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Exploring Affordances of Online and Offline Strategies for Continuity of Learning in Secondary Schools during Pandemics: Lessons from Uganda's Response to the COVID-19 Pandemic

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The COVID-19 pandemic led to widespread school closures, disrupting learning in institutions worldwide. This study examined the online and offline strategies implemented in Uganda's secondary schools during the pandemic and draws lessons from the country's response. This study was conducted in two schools in Kampala District, the research employed a qualitative multiple case study approach, gathering data through interviews, observations, and focus group discussions. The findings revealed that both online and offline strategies played significant roles in facilitating home-based learning. Printed learning materials, such as textbooks and workbooks, were valued by teachers and students for providing a sense of continuity in their studies. However, limitations such as the lack of immediate clarification and two-way communication were identified. Logistical challenges in distributing the materials also posed difficulties, particularly for students in remote areas. Radio broadcasts emerged as a pivotal offline strategy for reaching students without internet access. Parents and students appreciated the insightful educational content delivered through radio programs, even in remote areas. However, accessibility concerns and the lack of interactivity were highlighted as limitations. These findings are not only pertinent for Uganda but also contribute to the global conversation on resilient educational systems in times of unforeseen disruptions. It is crucial to address the limitations of online and offline strategies to ensure equitable access and effective learning experiences for all students, especially those in remote areas.

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INTRODUCTION

The COVID-19 pandemic had a global impact on the education sector, leading to the closure of schools and the implementation of remote learning methods in various countries. For instance, UNESCO (2020) reported that as of April 2020, over 190 countries had implemented nationwide school closures, affecting more than 1.5 billion learners worldwide. The World Bank (2021) also highlighted the widespread disruption of education systems, with schools closing in nearly every country.

In Uganda, the government took swift action in response to the pandemic. The President of the Republic of Uganda addressed the nation on March 18th, 2020, announcing the closure of all primary and secondary schools, universities, and tertiary institutions by mid-day on March 20th, 2020 (New Vision, March 19th, 2020). The Ministry of Education in Uganda reported that over 73,000 learning institutions were closed, impacting approximately 15 million learners and 600,000 refugee learners (Ministry of Education and Sports, 2020).

Uganda, like many other countries, faced significant challenges in ensuring the continuity of learning for secondary school students during this period (Tumwesigye, 2020). These challenges were particularly pronounced for students from disadvantaged backgrounds, who often lacked access to the necessary resources for effective remote learning (Tumwesigye, 2020). To address these concerns, the government of Uganda and educators implemented various strategies and technologies, including digital learning platforms, educational broadcasting, and self-learning materials (Vincent-Lancrin et al., 2022).

However, the affordances of these strategies in facilitating continuity of learning in Uganda's secondary schools during the pandemic is mixed. While some students and educators reported that these approaches effectively supported remote learning, others found them inadequate (World Bank, 2021). This discrepancy highlights the need for a comprehensive examination of the online strategies and technologies employed in Uganda's educational response to the pandemic and an understanding of their strengths, weaknesses, and potential for scalability.

Existing studies have explored the effectiveness and affordances of online strategies for continuity of learning during pandemics. These studies have generally acknowledged that online learning can be a viable alternative to in-person instruction (Mishra et al., 2020; Tumwesigye, 2020; World Bank, 2020). However, they also emphasize the importance of carefully considering the needs of students and teachers when designing and implementing online programs. While online learning offers potential benefits for continuity of learning during pandemics, also has its limitations. One major limitation is the unequal access to technology and internet connectivity, which can exacerbate existing educational inequalities (Floralin et al., 2022). Not all students have reliable internet access or the necessary devices to fully participate in online classes (Hoskins & Wainwright, 2023). Additionally, digital literacy skills are essential for effective online learning, and inadequate proficiency in technology can hinder students' engagement (Contini et al., 2023). Furthermore, online learning may lack the same level of social interaction and immediate clarification as in-person instruction, impacting motivation and the ability to seek immediate feedback or assistance

(Floralin et al., 2022). These limitations highlight the need to address issues of access, digital literacy, and social engagement to ensure equitable and effective online learning experiences. This study aims to contribute to the existing literature by specifically examining the affordances of online and offline strategies and technologies implemented in secondary schools in Uganda during the COVID-19 pandemic.

Despite the growing body of literature on online learning during pandemics, there is still a research gap in understanding the affordances and outcomes of specific online and offline strategies and technologies in the context of secondary schools in Uganda. While previous studies (Mishra et al., 2020) have provided valuable insights into the general effectiveness of online learning, research is needed that focuses specifically on the experiences and outcomes of educators and students in Uganda.

Furthermore, while the existing studies have highlighted the importance of considering the needs of students and teachers, limited research examines the specific challenges and potential solutions in Uganda's context. This study aims to address this gap by investigating the affordances of the online and offline learning strategies. By analysing the experiences of educators and learners, this study identifies the strategies that effectively supported remote teaching and learning, shedding light on their strengths, advantages, weaknesses, challenges, and potential for scalability.

By addressing these research gaps, this study aims to provide evidence-based insights and recommendations to inform educational practices and policies in Uganda and similar contexts. The findings of this research article can contribute to the development of more resilient and inclusive educational systems that can effectively respond to future disruptions and ensure the continuity of learning for all learners regardless of their socioeconomic backgrounds.

LITERATURE REVIEW

Online learning refers to learning experiences in synchronous or asynchronous environments using

different devices (e.g., mobile phones, laptops, etcetera.) with internet access (Andersen et al., 2022). In these environments, students access learning content from anywhere, receive instructions, learn, and interact with instructors and other students. In this study, online learning meant all forms of learning that occur in different environments using devices and internet connectivity (Dolgunsöz & Yıldırım, 2021).

According to UNESCO (2020c), teachers face inadequate training and resources to address the challenges of adapting teaching content and formats to pupils in disadvantaged situations. The new circumstances meant that teachers had to use virtual platforms and methodologies they may not be familiar with. The latest Teaching and Learning International Survey (TALIS) conducted by the Organization for Economic Cooperation and Development (Reimers & Schleicher, 2020) reported that most Latin American countries had a significant percentage of teachers who had not received training on the use of information and communications technology (ICT) for formal education or training. Teachers in these countries considered urgent training in this area necessary (Armoed, 2021).

Many principals in Brazil, Colombia, Mexico, and the City of Buenos Aires reported a shortage or inadequacy of digital technology for instruction (Castillo-Canales et al., 2023; Torres Jimenez, 2022; Huepe et al., 2023). This meant that teachers needed training to use online strategies and technologies for the continuity of learning during the pandemic (Huepe et al., 2023). Reimers and Schleicher (2020) highlighted the adoption of distance learning by many countries to mitigate the impact of school closures. Different approaches were observed, with some countries providing resources on their websites without online classes, while others like Spain asked teachers to prepare online content and offer online classes. The success and challenges of delivering distance learning depended on factors such as infrastructure and familiarity with technology (Alkhwaldi et al., 2022; Saliba, 2023). Countries with robust connectivity, like China, were able to offer distance learning successfully, while others

with limited internet penetration faced difficulties in reaching all students equally (World Bank, 2021). Accessibility for students and employees with disabilities also posed challenges for many countries (World Bank, 2021).

Research indicates that video conferencing has been used to ensure continuity of learning. It is a technology that allows users in different locations to hold prominent meetings without moving or meeting at the same location (Kassymova, 2018; Vincent-Lancrin et al., 2022). It supports comfortable and practical learning experiences, saving time and eliminating travel-related difficulties, especially during a pandemic (Vincent-Lancrin et al., 2022). Digital technology, including video conferencing, has created an environment for developing human cognition and digital competence (Kassymova et al., 2019; 2020). Teachers and students need to adapt to technology-supported education and develop their teaching competencies accordingly (Konig, 2020).

According to Bailey and Lee (2020), Google Meet has been used as an online strategy to help students acquire new knowledge and experiences through interactive approaches. Google Meet is considered an appropriate platform for achieving learning goals (Simamora, 2020). Google Classroom is another platform mentioned in the literature, which provides a simple and appropriate way for teachers to interact with students (Mishra et al., 2020). Google Classroom has significantly impacted teaching and learning, enabling interaction between teachers and students, facilitating the delivery of lectures, and promoting the exchange of knowledge and experiences (Oktaria & Rohmayadevi, 2021).

WhatsApp has been identified as an online strategy for sharing information and interacting among teachers and students. It is a popular application that allows users to send various media files, making it suitable for educators and students to communicate and share learning materials (Alubthane & Al Youssef, 2021). WhatsApp is considered an effective communication tool in the educational context, as

it helps to create a comfortable and enjoyable environment for learning (Urien et al., 2019).

DingTalk, developed by Alibaba Group, was used in China as a platform to resolve school closures caused by the COVID-19 pandemic. It was recognized as effective platform for distance education and provided various features, including communication and collaboration tools, file transmission capabilities, health reports, online class reports, and live interaction (UNESCO, 2020a).

Technological Affordances

Affordances refer to the potential actions or uses that an object, environment, or technology offers to an individual (Gibson, 1977; Gaver, 1991; Ronzhyn, 2023; Jin, 2023). They are the perceived or actual properties of an entity that enable specific interactions or functionalities. Affordances can be physical, social, or cognitive in nature and are dependent on the capabilities and intentions of the user (Ronzhyn, 2023; Jin, 2023). For example, a chair affords sitting, a doorknob affords turning, and a smartphone affords communication, browsing the internet, and accessing various applications (Johannessen, 2023).

In the context of this study, the term "affordances of online and offline strategies for continuity of learning in secondary schools during pandemics" refers to the potential benefits and opportunities provided by different online and offline approaches in facilitating and maintaining the learning process during periods of school closures (Johannessen, 2023). It encompasses the advantages and capabilities of these strategies in supporting students' educational progress, ensuring access to learning materials, promoting engagement, and enabling effective communication and interaction between teachers and students (Jin, 2023). The affordances of these strategies include their ability to provide a sense of continuity in students' studies, facilitate access to educational resources, address connectivity limitations, and support different modes of learning, such as independent study or collaborative activities. Additionally, the concept

of affordances also encompasses the limitations and challenges associated with these strategies, such as the lack of immediate clarification, logistical difficulties in distribution, accessibility concerns, and limited interactivity (Wawire et al., 2023; Kabeba Muriisa et al., 2023; Malenya, 2021; Ochieng, 2023; Belete, 2020).

Offline Strategies

Printed learning materials were widely distributed to students in Uganda during the COVID-19 pandemic (Wawire et al., 2023). These materials, including textbooks, workbooks, and worksheets, allowed students to continue their education at home. Radio broadcasts were an effective medium for delivering educational content to students in Uganda (Kabeba Muriisa et al., 2023). Educational radio programs were developed and broadcasted to provide lessons, instructions, and educational content to students who may not have had access to the internet or online platforms. Television programs played a significant role in delivering educational content to students during the pandemic in Kenya (Malenya, 2021; Ochieng, 2023). Educational TV programs were designed to align with the curriculum and cover various subjects, ensuring students could continue learning.

Mobile phone-based learning was utilized to provide students with learning materials and assessments in rural areas of Uganda (Wawire et al., 2023; Klabbers et al., 2023). Text messages, voice messages, and interactive voice response systems were used to deliver educational content to students, particularly in remote areas (Klabbers et al., 2023). Community-based learning centres were established in certain regions of Uganda to provide a physical space for students to access educational resources. These centres adhered to social distancing guidelines and provided support from teachers or volunteers (Belete, 2020).

Peer-to-peer learning was encouraged offline during the pandemic (Namulondo et al., 2023). Students formed study groups or engaged in collaborative learning activities with their peers, either in person or through phone calls or messaging apps. Parental involvement was

emphasized in supporting students' learning at home (Klabbers et al., 2023). Parents were encouraged to assist with reading, provide guidance, and create a conducive learning environment.

Self-study materials, such as textbooks and workbooks, were distributed to students for independent learning (Brunel et al., 2023). These materials were designed to be self-explanatory and allowed students to study at their own pace. In sum offline strategies, including the distribution of printed learning materials, the use of radio broadcasts, television programs, mobile phone-based learning, community-based learning centres, peer-to-peer learning, parental involvement, and self-study materials, played a crucial role in ensuring continuity of learning for secondary school students during the COVID-19 pandemic.

METHODS

Research Philosophy

The research adopted a subjective reality perspective based on constructivism. The subjective nature of reality was recognized due to learners' and instructors' different views and interpretations regarding educational technology affordances. The researcher approached the study with an open mind, acknowledging the diversity of realities across multiple sites. Constructivism emphasized the role of prior experiences in knowledge construction, highlighting the influence of instructors' shared experiences on learners' cognitive development.

Study Design

A qualitative approach was employed to gain an in-depth understanding of the strategies used by secondary schools during the COVID-19 lockdown. The research design involved a multiple case study, allowing for data analysis within and across settings. This design facilitated a comprehensive exploration of the issue under investigation, providing insights into unique and critical cases.

Study Area

The study was conducted in secondary schools located in Kampala District, particularly in the Central and Northern areas. Kampala District was selected as it houses advanced secondary schools with the necessary facilities and resources to support continuity of learning during pandemics. Two schools, St. Joseph Gayaza School and St. Thereza-Makerere Senior Secondary School, were chosen based on their active participation in ensuring continuity of learning during the COVID-19 lockdown.

Population and Sampling Techniques

The study population consisted of school administrators, teachers, students, and parents from the two selected secondary schools. A total of 23 respondents were included in the sample, selected through purposive and snowball sampling techniques. Purposive sampling was used to select school administrators and teachers based on their influence and roles in the schools. Snowball sampling was employed to identify students and parents actively supporting continuity of learning during the pandemic.

Data Collection Methods and Instruments

The research utilized various data collection methods, including in-depth personal interviews, non-participant observation, documentary review, and focus group discussions. In-depth personal interviews were conducted to gather detailed information about the experiences and opinions of the participants. Non-participant observation allowed the researcher to observe events and interactions in the school setting directly. Documentary review involved analysing relevant documents related to continuity of learning during the pandemic. Focus group discussions were conducted to encourage group interaction and obtain in-depth insights from the participants.

Data Quality Control

Expert review by research supervisors was conducted to ensure the validity of the study instruments. The feedback and suggestions provided by the supervisors helped establish the validity and truthfulness of the research decisions.

The study employed strategies such as triangulation and member checks to enhance data reliability and accuracy. Triangulation involved collecting data from multiple sources and positions, while member checks ensured the expertise and accuracy of the respondents' information. Transparency and neutrality were maintained to decrease researcher bias and uphold trustworthiness in reporting the findings.

Data Analysis

The process of data analysis in this study followed an iterative approach of thematic analysis. The verbatim transcriptions of the audio recordings were systematically coded and categorized into themes and sub-themes using NVivo software. The themes that emerged from the participants' narratives and experiences allowed for a comprehensive exploration of their perspectives (Collis & Hussey, 2014).

FINDINGS

Online Strategies

The following findings shed light on the experiences and perspectives of teachers and students regarding the use of WhatsApp and Zoom as online learning strategies during the COVID-19 pandemic. The aim was to explore the advantages and disadvantages of these platforms in facilitating continuity of learning amidst the challenging circumstances brought about by the pandemic. The findings highlight the initial reliance on WhatsApp for communication and sharing educational materials, as well as the subsequent transition to Zoom for virtual classes and interactive sessions. Notably, both platforms offered unique benefits such as easy access to study materials, real-time communication, and the ability to record lessons. However, various challenges were also encountered, including limited storage capacity, difficulties in downloading large files, the risk of lost or deleted information, and uneven access to reliable internet connectivity.

Teachers in the interview reported that, in response to the prolonged period without in-person teaching, they considered using WhatsApp

as an initial online teaching method. One teacher highlighted the use of WhatsApp for distributing question papers and receiving answers from students through chat and audio messages. The teacher from St Theresa noted that;

"I found using WhatsApp as an initial online teaching method quite effective. It allowed me to distribute question papers and receive answers from students through chat and audio messages. It was a convenient way to maintain communication and engagement, especially when face-to-face interaction was not possible." (Teacher interview St Theresa, December 2022)

However, as the pandemic persisted, another teacher mentioned that they had to switch to Zoom as a more sustainable online teaching platform. They realized that the pandemic would continue for an extended period, leading to the decision to transition to Zoom for the continuity of learning (Teacher interview, November 2022).

"Initially, we considered using WhatsApp for online teaching, but as the pandemic persisted, we realized the need for a more sustainable platform. We made the decision to switch to Zoom, understanding that the pandemic would continue for an extended period. Transitioning to Zoom was crucial for ensuring the continuity of learning and providing a more comprehensive online teaching experience." (Teacher interview, November 2022)

According to the focus group discussion respondents, WhatsApp offered several advantages. It was cost-effective compared to Google Classroom and Zoom. Even without mobile data, WhatsApp would refresh and send text messages, although videos could not be sent under such circumstances. WhatsApp allowed students to access and submit work at any time, as well as providing easy access to Zoom meeting links as noted by a student FGD respondent at St Joseph, Gayaza;

"WhatsApp was really helpful for online learning. It was cost-effective and allowed us to send text messages even without mobile

data. We could access and submit our work anytime, and it made it easy to join Zoom meetings. Overall, it made the online learning experience much more convenient." (Student FGD, December 2022)

However, despite these advantages, key informants and students encountered challenges using WhatsApp as an online teaching strategy. One challenge was the limited storage capacity of phones, causing students with weak phones to frequently delete work, and leading to a lack of reference materials for future revision. Some students faced difficulties accessing their parents' phones due to financial constraints at home as shown in the findings below:

"While WhatsApp offered several advantages for online teaching, we also faced some challenges. One major challenge was the limited storage capacity of our phones. Many of us had weak phones, and we had to frequently delete work to make space, which meant we lost important reference materials for future revision. It was frustrating not being able to keep all our work and study materials in one place." (Students' FGD, St Joseph's Gayaza)

"Using WhatsApp as an online teaching strategy had its challenges, especially for students facing financial constraints at home. Some of us had difficulties accessing our parents' phones, which limited our ability to fully participate in online learning. It was disheartening to see our peers having access to their own devices while we struggled to find opportunities to use a phone for educational purposes. This inequality in access created additional barriers to our learning experience." (Students FGD, St Theresa, Makerere).

Also, WhatsApp lacked cloud storage, making storing and retrieving downloaded content difficult. The platform also had limitations in sending large files, with a maximum limit of 16 MB for videos. There was also a risk of losing information if the sender deleted it before the

receiver had a chance to read it. The responses are summarized below:

"One challenge we encountered with WhatsApp as an online teaching platform was the lack of cloud storage. It made storing and retrieving downloaded content quite difficult. We had to rely on our phone's limited storage, which often led to a cluttered and disorganized collection of educational materials. It would have been much more convenient if WhatsApp had a cloud storage feature to easily access and manage our downloaded content." (Students FGD, St Theresa, Makerere School).

"Another limitation we faced with WhatsApp was the difficulty in sending large files. The platform had a maximum limit of 16 MB for videos, which often restricted our ability to share and receive multimedia content. This limitation hindered our learning experience, especially when we needed to share or access larger files for assignments or projects. It would have been beneficial if WhatsApp allowed for the seamless transfer of larger files to enhance our engagement with multimedia learning materials." (Students FGD, St Theresa, Makerere School).

"We also experienced a risk of losing information on WhatsApp. There were instances where the sender deleted a message or file before the receiver had a chance to read it. This posed a challenge, as important instructions or study materials could be unintentionally lost. It would have been helpful if WhatsApp had a feature to prevent accidental deletion or provided a way to recover deleted messages, ensuring that crucial information was not lost during our online learning journey." (Students FGD, St Joseph's School).

Moreover, students reported instances where teachers ignored their messages on WhatsApp when they requested assistance or shared their work. This lack of response affected their learning experience and hindered their ability to receive

timely feedback (Student FGD St Josephs' Makerere School, November 2022).

"One challenge we faced with WhatsApp was the lack of cloud storage, making it difficult to store and retrieve downloaded content. It would have been much more convenient if WhatsApp had a cloud storage feature to easily manage our educational materials." (Student FGD St Joseph Gayaza, November 2022)

"We also encountered limitations in sending large files on WhatsApp, with a maximum limit of 16 MB for videos. This restriction hindered our ability to share and access multimedia content, impacting our learning experience." (Student FGD St Theresa Makerere School, November 2022)

In contrast to WhatsApp, Zoom was chosen as an online teaching strategy due to its advantages, as reported by respondents. Zoom provided a more interactive and classroom-like experience, allowing students to see and hear the teacher, as well as enabling the teacher to notice student engagement and address their queries. Students felt more confident participating and giving answers during Zoom classes, as their identities were partially concealed, and they could easily search for information without leaving the session (Teacher interview, November 2022; Student FGD, December 2022). *"Zoom provided a more interactive and classroom-like experience, allowing students to see and hear the teacher, as well as enabling the teacher to notice student engagement and address their queries."* (Student FGD St Joseph Makerere School, December 2022)

Furthermore, Zoom allowed teachers to record sessions, making it easier for students to review and access missed content. Teachers could also use screen sharing to demonstrate concepts, share videos, and conduct breakout room discussions. The breakout rooms facilitated collaborative tasks and knowledge sharing among students as noted by one teacher who mentioned that;

"Zoom offered valuable features that enhanced the online learning experience. The

ability to record sessions was particularly beneficial as it allowed students to review missed content at their own pace. Additionally, screen sharing capabilities enabled teachers to effectively demonstrate concepts, share videos, and conduct breakout room discussions. The breakout rooms fostered collaboration and knowledge sharing among students, promoting a dynamic and interactive learning environment." (Teacher interview, St Theresa, Makerere School, November 2022)

However, Zoom had some drawbacks according to the respondents. It was considered costly, both in terms of downloading the app and paying for data. Connectivity issues and limited time for free sessions were also mentioned as challenges. Some students faced difficulties accessing Zoom classes due to the lack of smartphones or laptops, while others struggled with language barriers and the technical skills required as noted by teacher:

"Despite its advantages, Zoom had some drawbacks, as highlighted by the respondents. The cost associated with downloading the app and paying for data was a concern for many. Connectivity issues and the limited time for free sessions were also mentioned as challenges. Additionally, some students faced difficulties accessing Zoom classes due to a lack of smartphones or laptops, while others encountered language barriers and struggled with the technical skills required to navigate the platform." (Teacher Interview St Joseph Gayaza School, December 2022)

It is important to note that Google Classroom was another online strategy used for remote learning. Respondents mentioned its usefulness for exams, and it was slightly cheaper than Zoom. Teachers could send exercises and exams through Google Classroom, facilitating assessment and evaluation as mentioned by one teacher;

"Google Classroom was another valuable online strategy we utilized for remote learning. It proved to be particularly useful for exams, and it was slightly cheaper than Zoom. Through Google Classroom, we were

able to easily send exercises and exams, which facilitated assessment and evaluation of our students' progress." (Teacher interview St Theresa Makerere School, December 2022)

Overall, while WhatsApp initially served as a convenient and cost-effective option for remote teaching, its limitations and challenges led to a transition to Zoom as a more sustainable and interactive online teaching platform. Google Classroom was also utilized for assessments and exams. The findings of the study provide valuable insights into the experiences and perspectives of teachers and students regarding the use of WhatsApp and Zoom as online learning strategies during the COVID-19 pandemic in Uganda. These findings align with existing literature on online learning and the challenges teachers and students face during the transition to remote education.

The study findings reveal that teachers initially relied on WhatsApp as an online teaching method, utilizing it for distributing question papers and receiving student answers. This aligns with previous research highlighting WhatsApp as an effective communication tool in the educational context (Alubthane & Al Youssef, 2021). WhatsApp was considered cost-effective and allowed students to access and submit work anytime, providing flexibility and convenience (Urien et al., 2019).

However, the study also identified several challenges associated with using WhatsApp. These challenges included limited storage capacity on phones, financial constraints preventing access to parents' phones, lack of cloud storage for downloaded content, limitations in sending large files, and the risk of losing information if deleted prematurely. These findings resonate with the literature, which emphasizes the need for robust infrastructure and familiarity with technology to ensure effective online learning (UNESCO, 2020c; OECD, 2019; World Bank, 2021).

In response to these challenges and the pandemic's prolonged nature, teachers transitioned to Zoom

as a more sustainable and interactive online teaching platform. The advantages of Zoom highlighted in the study, such as its ability to provide an interactive classroom-like experience, record sessions for content review, and facilitate collaborative tasks through breakout rooms, are supported by previous research (Moore-Beyioku, 2022).

However, the study also identified drawbacks associated with Zoom, including cost, connectivity issues, limited free session time, and difficulties accessing classes due to device and connectivity limitations, language barriers, and technical skills. These challenges align with the literature, which emphasizes the need for adequate training and resources to address the digital divide and ensure equitable access to online learning (OECD, 2019, 2020).

The study briefly mentions using Google Classroom for assessments and exams, highlighting its usefulness in facilitating assessment and evaluation. This aligns with previous studies that recognize Google Classroom as a suitable platform for interaction between teachers and students and the delivery of lectures (Mishra et al., 2020).

Overall, the study's findings provide empirical evidence that supports and extends existing literature on online learning strategies and their affordances and challenges. The study highlights the need for adequate infrastructure, training, and resources to ensure the successful implementation of online learning during times of crisis. The findings also emphasize the importance of considering students' specific needs and limitations, such as access to devices and reliable internet connectivity, language barriers, and technical skills.

Offline Strategies

Printed Learning Materials

Respondents emphasized the value of printed materials in facilitating home-based learning. A St. Thereza-Makerere Senior Secondary School teacher noted, *"The printed materials were a lifeline for students. They could refer to textbooks*

and workbooks at home, ensuring a sense of continuity in their studies." (Student FGD St Joseph Gayaza School, December 2022)

While printed materials were a lifeline, students struggled to seek immediate clarification. One teacher noted, *'The challenge was that students could not ask questions on the spot. It was a one-way communication.'* (Student FGD St Theresa School, December 2022)

Logistical issues in distribution were highlighted by a school administrator who said, *'Ensuring every student got the materials on time was a challenge. Some students in remote areas received them later than others.'* (Student FGD St Joseph Gayaza School, December 2022)

Radio Broadcasts

The radio broadcasts played a pivotal role in reaching students without internet access. A parent expressed, *"The radio programs were insightful. Even in our remote village, my child could tune in and learn. It was like having a virtual classroom on air."* (Student FGD St Joseph Gayaza School, December 2022)

Accessibility concerns were voiced by a parent who said, *'Despite the insightful radio programs, there were times when the signal was weak. In some areas, students struggled to tune in.'* A teacher shared concerns about interactivity, saying, *'Radio programs lack the back-and-forth of a classroom. Students could not ask questions or engage in discussions in real-time.'* (Student FGD St Theresa Makerere School, December 2022)

Television Programs

Television programs were highlighted for their role in delivering comprehensive educational content. A St. Joseph Gayaza School student mentioned, *"The TV programs covered a range of subjects. It felt like attending regular classes, helping me stay connected with the curriculum."* (Student FGD St Theresa Makerere School, December 2022)

Access limitations were highlighted by a student who expressed, *'Not everyone had a TV. Some*

students missed out on the televised lessons because of this disparity." Power outages posed challenges, as noted by a teacher: 'In areas with unreliable electricity, students faced disruptions during the TV programs. Consistency was a concern.' (Student FGD St Joseph Makerere School, December 2022)

Mobile Phone-Based Learning

The use of mobile phones for learning was praised for its accessibility. A school administrator from St Joseph's Gayaza, shared, *"Mobile phones became a powerful tool in areas with no internet. Students received texts and voice messages, making learning materials reachable even in remote places."* (Teacher Interview St Joseph's Gayaza School).

A school administrator emphasised device disparity, saying, *'Mobile-based learning assumes every student has a smartphone. That is not the case for everyone.'* A student highlighted data challenges, saying, *'Downloading educational content was expensive. Some students could not afford the data needed for mobile learning.'* (School Administrator St Joseph, Gayaza,).

Peer-to-peer Learning

Peer-to-peer learning fostered collaboration. A student mentioned, *"We formed study groups. Even if not in person, we connected through messages. It was motivating to learn together and discuss topics with friends."* "Technological barriers were acknowledged by a student who stated, *'In areas with poor internet, forming virtual study groups through messaging apps was nearly impossible.'* Inequality in participation was voiced by a teacher from Joseph Gayaza School, who said, *'Some students felt overshadowed in virtual study groups. It was a challenge ensuring everyone had a voice.'* (Teacher Interview, St Joseph's Gayaza, December, 2022)

Self-study Materials

Self-study materials empowered students for independent learning. A teacher from St Theresa Makerere highlighted, *"The self-study materials were designed for autonomy. Students could learn*

at their own pace. It encouraged a sense of responsibility for their education." (Teacher Interview, St Theresa Makerere, December, 2022)

Lack of guidance was expressed by a student who shared, *'Without a teacher present, it was hard to know if I was understanding the concepts correctly. I missed the guidance.'* Motivational challenges were highlighted by a parent who said, *'Some students found it hard to stay disciplined without the regular structure of a classroom. Motivation was a struggle.'* (Students FGD, St Theresa, Makerere School. December, 2022).

The study found that printed learning material were used to ensure continuity of learning during the COVID 19 pandemic in Uganda. The findings regarding the use of printed learning materials during the pandemic align with earlier studies that have emphasized the value of having physical resources at home for home-based learning (Goh et al., 2023; Schuck, 2023). The continuity provided by textbooks and workbooks is crucial in ensuring that students can continue their studies even in the absence of in-person classes. However, as noted in previous research, the lack of immediate clarification and two-way communication is a limitation of printed materials (Yildiz, 2023; Wawire et al., 2023). This finding reinforces the importance of incorporating interactive elements into remote learning strategies to address this challenge.

Similarly, the use of radio broadcasts to reach students without internet access aligns with earlier studies that have highlighted the role of radio in providing educational content during emergencies (Kabeba Muriisa et al., 2023). The appreciation expressed by parents and students for the insightful educational content delivered through radio programs is consistent with the positive impact of radio-based learning reported in previous research (Ochieng, 2023). However, the accessibility concerns and lack of interactivity mentioned in the findings are consistent with the limitations of radio-based learning identified in earlier studies (Malenya, 2021).

The findings regarding television programs align with previous research that has emphasized the

comprehensive educational content delivered through televised lessons (Wawire et al., 2023). The challenges related to access limitations and power outages mentioned in the findings are consistent with the barriers to television-based learning identified in earlier studies (Klabbers et al., 2023). These findings highlight the need for alternative strategies to ensure equitable access to televised lessons and address the impact of power outages on consistency.

The use of mobile phone-based learning as a highly accessible strategy aligns with earlier studies that have emphasized the potential of mobile devices in reaching students in remote areas (Belete, 2020). The device disparities and data challenges mentioned in the findings are consistent with the limitations of mobile-based learning identified in previous research (Wawire et al., 2023). These findings underscore the importance of addressing device and connectivity issues to ensure the effectiveness of mobile learning strategies.

The findings regarding peer-to-peer learning align with earlier studies that have highlighted the benefits of collaboration and motivation in student learning (Namulondo et al., 2023). The technological barriers mentioned in the findings are consistent with the challenges of peer-to-peer learning identified in previous research, particularly in terms of access to devices and internet connectivity (Namulondo et al., 2023). These findings emphasize the need to address technological disparities to fully leverage the potential of peer-to-peer learning strategies.

Overall, these findings provide valuable insights into the strengths and limitations of various offline strategies used during the pandemic. They align with earlier studies and highlight the importance of addressing access, interactivity, and technological barriers to ensure equitable and effective remote learning experiences for all students.

CONCLUSION

Online Strategies

The findings of this study shed light on the experiences and perspectives of teachers and students regarding the use of WhatsApp, Zoom, and Google Classroom as online learning strategies during the COVID-19 pandemic in Uganda. The study aimed to explore the advantages and disadvantages of these platforms in facilitating continuity of learning amidst the challenging circumstances brought about by the pandemic.

The initial reliance on WhatsApp for communicating and sharing educational materials highlights its convenience and cost-effectiveness. WhatsApp offered easy access to study materials, real-time communication, and the ability to distribute question papers and receive answers through chat and audio messages. It also allowed students to access and submit work anytime and provided easy access to Zoom meeting links. These advantages made WhatsApp an attractive choice for remote teaching, especially in the early stages of the pandemic.

However, despite these advantages, WhatsApp presented several challenges. The limited storage capacity of phones led to the frequent deletion of work, resulting in a lack of reference materials for future revision. Some students faced difficulties accessing their parents' phones due to financial constraints at home. Also, WhatsApp lacked cloud storage, making storing and retrieving downloaded content difficult. It had limitations in sending large files, and there was a risk of losing information if the sender deleted it before the receiver had a chance to read it. Furthermore, instances were reported where teachers ignored students' messages on WhatsApp, affecting their learning experience and hindering timely feedback.

Many teachers transitioned to Zoom as a more interactive and classroom-like online teaching platform to address these challenges and ensure sustainable online learning. Zoom offered benefits such as a more engaging learning experience, allowing students to see and hear the teacher,

participate confidently, and easily search for information without leaving the session. It also enabled teachers to record sessions for later review, conduct breakout room discussions, and share videos and screen demonstrations. These features facilitated collaborative tasks, knowledge sharing, and improved student-teacher interaction.

However, Zoom also had its drawbacks. It was considered costly to download the app and pay for data. Connectivity issues and limited time for free sessions posed challenges. Some students faced difficulties accessing Zoom classes due to the lack of smartphones or laptops, language barriers, and technical skills required.

Google Classroom was another online strategy used for remote learning, particularly for assessments and exams. It provided a simple and appropriate way for teachers to interact with students, send exercises and exams, and facilitate assessment and evaluation. Google Classroom was slightly cheaper than Zoom and proved useful in specific areas of remote learning.

In summary, each of the technologies - WhatsApp, Zoom, and Google Classroom - exhibited their potential in ensuring continuity of learning during pandemics. WhatsApp served as a convenient and cost-effective option for communication and sharing materials. Zoom provided a more interactive, classroom-like experience, promoting student engagement and knowledge sharing. Google Classroom facilitated assessments and exams. The findings of this study suggest that a combination of these technologies could be employed to overcome the limitations and challenges faced during remote teaching.

However, it is important to address the challenges identified, such as limited storage capacity, connectivity issues, cost, and accessibility barriers. Providing adequate resources, training, and support for teachers and students is crucial for effectively implementing online learning strategies. Additionally, efforts should be made to improve internet connectivity and ensure equitable access to devices and technology, especially for disadvantaged students.

By leveraging the potential of these technologies and addressing the associated challenges, educational institutions and policymakers can enhance the continuity of learning during pandemics, ensuring that students have access to quality education regardless of physical restrictions.

Offline Strategies

The findings from the above discussions highlight the diverse range of offline strategies that were implemented during the COVID-19 pandemic to facilitate continued learning for students. Printed learning materials, radio broadcasts, television programs, mobile phone-based learning, and peer-to-peer learning all played significant roles in ensuring educational continuity.

Printed learning materials were widely distributed and served as a lifeline for students, allowing them to refer to textbooks and workbooks at home. However, limitations such as the lack of immediate clarification and logistical challenges in distribution were identified.

Radio broadcasts proved an effective medium for reaching students without internet access, providing insightful educational content even in remote areas. However, accessibility concerns and the absence of interactivity were noted as limitations. Television programs were praised for delivering comprehensive educational content and helping students stay connected with the curriculum. However, access limitations and power outages posed challenges to consistent participation.

Mobile phone-based learning emerged as a highly accessible option, particularly in areas without internet access. Students received learning materials through text and voice messages, but device disparities and data challenges were identified as barriers. Peer-to-peer learning fostered student collaboration and motivation, both in person and through messaging platforms. However, technological barriers may have limited its effectiveness for some students.

Overall, these findings underscore the importance of implementing a combination of offline

strategies to ensure educational continuity during crises. While each strategy had its strengths and limitations, their collective use allowed students to continue learning despite the challenging circumstances. Moving forward, it is crucial to address the identified limitations and further explore innovative offline strategies to enhance the effectiveness and inclusivity of remote learning initiatives.

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