Delivering Higher Education in Public Health Emergencies: Lessons From the COVID-19 Pandemic in Sierra Leone

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ABSTRACT

With the general closure of universities and schools in Sierra Leone due to the COVID-19 pandemic, digital learning has become a credible alternative to maintain students in educational, training, and research links. The study responds to three primary questions: 1) Which digital learning modalities have shown to be most effective for providing continuity in learning amid temporary or permanent school closures? 2) Which digital learning modalities are promising for their use but evidence for their use evidence about them is still lacking? 3) What are the challenges and considerations when planning for and implementing digital learning? The study utilised qualitative research methods: interviews, focus group discussions, qualitative survey, and document reviewing. A stratified sample of 260 participants (161 male and 99 female) was randomly drawn from teachers, education officials, and information technology experts. This paper provides snapshots of the different distance learning initiatives and programs that have been implemented, including the promises they offer.

KEYWORDS

COVID-19 Pandemic, Digital Learning, E-Learning, Higher Education, Sierra Leone

INTRODUCTION

Background

Universities, Colleges and Schools in Sierra Leone were closed from March 2019 to February 2020 due to preventive measures put in place by the Government as a result of the Coronavirus (COVID-19) pandemic. With this general closure following the COVID-19 health crisis, distance learning and blended learning have become a credible alternative to maintain students and pupils in educational, training, and research links. All academic staff of the university have been instructed to prepare their course outlines, lecture notes and reference materials for transmission to students through the university’s online course delivery platform.

The overall objective of the study was to get a better understanding of the current situation of the digital learning environment, and the accurate picture of stakeholders’ (public, private, international, etc.) interventions in this domain in Sierra Leone. More specifically, this report aims at assessing...
the use of distance learning tools in Sierra Leone. The study utilised qualitative research methods: interviews; focus group discussions; qualitative survey and document reviewing. The research participants were teachers, education officials and information technology experts. The study results showed that the digital learning modalities used were radio, television, mobile phone, and online platforms such as Moodle, WhatsApp, Zoom and Skype.

This paper is organized in five sections: Section one gives the background to the study leading to delineation of the research problem; statements of the aim, objectives, the research questions, the significance and limitations of the study. Section two, the literature review, includes the careful study and review of various research journals, books, dissertations, thesis, research papers, articles and other sources that are directly or indirectly related to the problem under study. Section three describes the methodology used in this research. The choices made in methodology are related to the research problems, research questions and research objectives. Section four highlights how the actual data was collected, analysed, coded and conceptualised. Finally, section five provides recommendations and conclusions of the study.

Statement of Problem

Sierra Leone is recovering from a devastating 11 years conflict from 1991-2002 that devastated the country and still suffers from serious gaps in its educational infrastructure. More recently, the most widespread epidemic of Ebola Virus Disease (EVD) in history began in Guinea in 2013 and spread to Liberia and Sierra Leone. The outbreak continued for over two years, resulting in significant loss of life and social disruption across the West Africa region. In August 2014, World Health Organisation (WHO) declared the Ebola epidemic in West Africa a Public Health Emergency of international concern. According to UNICEF, approximately 5 million children were denied access to education in Guinea, Liberia and Sierra Leone as schools did not re-open for nearly one academic year as a result of the EVD outbreak. Before the Ebola outbreak only 74% of children of school going-age were in primary school in Sierra Leone. The impact of prolonged school and university closures in a country with some of the lowest education indicators in the world is dire and the outbreak had negative consequences on the availability of teachers and teaching and learning materials; the safety of school premises; and the vulnerability of girls and women. The psychological well-being of children and youth was also impacted by school closures because school provides a sense of stability and hope, helping to mitigate the psychosocial impact of a crisis. Thousands of children lost their parents and caregivers, which increased the risk of homelessness, neglect and malnutrition. The Ebola and more recently the coronavirus (COVID-19) crisis has made the poorest families even more vulnerable, increasing the risk of children being forced to drop out of school to work, and therefore contribute to the household budget.

Although several efforts are underway to address the challenges of Sierra Leone’s education sector, the problem is so vast that the need for more investment into education by government and partners still remains pressing. Learning outcomes in educational institutions, especially in remote communities - are poor. Poor learning outcomes can only be addressed through increased investment in quality teaching, market responsive curricula and learning materials and Information and Communication Technology (ICT) tools, training of teachers, and building the capacity of community traditional leaders and religious leaders to work with the Ministries of Education to effectively monitor and manage schools in rural communities. The policy makers in Sierra Leone expected that the introduction of ICT into formal education settings would improve the academic performance of teachers and students by encouraging them to improve their ability to use and apply technology and software in teaching and learning. It was hoped that teachers’ use of technology in education would improve educational outcomes, increase technological skills and reduce anxiety when preparing lessons.
Aim of and Objectives of This Study

The overall objective of this study was to get a better understanding of the current digital and distance learning modalities in Sierra Leone situation. The specific objectives were:

- Produce an analysis of the enabling environment, including the current intervention regarding distance learning.
- Conduct a mapping of existing digital learning platforms.
- Develop a roadmap for distance and digital education in Sierra Leone.
- Ascertain any existing implementation strategy or innovative experience on distance teaching and learning that may be useful to this Project.

Research Questions

The purpose of this study was to explore the current intervention regarding distance learning tools, factors that support the use, barriers that hinder the use, as well as the roadmap and implementation strategy for distance learning in Sierra Leone. In order to shed light on these topics, this research study mainly focused on the following four questions:

- What ICTs resources (software, instrumental tools and materials) are used by teachers?
- What distance learning management systems (platforms) are used and promising?
- What are teachers’ perceptions in relation to digital learning tools (ICTs) usage?
- What are the barriers and/or challenges for implementing distance learning in Sierra Leone?

In order to answer the four questions, the underlying assumption is that ICT is treated as one of the influential factors. It is assumed that ICT should play an important role in delivering distance learning and blended learning in the education services in Sierra Leone. This research concentrates on the adoption of distance learning, and its role in teaching and learning in Sierra Leone.

Significance of the Study

The overall significance of the study lies in how the results and recommendations presented in the report would be implemented in the delivery of distance and blended learning order to improve the teaching and learning environment in the Sierra Leone.

The researcher was confident that this study would fill some of these gaps in distance and blended learning, expand knowledge relevant in the context of Sierra Leone and stimulate debate on related topics. It is an important phenomenon for researchers, professionals and decision makers. The findings and conclusions of this study are useful for policy makers at national and international levels.

Limitations of Study

There are certain limitations with every research study, and the present study is no exception:

- The data was collected qualitatively; hence, the main focus of the study was a small selection of participants from the population for interviews and focus group sessions.
- Time pressures and the impact of covid-19 crisis lockdown were one factor that might have prevented top managers, lecturers and students from participating in research. Limitations included the availability of potential participants.
RELATED LITERATURE

Distance learning is teaching and learning where educators and learners are in different physical spaces. Often used synonymously with distance education, distance learning takes place through one of four modalities: audio/radio, video/television, mobile phone, and/or online learning platforms. Printed and digital texts often accompany these modalities or could be a fifth modality in cases where other technology is not available.

When and why is Distance Learning Used?

Distance learning can be a temporary and short-term strategy when in-person learning cannot take place, such as in emergencies, crises, and conflicts. It can also be designed as a permanent and long-term strategy where educators and learners are in separate physical spaces throughout the learning process. Distance learning can be designed for multiple purposes including as the main form of instruction, or as complementary, supplementary, or additional support.

Who is Distance Learning For?

Distance learning can be designed for all ages and levels, from preschool learners through adults in nonformal learning programs or higher education. Audio and video content transmitted through radio or television require less technological literacy. In general, audio and radio programming has been tried and studied for younger audiences, as well as out-of-school youth and adult learners such as in-service teachers.

Video programming has been designed for all ages, including educational television broadcasts for pre-schoolers and interactive video lectures for secondary and tertiary students. Mobile phone programming varies greatly in design and technological literacy required but can be designed for all age levels. Online learning is more commonly used for older youth and adults who have higher levels of technological literacy.

How Does Distance Learning work?

Distance learning can be implemented in different ways. Learners may participate asynchronously, completing the learning activities in their own time (e.g. learners watch a science experiment on video in their own time). Learners may also participate synchronously, where teaching and learning happens simultaneously in real time either in an online space (e.g. virtual classroom or learning management system) or through a concurrent broadcast (e.g. educational radio or video program). Finally, learners may participate in a mixed approach that engages both synchronous and asynchronous learning.

Distance Learning in Emergencies

During crises and conflicts, closures of learning institutions and non-formal programs can exacerbate the vulnerability of learners and their families and have a detrimental impact on learners’ wellbeing. These gaps in learning contribute to educational inequities, delay learners’ progress in school, and can pose threats to safety. Children and youth not engaged in formal or non-formal learning are often more vulnerable to violence and exploitation through unsafe work, early marriages, begging for food, and other activities (Ghaffar-Kucher 2018). Moreover, teacher training institutions have closed, leaving pre-service teachers in limbo and delaying the entry of new educators into the teaching workforce. Distance learning has a rich history around the world providing teaching and learning opportunities for communities that have been historically excluded from formal learning, such as ethnic, indigenous, and linguistic minority groups; women; people with disabilities; rural residents; families and individuals living in poverty; and communities in crisis and conflict areas. Likewise, distance learning offers new methods and modes of learning to non-traditional learners, such as working adults, educators, or home-schooled children and youth (Burns 2011).
Conversely, distance learning provides educators and learners with a sense of normalcy, routine, contact with peers and educators, and psychosocial support, all of which are critical to the wellbeing of children, youth, and educators. According to a 2015 Global Education Cluster, UNICEF, and Save the Children brief on the Ebola response, “school provides a sense of stability, hope, and helps to mitigate the psychosocial impact of a crisis.” In the case of COVID-19, formal and non-formal institutions are being challenged to modify not only learning calendars, curricula, and lesson plans, but also the modalities through which teaching and learning take place. Learning that until very recently occurred in person now must take place through distance learning.

Ministries and departments of education around the world have rolled out strategies for quick transitions to distance learning (see Cobo, Hawkins, and Rovner 2020; Trucano 2020). To name a few, UNICEF and UNESCO have shared publications, data, strategic thinking on mitigating the effects, and curated list of educational applications, platforms, and resources (see below). The Inter-agency Network for Education in Emergencies (INEE) has published and shared guidance for educators, learners, caregivers, policymakers, ministries, and community members on how to support learning and wellbeing during crises such as COVID-19 as well as how to rollout ICT in learning (see checklist below). The Brookings Institution has presented research, strategies, and implications for learning in the United States and globally (see Anderson 2020; Harris 2020; Turner Lee 2020). Implementing organizations have shared their experiences, challenges, and successes as technical experts leading distance learning efforts (see AIR 2015; BEC 2020; Bosch, Hartenberger, and Alhamzy 2017; Burns 2011; Corlazzoli 2014). The private sector has also shared data and guidance on technology use (see Google Classroom, Zoom, and other sites). The World Bank continues to publish blog posts on broadening technological reach and distance learning, and the Global Partnership on Education’s (GPE) blog covers different distance learning approaches that have shown promise and success (see Trucano 2020 for World Bank Group and Bangay 2020; Burns 2020a, 2020b for GPE).

**Reviewing the Evidence of Distance Learning**

The evidence in this review, which is illustrative and not exhaustive, is drawn from implementing partners’ experiences program evaluations, and research from sub-Saharan Africa, Asia, Latin America, and to a lesser extent evidence from North American and Europe. This literature presents important considerations for the teams planning, creating, and implementing distance learning programming, and for educators and learners using the various modalities. This review responds to three questions:

- What distance learning modalities are shown to be most effective in the Global South for providing continuity in learning amid temporary or permanent school closures?
- What distance learning modalities are promising but lack evidence?
- What are the required considerations when planning for and implementing distance learning?

The four distance learning modalities - audio/radio, video/television, mobile phone, online teaching and learning are discussed. While these modalities are separated into four groups, a combination of modalities has the greatest potential for reaching the most learners (e.g., different ages, geographical locations, education levels, learners with disabilities, gender) and for maximizing learning outcomes, which can be cognitive (e.g., literacy, numeracy) and non-cognitive measures (e.g., openness to experience, conscientiousness, extraversion, agreeableness, and emotional stability), or defined as socioemotional learning skills. Although the evidence is heavily skewed toward cognitive measures, non-cognitive skills are critical to predicting later schooling and life outcomes such as health (see Heckman 2012). As an ICT expert in northern Nigeria Anthony Udeh advises, “using multiple and different approaches and building on technology that people have access to and responds to the environments in which people live will ensure the greatest impact” (personal communication, 4-2020).
MODALITIES FOR CONTINUITY OF EDUCATION AND KEY CONSIDERATION

To best compare access and functionality of each modality for the given context(s), factors must be considered at different levels - the education system, learning environment, and community and home- and across different equity factors. This section starts with a description of each of these modalities with examples, existing evidence on their effectiveness, and different considerations.

Interactive Radio/Radio Instruction

Interactive audio instruction (IAI) is an educational approach that uses interactive pedagogies to record educational content in audio segments that can either be digitized (IAI) or broadcast on radio (IRI). IAI is designed to solicit audience involvement and interactions, which makes this approach different from other audio and radio programming that emphasizes passive listenership. Emerging in the early 1970s, some educators across the US began to look at radio as “a possible inexpensive and universal means of redressing mounting educational problems worldwide: too few trained teachers, too many people with no access to education, and too few resources” (de Fossard 1994, p 7). In 1974, IRI mathematics programs were developed and used in Nicaragua—among the first attempts to implement IRI (de Fossard 1994). While IRI was developed and disseminated at first, in the past decades digitized audio material has been increasingly distributed via mobile phones and tablets.

Video and Television

Video and television-based programming is an important modality for complementing and supplementing teaching and learning. There are two main categories in this modality, video instruction programs which are created to accompany certain curricula and content or as stand-alone programs (e.g., video demonstration of a science experiment or public service announcement on health education topics) and educational television broadcasting (e.g., Sesame Street and Ubongo Kids featured in the case studies below) intended to teach children through “edutainment,” which combines educational content with entertaining stories, games, music, and images. Video instruction programs can either follow curricula or complement curricula, and target any age group, from early childhood to university and preservice teaching students. However, many of the programs discussed, such as video demonstrations and lectures, target secondary school-age learners. Video instruction programs are often small enough files that they can be shared via mobile phone, email, Internet (download), or other means. Educational television broadcasting, on the other hand, has historically targeted preschool and primary school age children and focuses on early literacy, numeracy, science, and life skills. While TV-based programs have been traditionally accessed via television, viewers are increasingly accessing such programming through tablets, smartphones, and other devices.

Mobile Phone

Education through mobile phone technology and programs is among the most rapidly changing in the world. As mobile phone ownership increases so does the potential for this modality to improve teaching and learning and to provide learning in emergency and crisis situations like COVID-19. There are generally three types of phone technologies in current use: (1) basic mobile phones for calling, (2) feature phones with texting, multimedia, a simple web-browser and operating system, and GPS capabilities; and (3) smartphones with advanced operating systems, GPS, faster Internet speeds, and the basic capabilities of a tablet or computer. All three phones can be used for educational purposes, but with different functionalities and capabilities. Each year, the number of users with smartphones, which have greater audio, video, and online potential, increases, including in sub-Saharan Africa where access to low-cost smartphones increases (Burns 2020b).

Mobile phones can be used for a variety of educational purposes. They can receive and transmit educational content (e.g., used to listen to IAI programs and video programs or receive homework),
maintain contact with educators and learners (e.g., communication and monitoring), and serve as an integrated part of learning and teaching (e.g., practice reading and comprehension).

One of the greatest challenges to this modality has been creating content that can be accessed on both a feature and smartphone, providing phone data, and in getting users access to the Internet (both cost and infrastructure). However, countries are making rapid policy changes to ensure broader access to educational resources. For example, South Africa is “zero rating,” or not charging data, for educational websites and apps; Turkey has increased its data caps for educational resources from 4GB to 8GB per month; and the Kyrgyz Republic is working with mobile providers to give educators and student free SIM cards and special data plans (Trucano 2020).

**Online Teaching and Learning**

Online teaching and learning modalities include learning management systems like Blackboard, Moodle, Skype, and Google Classroom; massive open online courses (MOOCs); and open access resources such as digital textbooks and teaching materials. These programs and resources allow educators and learners to connect with each other synchronously and asynchronously via the Internet to continue curriculum during disruptions in face-to-face education. Using these online programs, where Internet connectivity is available, educators can deliver curriculum content to learners through computers, tablets, smartphones, and even (with extensive modifications) basic phones (Creed and Morpeth 2014; Instruction Partners 2020; UNESCO 2020c; UNESCO 2020d). While these programs allow for both synchronous and asynchronous education, they are also among the most complex solutions for distance learning. As a result of the complexities involved, these tools are most suitable for educators and learners in secondary school and above (or with accompaniment for younger learners).

In order to use online learning resources, learners and educators require an Internet-ready device, stable electricity, stable Internet, digital literacy, and linguistic competence in the language of the platform (Qureshi et al. 2012). Provided these conditions are met, online platforms offer educators and learners a wide array of possibilities for teaching and learning across most content areas and potentially offer improved student safety in conflict and crisis situations (Oshiberu 2018; Rajab 2018). Educators, school administrators, and other education sector stakeholders have used online distance learning approaches to provide continued student education in the Global South (Niyigena et al. 2020; Oshiberu 2018; Rajab 2018; World Bank 2020). However, research on the effectiveness of online education is mixed, and both “extensive and inconclusive” (Rajab 2018).

An important caveat to using virtual classrooms, video conferencing tools, and screencasting programs is that educators will need to receive pedagogical and monitoring support to ensure all their learners can continue receiving high-quality education, as digital content delivery often relies on unfamiliar teaching techniques. This becomes even more important as the content itself becomes more advanced (Instructional Partners 2020).

While computer and Internet penetration is increasing globally, many low- and middle-income countries are still working to improve connections, particularly in rural areas. Even in urban areas, large gaps remain in terms of regular computer and Internet access, particularly for low-income families and individuals. Furthermore, many users can only access the Internet on smartphones, which requires using phone data (Silver and Johnson 2018). Some countries are addressing Internet access issues by requesting increased bandwidth and preferential access for educational materials (Kenya); unbanning online calling, also known as VOIP (Oman); distributing Internet-ready devices to educators and learners (Egypt); and creating additional public Wi-Fi hotspots (USA) (Trucano 2020).

During closures of learning institutions, even for scheduled holiday breaks or inclement weather, educational inequalities tend to worsen (see Young Lives studies in the Global South and longitudinal studies in the US like Chicago Longitudinal Study). Access to technology in the home impacts learners’ ability to succeed in online learning as a large study in East Africa revealed among undergraduate students (Niyigena et al. 2020). In some contexts, technology access is gendered. For
example, in India, boys are much more likely to have access to computers and Internet than girls (Moore 2020). Access to appropriate technology for learners with special needs is also a critical problem, although understudied.

**METHODOLOGY**

**Participants**

The participants for this study were 360 teachers and educationists from secondary schools, universities and officials from the Ministry of Education, who voluntarily participated in the study.

**Instruments**

A questionnaire using a 5- scale was created to collect data for this research study. The response scales use anchors extending from 1 represent “strongly Disagree”, till 5 which represent “strongly Agree”. Interview and focus group discussion was used which gives insight on opinion of respondents. Using Cronbach’s alpha which measures the internal consistency, of a set of scale or test items, the questionnaire alpha was 0.950 which very high level of internal consistency among the questions which indicate a respectable value for the questionnaire.

The survey was composed of four parts. The first part of the survey consisted of 6 items regarding respondents' demography and personal information, The second part consisted of teachers’ software use, as well as other instructional tools and materials. The purpose of this part was to find out the self-expertise level of the social studies teachers. The second part consisted of 4 items about the respondents' digital knowledge and skills in the use of ICT tools. The third part consisted of 7 items about the digital learning tools used in response to covid-19 restrictions. Finally, the last part was composed of 2 questions with 14 items regarding the barriers that teachers faced during digital technology utilization in the teaching-learning process. The questionnaire was created in English.

**Data Design**

The study will use qualitative and quantitative research approach. Convenience sampling was used to reach the participants in this study. Quantitative data collection scheme has been used in this study supported by discussion forums created in google form system and a complete online. Descriptive statistics method has been used for analyzing the collected data.

**PROCEDURE**

Use of Online materials was supplemental and a supporting system for traditional face-to-face classes. The participants received directions on the most effective method to utilize online course delivery platform (Moodle) during the covid-19 restrictions. When the course was finished, participants were provided the link to the online questionnaire. The results of this study dependent on the data that has been collected from the online survey, using Kobotoolbox platform. SPSS 15.0 and Microsoft office Excel 2016 were utilized to analyze the collected data.

**Findings Results**

This section presents the analyses and interpretation of data collected from the respondents. 120 respondents participated in the online questionnaire.

**Personal Information**

For the gender factor (Table 1), the majority of respondents are male 61.9% (n=161), whereas female is 38.1% (n=99). Then, in age of the participants is classified into five groups, in which 5.4% (n=14) are in between 21- 30 years, 15.4% (n=40) of those are in between 31-40 years, 61.9% (n=161) are
in between 41-50 years, 16.6% (n=43) are in between 51-60 years, and the smallest category is over 60 years old with percentage rate 0.8% (n=2). To conclude, the majority of the respondents were between the ages of 41 and 50 years.

Participants were also asked to indicate the period to which they have used ICT in teaching. In teaching experience factor, high experience educators (5-10 years) as much 73.1% (n=190). Next, followed by (> 10 years) with total 15.4% (n=40) and little experience/fresh lecturers (≤ 5 years) with total 11.5% (n=30).

In terms of educational level, 14.2% (n=37) from total respondents hold a Bachelor degree, 75.8% (n=197) hold a Master degree, and only 10.2% (n=26) hold a PhD.

Knowledge of Digital Skills and Commitments

Respondents were asked to indicate their experience of using digital tools in their institutions. Based on the result, 4.2% (n=5) of the respondents have been using digital tools for less than 1 years, 20.8% (n=25) reported to have been using digital tools for 1 to 3 years, 53.3% (n=64) reported to have been using digital tools for 1 to 6 years, while 21.7% (n=26) have been using digital tools for more than 6 years.

Respondents were also asked to indicate their opinion of the current commitment of resources for digital learning in schools. Based on the result, 23.08% (n=60) of the respondents indicated that the current commitments of resources for digital learning is far too low, 19.23% (b=50) reported somewhat too low, 38.46% (n=100) of the respondents indicated that the current commitments of

Table 1. Gender Data

| Gender   | Frequency | Percent |
|----------|-----------|---------|
| Male     | 161       | 61.9%   |
| Female   | 99        | 38.1%   |
| Total    | 260       | 100%    |

Table 2. Teaching Experience

| Teaching Experience | Frequency | Percent |
|---------------------|-----------|---------|
| <5 years            | 30        | 11.5%   |
| 5-10 years          | 190       | 73.1%   |
| >10 years           | 40        | 15.5%   |
| Total               | 120       | 100%    |

Table 3. Digital Skills Experience

| Digital skills      | Frequency | Percent |
|---------------------|-----------|---------|
| Less than 1 year    | 10        | 3.85%   |
| Between 1 to 3 years| 30        | 11.54%  |
| Between 4 to 6 years| 120       | 46.15%  |
| More than 6 years   | 100       | 38.46%  |
| Total               | 260       | 100%    |
resources for digital learning is somewhat too little, 11.54% (n=30) of the respondents indicated that the current commitments of resources for digital learning is far too much, and 7.67% (n=20) indicated that is about right. This finding shows that current commitments of resources for digital learning in Schools are somewhat too little.

ICT Tools Used to Support Distance Learning

**Research Question 1:** What ICT tools are used to support distance learning modalities for providing continuity in learning amid school closures?

Respondents were asked to indicate the ICT tools in schools or homes that they normally used to support digital or distance learning during covid-19 lockdown. From the findings, 96% (n=250) of the respondents indicated that they used Computers, 81% (n=210) for Internet, 96% (n=250) used Smart Phones, and 12% (n=30) for Radio. The findings showed that Smartphones are widely used followed by Radio, computers and internet in teaching and learning.

Most of the teachers use Computers (96%, n=250) and the Internet (81%, n=210) in teaching and learning. Such significant agreement on the use of ICT tools gained overwhelming support from respondents’ views as expressed and extracted from the open-ended responses. One of the respondents wrote:

*Teachers and learners should use ICT devices for planning their lessons, as they will do more research on the topic to be presented.*

Another teacher uttered similar sentiment by suggesting that:

*ICT may be a hustle to use in the beginning, but once one gets the hang of it - it makes daily lesson planning as well routine assessment more convenient and efficient. Also, learners will be more interested in the subject when it is presented with the aid of various ICT resources.*

**Research Question 2:** What distance learning modalities are promising?

Responded were also asked to indicate collaborative tools that are currently used and promising to support teaching and learning during covid-19 restrictions. From the finding, 50% (n=60) of the respondents used Moodle, 37.5% (n=45) of the respondents used Teams, 75% (n=90) used Skype, 74.2% (n=89) used Zoom, 98.3% (n=118) used WhatsApp, 82.5% (n=99) used Google Meet, 41.7% (n=50) used YouTube, and 12.5% (n=15) used other tools. This finding indicated that WhatsApp, Google meet, Zoo and skype are widely used collaboration tools.

Responded were also asked to indicate collaborative tools that are currently used and promising to support teaching and learning during covid-19 restrictions. From the finding, the use of computers in their academic life, out of a total of 260 staff. The participants also used other ICT equipment for teaching and learning. About 51.15% (n=133) participants used Moodle platform for online course delivery, 38.46% (n=100) participants used Team, 72.67% (n=189) participants used Skype, 69.23% (n=180) participants used Zoom, 99.23% (n=258) participants used WhatsApp, 57.69% (n=150) participants used Good Meet, 88.46% (n=230) participants used YouTube and 36.15% (n=94) participants used other platforms.

PERCEPTION OF DIGITAL LEARNING IN TEACHING AND LEARNING

**Research Question 3:** What are Teachers’ Perceptions in Relation to ICT Usage?

In this section, the researcher presents the perception that lecturers in the Sierra Leone university education sector holds towards the use of ICT in teaching and learning. Five Likert-type
scale (i.e., 1=Strongly Agree, 2=Agree, 3=Neutral, 4=Disagree and 5=Strongly Disagree) was made the options for the respondent to rate from 11 items used in investigating Sierra Leonean university lecturers’ perception on the use of ICT in teaching and learning. However, item 1 is a negative item and was firstly converted to positive by reversing or recording the scale. Hence, a reversed Likert-type scale (i.e., 1=strongly disagree, 2=Disagree, 3=Neutral, 4=Agree and 5=Strongly Agree) was used. From the data analysis, the overall mean score on the perception of ICT usage was 2.36 (SD = 1.07). Such overall mean score and standard deviation demonstrates that participants in this study portrayed a positive perception towards the use of ICT in teaching and learning.

As indicated in Table 4 and 5, majority of the participants agreed that using ICT in teachings make their teaching easier (97.7%, n = 254, M = 2.14, SD = 1.09). In line with this agreement, one of the participants wrote subjectively in support of the quantitative response that:

*It makes my teaching very easier especially in my subject (computer science studies). I get to show learners videos and images, and I get to use my resources for a longer time.*

Majority of the participants agreed that the use of ICT in teaching and learning enhances learners’ critical thinking (97.3%, n = 253, M = 2.56, SD = 1.08). In line with this quantitative view, one of the respondents wrote that:

*ICT makes work easier for lecturers and learners. It enhances critical thinking and helps learners to be actively involved in learning.*

Table 4. Teacher’s perception on the use of Digital learning

| # | Items                                                                 | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|---|-----------------------------------------------------------------------|----------------|-------|---------|----------|-------------------|
| 1 | I find the use of ICT in teaching and learning a time consuming      | 13%            | 42%   | 25%     | 13%      | 7%                |
| 2 | Universities need to prioritize the ICT pedagogical training in their Continuous Professional Development (CPD) | 33%            | 34%   | 15%     | 9%       | 9%                |
| 3 | ICT promote research-based teaching and learning                      | 18%            | 57%   | 10%     | 10%      | 5%                |
| 4 | ICT facilitates problem based-learning                               | 13%            | 51%   | 21%     | 10%      | 6%                |
| 5 | Using ICT enhances my learners critical thinking                     | 10%            | 53%   | 14%     | 16%      | 7%                |
| 6 | Using ICT promote innovation and problem solving                    | 18%            | 56%   | 11%     | 9%       | 5%                |
| 7 | Using ICT enhance collaborative learning                              | 13%            | 61%   | 10%     | 9%       | 7%                |
| 8 | Lack of ICT makes it difficult for lecturer to keep up with current trends in education | 11%            | 59%   | 13%     | 11%      | 5%                |
| 9 | Using ICT help to ensure quality education                           | 21%            | 50%   | 10%     | 13%      | 7%                |
| 10| Lecturers need to be encouraged to use ICT in their teaching and learning activities | 9%             | 68%   | 8%      | 10%      | 5%                |
| 11| Using ICT make my teaching easier                                    | 29%            | 48%   | 7%      | 11%      | 5%                |
The participants agreed that using ICT in teaching and learning promotes innovation and problem-solving skills of their students (97.7%, n=254, M = 2.26, SD = 1.02). In support of this finding, one of the participants stated:

Learners are more motivated and as such, they become more creative when they are faced with new learning environments. Also, they are prone to assimilate in a disciplined way working collaboratively with their peers. As a result, they can generate knowledge. They will have the capacity to handle rapid change in any environment.

Additionally, majority of the respondents agreed that using ICT in teaching and learning enhances collaborative learning among students (97.3%, n=254, M = 2.26, SD = 1.06). This finding was expected as many researchers agree that collaborative learning enhances learners’ academic performance. Similarly, most of the participants agreed that ICT promotes research- based teaching and learning (96.5%, n=251, M = 2.44, SD = 1.04). Moreover, most of the participants agreed that using ICT in teaching and learning serves a catalyst in the quest to ensure quality education (96.9%, n=252, M = 2.36, SD = 1.15). In harmony with this rating one participant asserts that:

I want to play my part in contributing to the attainment of the sustainable development goals, where it advocates for quality education and ICT is one of the components that gives quality to education.

The participants maintain that lack of ICT at their disposal makes it difficult to keep up with the current trends in education (98.8%, n=275, M = 2.40, SD =1.01). In view of this, the participants acknowledged the relevance of using ICT in teaching and learning. Thus, most of them agreed that the universities need to prioritize and integrate ICT pedagogical training in their CPD (97.7%, n=254, M = 2.28, SD = 1.27). One of the participants wrote to express the challenges that many of the lecturers face in the use of ICT in teaching and learning.

| #  | Items                                                                 | Mean | Std. | No. |
|----|----------------------------------------------------------------------|------|------|-----|
| 1  | I find the use of ICT in teaching and learning a time consuming      | 2.59 | 1.09 | 255 |
| 2  | Universities need to prioritize the ICT pedagogical training in their Continuous Professional Development (CPD) | 2.28 | 1.27 | 254 |
| 3  | ICT promote research-based teaching and learning                      | 2.27 | 1.04 | 251 |
| 4  | ICT facilitates problem based-learning                                | 2.44 | 1.01 | 252 |
| 5  | Using ICT enhances my learners critical thinking                     | 2.56 | 1.08 | 253 |
| 6  | Using ICT promote innovation and problem solving                     | 2.26 | 1.02 | 254 |
| 7  | Using ICT enhance collaborative learning                              | 2.36 | 1.06 | 254 |
| 8  | Lack of ICT makes it difficult for lecturer to keep up with current trends in education | 2.40 | 1.01 | 257 |
| 9  | Using ICT help to ensure quality education                           | 2.36 | 1.15 | 252 |
| 10 | Lecturers need to be encouraged to use ICT in their teaching and learning activities | 2.33 | 0.94 | 249 |
| 11 | Using ICT make my teaching easier                                    | 2.14 | 1.09 | 254 |
|    | Overall                                                               | 2.36 | 1.07 |     |

The participants agreed that using ICT in teaching and learning promotes innovation and problem-solving skills of their students (97.7%, n=254, M = 2.26, SD = 1.02). In support of this finding, one of the participants stated:

Learners are more motivated and as such, they become more creative when they are faced with new learning environments. Also, they are prone to assimilate in a disciplined way working collaboratively with their peers. As a result, they can generate knowledge. They will have the capacity to handle rapid change in any environment.

Additionally, majority of the respondents agreed that using ICT in teaching and learning enhances collaborative learning among students (97.3%, n=254, M = 2.26, SD = 1.06). This finding was expected as many researchers agree that collaborative learning enhances learners’ academic performance. Similarly, most of the participants agreed that ICT promotes research- based teaching and learning (96.5%, n=251, M = 2.44, SD = 1.04). Moreover, most of the participants agreed that using ICT in teaching and learning serves a catalyst in the quest to ensure quality education (96.9%, n=252, M = 2.36, SD = 1.15). In harmony with this rating one participant asserts that:

I want to play my part in contributing to the attainment of the sustainable development goals, where it advocates for quality education and ICT is one of the components that gives quality to education.

The participants maintain that lack of ICT at their disposal makes it difficult to keep up with the current trends in education (98.8%, n=275, M = 2.40, SD =1.01). In view of this, the participants acknowledged the relevance of using ICT in teaching and learning. Thus, most of them agreed that the universities need to prioritize and integrate ICT pedagogical training in their CPD (97.7%, n=254, M = 2.28, SD = 1.27). One of the participants wrote to express the challenges that many of the lecturers face in the use of ICT in teaching and learning.
Some lecturers do not know how to use/integrate ICT in their classroom, they received no or lack training on ICT.

The researcher aimed to ascertain whether the use of ICT should be encouraged in universities. The study revealed that majority of the responded reacted positively to the statement that lecturers need to be encouraged to use ICT in teaching and learning activities (95.8%, n=249, M = 2.33, SD = 0.94). Nevertheless, most of the participants disagreed that the use of ICT in teaching and learning is time consuming (13%, n=32, M = 2.59, SD = 1.09). However, most of the respondent agreed that ICT facilitates problem-based learning (51%, n=129, M = 2.44, SD = 1.01).

BARRIERS / CHALLENGES TO IMPLEMENTING DISTANCE LEARNING

Research Question 3: What are the barriers for implementing distance learning in schools?

The respondents used a three-point likert-type scale (i.e. 3=Agree, 2=Neutral and 1=Disagree) to rate their level of agreement on 7 statements about barriers to adoption. Based on the presentation in Table 5, the top barriers for implementing digital and distance learning are; 79.2% (n=95) insufficient funding for digital and distance learning, 70.8% (n=85) lack of adequate skills for teachers, 83.3% (n=100) insufficient internet bandwidth, 76.7% (n=92) poor technical and learning infrastructure and 77.5% (n=93) lack of preparedness for distance learning.

Finally, participants were asked to indicate what more can be done to overcome the challenges or barriers in the implementation of distance learning and blended learning. Results indicated that 98.3% (n=118) of the respondents indicated that the need to improve internet connectivity, 70.8% (n=85) of responded to establish a clear policy and strategy for distance learning, 90.0% (n=108) of responded to improve the infrastructure, 95.8 % (n=115) responded improvement in the technical capacity of the staff, 82.5% (n=99) of responded to motivate/support for distance learning and 75.0% (n=90) highlighted the need to provide sustainable funding for distance learning.

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study provides a comprehensive look at distance learning modalities that exist in Sierra Leone (audio and radio, video and television, mobile phone programming, and online learning), the technology available, and the existing evidence of what has been effective, why, for whom, and in what

| ICT Challenges/Barriers to ICT Usage                         | Disagree (1) | Neutral (2) | Agree (3) |
|--------------------------------------------------------------|--------------|-------------|-----------|
| General lack of computers (desktops, laptops)                | 4.2%         | 33.3%       | 62.5%     |
| Insufficient Internet bandwidth or speed                     | 8.3%         | 8.3%        | 83.3%     |
| Lack of preparedness for distance learning                   | 5.0%         | 17.5%       | 77.5%     |
| Lack of adequate skills for teachers                         | 3.3%         | 25.8%       | 70.8%     |
| Insufficient pedagogical support for teachers                | 7.5%         | 15.0%       | 77.5%     |
| Poor technical and physical infrastructure of learning       | 6.7%         | 16.7%       | 76.7%     |
| Insufficient founding for distance learning                  | 9.2%         | 11.7%       | 79.2%     |
contexts. This review began by identifying the main purposes of distance learning: teaching lessons based on formal or nonformal curricula as the primary means of instruction (e.g., for learners not in school or learning online); teaching lessons based on formal or nonformal curricula to complement (reinforce) learning (e.g., short teaching demonstrations); providing additional educational support to learners (e.g., tutoring); and supplementing learning beyond a formal or nonformal curriculum (e.g., educational television). Whether intended for extending learning, enhancing learning, or creating equity in learning, distance education has the potential to reach learners of all ages (from pre-schoolers to adults), low-tech and high-tech environments, and from different demographics.

**Recommendations**

Based on the evidence gathered for this review, and the four distance learning modalities used and in Sierra Leone studied are: audio/radio, video/television, mobile phone, and online teaching and learning tools: Moodle, Google Classroom, WhatsApp, Skype and Zoom. This study makes nine key recommendations for developing more comprehensive distance learning strategies in Sierra Leone are made below:

Commitments from Government and institutional leadership are critical in the implementation of digital learning and distance learning in Sierra Leone. The Government and policy makers should ensure distance learning policy for educational institutions are defined and communicated to these institutions.

The adoption of sustainable funding for digital or and distance learning is critical to ensure the delivery of distance learning. The educational institutions are mostly dependent on government funding to support their operations. Without adequate funding for digital learning, the implementation will be severely impacted.

Findings from this study suggested that both teachers and learners need support in the transition and uptake of digital learning initiatives by providing specialised support for marginalised learners. Tackle equity and inclusion in learning.

The uptake of digital learning and distance learning is relatively new in the teaching and learning environments in Sierra Leone. The provision of ongoing capacity training and support to educators in distance instruction is critical in building confidence amongst staff and students in the educational institutions.

| What can be done to improve ICT                                      | Total | %     |
|---------------------------------------------------------------------|-------|-------|
| Improve internet connectivity                                      | 118   | 98.3% |
| Establish clear policy and strategy for distance learning          | 85    | 70.8% |
| Improve the infrastructure                                         | 108   | 90.0% |
| Improve technical capacity of staff                                | 115   | 95.8% |
| Motivate/Support for distance learning                             | 99    | 82.5% |
| Provide sustainable funding for distance learning                  | 90    | 75.0% |
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