were in terms of the availability and the quality of resources. Students from well to do families for instance, possesses good quality gadgets that enable them to participate in online classes without difficulties. On the other hand, those from poor families may lack the resources and perhaps possess low quality gargets that cannot even take quality photos needed when submitting assignments. This is an issue raised by teachers that some students were submitting assignments that were not visible.

xiv.Evaluation Challenges

Evaluation is defined as the process that seeks to find approval or disapproval of a certain program or process. The process envisions the collection and analysis of feedback of a certain activity to make a judgment of the entire process (Husain & Khan, 2016). Evaluation of lesson by way of exams, collection of students' lesson feedback and lesson rating, issuance of assignment, and group work are all part of the teacher-student evaluation. Without evaluation, it would be difficult to improve the course and lesson delivery. According to (Rowan, et al., 2017), student evaluations of teaching (SET) are important both for lesson improvement and course effectiveness evaluation. Most importantly, it is the basis of class design and teaching environment.

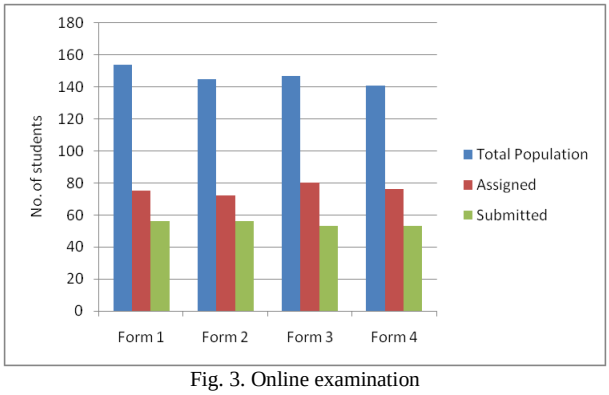

Fig. 3. Online examination

Figure 3 shows the number of students who turned in online exams after a period of 9 weeks of online study. A big

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number of students did not participate in online exams. However, among those who were assigned, not all submitted. Following a WhatsApp discussion one teacher commented that:

> "Among those who enrolled for exams not all submitted. And there are those who turned in their answers long after the submission deadline. Some students complained of power interruptions and poor network, so they asked to be allowed to submit their answers some time later."

Another teacher added

> "A number of students submitted screenshots that were not visible, making it difficult to mark. There are those who submitted blank pages. A number of students complained that time allocated to finish exam was not enough."

Following this discussion, it is evident that the evaluation of online exams is a complex undertaking. Firstly, virtual administration of examination is difficult, especially where students take exams from the comfort of their homes. This is because the student can opt to log out in the guise of internet issues or power interruptions. Before the onset of COVID-19, most students in SSA were used to face-to-face administration of exams, and as such would be difficult to expect them to type their answers. According to Khan and Khan (2017), online exams are difficult to administer, and their credibility cannot be guaranteed. These exams would be difficult to supervise since sessions are prone to internet interruption (Oyo, Maiga, & Muyinda, 2019). Moreover, online exams are subject to irregularities, such as copying, cheating, and pasting online materials. Before COVID-19, teachers in public institutions were complaining of heavy workloads due to large class sizes (Oyo, Maiga, & Muyinda, 2019). Therefore, migrating to online classes poses a great challenge on individual student exam supervision hence making exam malpractice a common occurrence.

Another issue of concern is the cost of evaluation; learners have to incur costs of downloading assignments and exams, and uploading answer sheets. Teachers complained of high consumptions of bundles as they downloaded answer sheets of every student to mark and as they uploaded them back. Researchers disagree on whether online learning is cheaper than traditional classroom set-up (Walsh, 2015). While some are of the view that online learning saves learners' costs on printing, others are of the view that online learning introduces hidden costs such as the internet, software installation, and purchase of devices as well as upload and download of assignments (Walsh, 2015). Depending on the length of the course and the type of software used during this COVID-19 period, the cost of online learning in SSA could be prohibitive and out of reach for most students.

xv. Learning environment

One of the factors leading to high dropout rate in online education is lack of a conducive and favorable environment for learning. Covid-19 crisis has negatively affected the learning environment, especially now learning is taking place from the confines of home. Researchers observed that online classes were characterized by noisy backgrounds of people shouting, loud music, and banging of doors and equipments. This was observed especially when students were told to unmute themselves to respond to a question. One teacher reported that: "It is difficult to conduct a group discussion online because of the noisy backgrounds from students; the teacher is forced to dominate." Teachers have no control over the noisy environment. The school management is not there either to ensure favorable environment for learning.

The learning environment is a major contributor to the successful delivery of content. The significance of the learning environment is always a subject of institution evaluation during its certification process (O'Sullivan, 2015). Ideally, teachers are expected to assess this environment periodically to determine its worthiness as a precursor to successful content delivery. In fact, the goal of any learning process is as important as the learning environment. However, the environment of an online learner is not subjected to these stringent evaluations. Since learners attend lessons at the comfort of their homes; lessons are often subject to home interruptions (Swan, 2017).

Learning environment is also affected negatively by increased rates of child labor, child marriage, early pregnancies and violence at home. These issues have been accelerated by the covid-19 related job losses, isolations and lockdowns. Domestic violence affects both physical and psychological development of children. Consequently this affects the academic achievement of learners. Moreover, child labor, early marriages and pregnancies keep off students from participating in online classes. Governments in SSA should make and enforce laws to protect children against early marriages, child labor and child abuse.

xvi.Equity and Inclusion

It is evident that closure of schools has widened the equity gap between the poor and the rich. Many learners from less privileged families are not able to access resources such as online materials, internet, smart phones and laptops; simply because they cannot afford. This has excluded a large number of students from marginalized families from attending online classes, as seen in Figure 1. Some governments in SSA are addressing the issues of inclusion by promoting learning through radios and TVs. Despite these efforts, learners from less privileged families especially from rural areas can not only afford TVs and radios but have neither electricity connection nor network coverage. This means that only those students from well to do families are able to access online learning. Nonetheless, online education can be achieved if the margin between the poor and the rich is catered for. Governments in SSA should find ways of bridging this gap. For example, governments should provide support of the required resources for learning such as distributing gadgets to all learners and providing cheaper internet access.

IV. Conclusion

Covid-19 crisis did not only affect the economic growth but also the education sector across all nations in the globe. Many schools were closed to prevent further spread of the virus. Education sectors in most of the African countries were

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worst hit perhaps due to high level of unpreparedness, underdevelopment and poverty. Schools had to find alternative ways of conducting learning. A number of schools in SSA started online classes to continue engaging their students. Despite these efforts, online learning was faced by a number of challenges and issues that saw more than 60% of the learners excluded. This paper studied these challenges and issues faced while implementing online education in secondary schools in Sub-Saharan Africa and suggested possible solutions. High dropout rate was found to be the major issue of concern with online education in SSA. A large number of students did not participate in online education. There were several factors that might have led to this; but the main ones were poverty, inaccessibility to ICT and poor internet connection. Some teachers and majority of students could not afford to purchase internet and devices such as smart phones and laptops needed for online learning. To ensure equity and inclusion in online education, governments should invest in providing cheap internet and distributing devices to all teachers and students. In addition to this, ministries for education should provide the curriculum for online education together with guidelines on how to conduct online classes. Another issue of major concern was the learning environment for students. Both parents and governments have a vital role of providing a conducive and favorable environment good for learning; and free from unnecessary noise, child abuse and domestic violence. Governments should tighten measures to protect children from child abuse, child labor and early marriages.

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