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Modeling Remote Learning in Nigeria: Lessons from the Covid-19 Pandemic

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Abstract

Education globally is among the sectors with devastating impact from the Covid-19 pandemic. Before the pandemic, Nigeria accounted for approximately 20% of the global out-of-school population. Its education system heavily adopted the face-to-face approach to teaching and learning in schools. This learning method exacerbated the digital divide gap during the Covid-19 pandemic, as most students could not continue their education. This reality has informed UNESCO's (2021) social contract on education, urging attention to be directed to nations that global challenges threaten their rights to education. Therefore, this study aimed to address the problem of the out-of-school population from the foundation (elementary schools) by investigating the remote learning strategies used in primary schools globally. Two questions guided this study: What promising strategies are in the existing research literature on remote teaching and learning? What are the possibilities and limitations of those remote teaching and learning strategies for Nigeria? A systematic literature review was conducted through the documented reality of what has been happening in different nations since the Covid-19 pandemic with remote learning. Three themes emerged as necessary strategies to effectively implement remote learning in Nigerian elementary schools. They include (1) the utilization of a variety of technologies (2) the provision of support during remote learning (3) adaptations to traditional teaching methods. These findings speak to the need to add educators' voices in bridging the existing gap with remote learning and inform new policy developments targeted at elementary schools. Similarly, mobile learning intervention looks promising since Nigeria's recorded increase in smartphone use and internet penetration. Significantly, this paper will cause some deep reflections on the practise of remote learning at the elementary level and promote changes in the teaching pedagogy.

Keywords: *Remote Learning, Nigeria, Elementary, Education, Covid-19*

INTRODUCTION

Since the onset of the Covid-19 pandemic and the subsequent shift to remote learning, educational institutions worldwide have increasingly relied on online academic programs to accommodate students' preferences for remote education. Consequently, the discourse among researchers and education stakeholders has shifted from debating the necessity of educational technology in schools to exploring how these tools can be effectively utilized in modern learning systems (World Bank, 2021). UNESCO (2021) has underscored the importance of formulating policies and strategies to harness technology in schools, aiming to enhance students' creativity, communication skills, and bridge the digital gap among nations.

Despite global efforts to narrow the digital divide, Nigeria continues to face significant challenges in education. The Global Partnership for Education (2020) reports that Nigeria accounts for approximately 20% of the global out-of-school population, despite compulsory and free elementary education. It was a struggle before Covid-19 to ensure that young children stayed in school (UNICEF, n.d.) The closure of schools during the pandemic exacerbated this issue, as many Nigerian schools lacked online learning systems, hindering students' access to education

(Ebohon *et al.*, 2021). Budgetary constraints, corruption, and inadequate technological infrastructure further impede Nigeria's ability to transition to virtual learning (Adanikin et al., 2020; Owate & Akanwa, 2018).

Moreover, the heavy reliance on traditional face-to-face teaching methods and the absence of efficient Information and Communication Technologies (ICT) systems pose additional challenges to remote learning in Nigeria (Amorighoye, 2020). The sudden shift to remote teaching during the pandemic highlighted the importance of technology tools such as discussion boards, video conferencing, and virtual assessments. However, many schools faced difficulties due to unreliable internet connections and limited opportunities for student-teacher interaction (Adeoye et al., 2020; Azubuike et al., 2021; Ebohon et al., 2021). Egielewa et al.'s (2021) findings further indicated that 16.1% agreed that interaction was audio-based only while 10.2% argued that lecture materials were posted for students to study on their own. Additionally, 23% of lecturers and students representing a good proportion of surveyed participants agreed that online lectures during this period were mainly text-based rather than audiovisual, such that camera-based interaction between students and teachers was one out of every ten online lecture interactions. Thus, most online learning sessions were mere interactions with students at the lecturers' convenience on free learning tools such as Google Classroom, WhatsApp, and Zoom.

Understanding Remote Learning

Technology plays a crucial role in facilitating learning and interaction among students and teachers in remote learning environments (Singh & Thurman, 2019). As long as key elements like effective pedagogy, relevant assignments, and suitable technology are present, these terms can be used interchangeably (Carrillo & Flores, 2020). Therefore, it is essential to understand what constitutes effective remote learning. The evolution of remote learning from mail correspondence to the World Wide Web has seen a shift towards learner-centered education, enabled by advancements in technology (Chigeza & Halbert, 2014; Moore & Kearsley, 1996). At one time, learners were passive, and the primary motive for educators was to connect with those whose only opportunity to learn was through correspondence due to their occupational, social, and family commitments (Bozkurt, 2019). A move from this era ushered in the second generation of distance education with new mass media technologies that enabled content to be delivered to students anywhere using minimal equipment such as radio and television (Bozkurt, 2019; Casey, 2008). Interactions between teachers and their students occured via mail, telephone, or face-to-face contact (Aoki, 2012). The third generation of instruction was delivered via computers, and the prominence of teacher-centred education was replaced with learner-centred education (Bozkurt, 2019). Learning during this era was built around networked connections and based on the learners' ability to actively participate in networked communities of their choice (Aoki, 2012). With the invention of the World Wide Web (www) came the fourth generation of distance education with interactive multimedia. This generation, called the Flexible Learning Model, is based on two-way communication technologies that allow for direct interaction between the teacher (who is seen as the originator of the instruction) and the remote student and among remote students themselves (Taylor, 1995). Therefore, students became active participants in the learning process. Taylor (2001) then introduced his fifth generation of distance learning, the Intelligent Flexible Learning Model, claiming that it is based on intelligent technologies that can record dialogues and allow for reusability through automated response systems.

Scholars argue that terms like distance education, e-learning, online teaching, and remote teaching can be used interchangeably, all referring to using web-based technologies to connect teachers and students (Carrillo & Flores, 2020; Lee, 2017). However, Bates (2001) have

questioned the adequacy of merely placing lecture materials online and emphasized the importance of interactive and student-centered approaches. Achieving effective remote learning requires addressing critical issues such as equitable access, student-centered pedagogy, clear communication of expectations, and alignment with digital-age learning frameworks (International Society for Technology in Education, n.d.). Therefore, in this systematic review, remote learning encompasses all forms of distance, online, emergency remote learning, and e-learning during the COVID-19 pandemic that do not involve face-to-face instruction.

In light of these considerations, this study sought to explore:

a) What promising strategies for remote teaching and learning are in existing literature?
b) What are the applicability and limitations for learning in the Nigerian context?

By examining existing literature and evaluating various remote learning approaches, this research aims to provide insights that can inform policy and practice to enhance elementary school education in Nigeria and beyond.

Purpose of the Study

These challenges of remote learning are not unique to Nigeria but extend globally, with millions of students lacking access to essential technology tools for remote education (Richards et al., 2021). From the United States to rural Canada and Portugal, disparities in internet access and electronic device availability persist, hindering equitable access to education (Ferren, 2021; Human Rights Watch, 2021; Seabra et al., 2021).

Against the backdrop of these challenges, the 2030 Agenda for Sustainable Development emphasizes the importance of providing all students with the knowledge and competencies necessary for a sustainable future (UNESCO, 2021). Given that elementary education forms the foundation of academic progression, particularly in Nigeria, where it is compulsory and free (Federal Government of Nigeria, 2014), attention to this level of education is crucial. However, despite the increase in the enrollment of students in elementary schools, research that specifically targets how remote learning is done in primary schools remains limited. There is a near absence of research that examines explicitly remote learning for elementary school students despite their steadily increasing enrollment (Gill et al., 2015). Most studies include minimal or no PK-5 students in their samples (Wagner, 2021), and little descriptive research characterizes instructional practices currently used for PK-5 online learning (Basham et al., 2013). While studies have explored various aspects of remote learning in Nigeria, the focus has predominantly been on secondary and post-secondary institutions (Agbele & Oyelade, 2020; Azubuike et al., 2021; Ebohon et al., 2021; Kuliya & Usman, 2021; Nwagwu, 2019; Ogundile et al., 2019; Olanrewaju, 2021; Olayemi et al., 2021; Onojah et al., 2021). Therefore, this research aims to address this gap by examining remote learning specifically within the context of elementary schools.

METHODOLOGY

Research Design

This study employed a systematic literature review (SLR) methodology, which mines, examines, and reports on existing literature relevant to the research field and questions of interest (Kitchenham et al., 2009). The primary unit of analysis for the reviewed articles was how nations implemented remote learning during the COVID-19 pandemic for elementary school students.

A combination of qualitative and quantitative research literature was reviewed to gather empirical evidence on remote teaching styles worldwide, facilitating the integration of findings within a single systematic review to address overlapping or complementary review questions (Harden, 2010). Data were collected from scholarly articles, books, and electronic resources, with a preference for primary data grounded in facts. Considering literature from diverse contexts globally helped minimize selection bias, ensuring reliable findings from which conclusions were drawn.

Data Collection and Analysis

Data were collected through searches across various academic databases, including uOttawa library, Omni libraries, Google Scholar, ProQuest, and ResearchGate. The initial searches yielded over 45,000 resources, which were refined based on criteria such as availability online, publication date (2019-2022), language (English), focus on COVID-19, and relevance to remote learning for elementary education (see Fig. 1). This process narrowed down the results to 1245 sources. Additional citations were identified from the reference lists of selected studies. Initial scrutiny of the returned articles' abstracts was conducted to assess their relevance to the research question before further examination for in-depth analysis. Keywords used in the search included:
remote learning AND elementary schools
primary students AND remote learning
online course structure AND K-12 education
learning AND COVID-19 OR pandemic OR emergencies

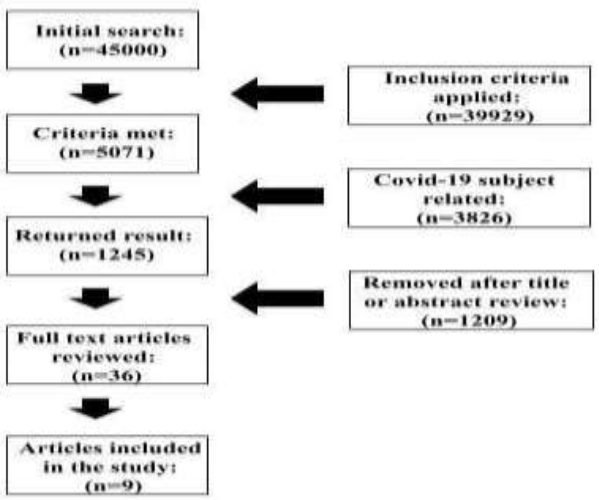

Figure 1. Data Collection Process

The inclusion criteria for articles stipulated that remote learning must have been the primary mode of instruction during the COVID-19 pandemic for elementary education. The structure and pedagogical approach to remote learning classes were also specified. Articles where face-to-face instruction was the predominant component supplemented by remote learning were excluded. The quality of evidence from selected articles was assessed based on factors such as interpretation of findings, impact factor, and peer-review status. Data extraction followed a modified PRISMA guideline, including details such as author, publication year, research objective, study population, data collection, and analysis methods (see Table 1). Extracted data

were synthesized with common themes identified in the literature review and presented in tabular form for analysis and discussion. Overall, the systematic review aimed to provide insights into effective strategies and challenges of remote teaching for elementary education, with a focus on applicability in the Nigerian context.

Table 1. Research Findings

Paper & Author	Research Type	Research Goal	Population & Place	Data Collection	Data Analysis
Ames et al. (2020)	Qualitative study	To discuss strategies teachers used to support distance student engagement and learning, and constraints.	Teachers in Australia	Focus group sessions	Categorical analysis approach
Basilaia & Kvavadze (2020)	Case study	To analyze the capacities of the country and its population to continue the education process at the schools in the online form of distance learning	Private elementary school in Georgia	Online form/ questionnaire	Descriptive analysis
Herwin et al. (2021)	Phenomenology qualitative approach	To analyze the learning organizing strategies of elementary school teachers during the Covid-19 pandemic	Indonesia	Interview, questionnaires and documentation.	Data condensation, data presentation and verification.
Iivari et al. (2020)	Exploratory empirical research	To explore how the Covid-19 pandemic forced schools and education to engage in digital transformation.	Teachers and personnel in educational admin. in India & Finland	Interview	Descriptive analysis
Kong (2020)	Report	N/A	China	N/A	N/A
Loukomies & Juuti (2021)	Descriptive qualitative study	The positive and negative students' experiences during the remote learning period	Elementary school students in Finland	Instant video blog (IVB)	Thematic analysis

Pozas et al. (2021)	Cross-national study	Exploring educational experiences in terms of difficulties, constraints, chances and opportunities of homeschooling during the COVID-19 crisis in two countries: Mexico and Germany.	Elementary school parents and students in Mexico and Germany	Online interview	Qualitative content analysis (QCA)
Paper & Author	**Research Type**	**Research Goal**	**Population & Place**	**Data Collection**	**Data Analysis**
Swain (2021)	Mixed methods study	To assess the pros and cons of e-learning for primary students of Odisha; To establish whether e-learning is a boon or bane for primary student	Elementary school students, parents, and teachers in India	Telephone interview	Descriptive statistics, ANOVA and Multiple Regression
Zhang et al. (2020)	Qualitative literature review	To discuss the gains and losses in implementing the "Suspending Classes Without Stopping Learning" program.	China	N/A	N/A

Data Analysis Methods

Thematic analysis was chosen as the most suitable method for this research due to the diverse nature of the articles included in the review, ranging from exploratory empirical research to qualitative studies and literature reviews. Thematic analysis systematically identifies, organizes, and provides insights into patterns of meaning (themes) across a dataset, allowing for the identification of commonalities in the selected articles (Braun & Clarke, 2012). The selection of research studies was unbiased, ensuring an objective approach to data analysis. Findings were presented using a discursive narrative approach, as defined by Genette (1972), which involves recounting a series of events over time.

FINDINGS

Based on the reviewed literature, three key strategies emerged as instrumental to the success of remote learning in various nations. These themes, detailed in Table 2 below and Appendix 1, include the utilization of a variety of technologies, adaptations to traditional teaching methods, and the provision of support to schools and students during the remote learning period.

Table 2. Key strategies to successful remote learning

Theme 1: Variety of online technology used	**Theme 2: Adaptations of online teaching methods**	**Theme 3: Support for remote learning**
Authors: Herwin et al. (2021); Ames et al. (2020); Iivari et al. (2020); Kong (2020); Loukomies & Juuti (2021); Swain (2021)	**Authors:** Herwin et al. (2021); Kong (2020)	**Authors:** Ames et al. (2020); Basilaia & Kvavadze (2020); Pozas et al. (2021); Zhang et al. (2020)
Theme 1: Variety of online technology used	**Theme 2: Adaptations of online teaching methods**	**Theme 3: Support for remote learning**
Email Video recording Apps Chat Phone call Audio streaming Zoom Google Workspace Google Classroom Team Channels Social Media Cisco Webex Meetings	The introduction of an emergency and simplified curriculum. The use of differentiated learning for students. The reduction of daily subjects and teaching duration. More scheduled breaks in-between lessons. Classes could temporarily hold on Saturdays. Temporary suspension of official grading. Live transmission of lessons in indigenous languages on radios and televisions. A unified teaching platform. Easy accessibility to free digital materials. Physical resources were sent out to students.	Teacher-Teacher support Parental support Peer support Government IT companies National and local education administration departments Giant Education companies Ministry of Education Telecom operators China Education and Scientific Research, Computer Network and Satellite Communication

Theme 1: Utilization of a Variety of Technologies.

Every practical remote learning session requires suitable technology (Muñoz-Najar et al., 2021) and easy access to the technologies. These suitable technologies include the hardware and software tools that can be accessed by different learners, based on their peculiarity, and that will

produce engaged learners. Various hardware devices such as desktop computers, laptops, tablets, mobile phones, televisions and radios were identified in the reviewed articles. At the same time, the software included video conferencing tools (e.g., Zoom and Google Meetings) and chat apps (e.g., WhatsApp). However, these devices were tailored to the unique situation of the learners. It is also essential to use a variety of media to ensure that better chances of accessing learning materials are given to different classes of students due to the peculiarities of the students' location, family income and whether the students have good access to the Internet. For instance, Herwin et al. (2021) explained that teachers in Indonesia taught complex concepts synchronously on Zoom and Google Meeting. This method is essential as synchronous learning creates room for paralinguistic cues that teachers can only identify in live lessons, which are helpful when teaching young language learners because they may not understand every verbal instruction (Butler, 2018).

The reviewed documents also showed that teachers taught asynchronously using WhatsApp and emails to connect with rural and financially disadvantaged students. This connection comprises intermittently sending lesson plans with short tasks and activities to parents or caregivers every two weeks (Iivari et al., 2020). In India, teachers included deadlines to ensure that students followed weekly expectations, and questions and feedback were exchanged on the WhatsApp platforms (Swain, 2021). There were also weekly online sessions using WhatsApp video to check on the progress made, provide short interventions, and discuss any issues. Teachers also sent written and audio feedback to their students (Ames et al., 2020). For parents who did not have access to or did not use WhatsApp, teachers sent the 15-day lesson plan via SMS and had weekly phone calls.

Evidence shows that despite best efforts to implement remote learning during the Covid-19 pandemic, the primary challenge in Nigeria bordered around the technological devices and platforms that teachers and students needed for remote learning. These tools are grossly insufficient and almost non-existent in schools (Ogundile et al., 2019; Eze et al., 2018). Research also suggests that the gross lack of educational infrastructure is due to the lack of finance for the adoption and maintenance of remote learning platforms (Kuliya & Usman, 2021; Ebohon et al., 2021; Ogundile et al., 2019). Ogunode and Jegede (2021) further examined this claim of lack of finance in their evaluation of the factors responsible for inadequate infrastructural facilities in Nigerian public universities. They explained that "with confidence mean values of 2.32, 2.25, 2.18, 2.13, and 2.30, respondents agreed that inadequate funding, poor planning and projection, institutional corruption, increased student population, and lack of maintenance culture are factors responsible for insufficient infrastructural facilities in public universities in North Central Nigeria" (p. 46).

Therefore, providing easy access to technology for students and teachers should be the starting point for Nigerian schools. For elementary school students who do not yet have sophisticated skills and the information technology capabilities to navigate complex technologies (Kong, 2020), extra precautions need to be taken in how learning and learning materials are passed across. Thoughts must also be given to selecting user-friendly technology tools that can enrich the students' learning in valuable ways.

Theme 2: Adaptations to Traditional Teaching Methods.

The second theme extracted from the articles is the need to modify the lesson plans and teaching strategies to suit the remote learning environment. It is essential to understand that when it comes to remote learning, quality trumps quantity (Virginia, 2021). In Nigeria, teachers (46%) and students (56%) acknowledged that the essential knowledge and skills were not achieved in some courses taught virtually (Ebohon et al., 2021).

To tackle this problem, Herwin et al. (2021) explained that to help minimize student boredom in learning activities, teachers simplified the curriculum by only choosing the essential concepts their students must know. In addition, the teachers also simplified their lesson plans to capture only three vital areas: the learning objectives, the learning activities, and the assessments. In Georgia, teachers replicated the idea of restructuring the traditional teaching method to suit the remote learning environment. Basilaia & Kvavadze (2020) document that Georgian teachers reduced the duration of online lessons to 30 minutes for all grades to avoid students' prolonged contact with a computer. The number of lessons also decreased so that grades one and two students have a maximum of 3 lessons a day, while grades three to seven students have a maximum of 4 lessons. Furthermore, students were made to work more independently, and teachers who want to gain more ground and recover lost time fixed classes on Saturdays. Additionally, examination and home assignments were modified to the open book principle.

In China, teachers modified their learning to an interactive feedback mode. Kong (2020) described that the interactive feedback mode required that teachers send class resource packs (protocol-guided learning, micro-lectures resources, and practice testing questions) to students through teaching platforms. Students download their resource packs on the teaching platform for home study and practice. The teaching platform analyzes student data and feeds it back to the teachers. The teachers then use the shared screen function in Tencent meeting tools to organize students and carry out online teaching. Teachers taught based on the feedback results from the students' views and opinions of the class resource packs. Although Nigeria may not be at the place technologically to implement the sophisticated interactive feedback mode used in China, it is essential that Nigerian schools adopt these modifications to their remote teaching and assessment styles.

There is currently no consensus on how long students should spend learning remotely. However, instructional time should be developmentally appropriate as the attention spans for younger students are shorter (Noonoo, 2020). Along this line, the National Board of Professional Teaching Standards recommends that elementary students have only 1-2 hours a day of online instruction (Hudson, 2020). Australian teachers exemplified this strategy by focusing on students' engagement as a central priority over teaching the curriculum (Ewing & Cooper, 2021). However, with most Nigerian students reporting that they were bored, not fully satisfied during the periods they learned virtually (Ikwuka et al., 2021), and had numerous assignments that required to be completed within an allocated time (Ebohon et al., 2021), it is safe to infer that the remote learning system for elementary school students will also fail unless a reformation is done. Therefore, attention should additionally be moved away from assessments as a critical determinant in showing how much students are learning remotely. Teachers instead should integrate the different activities that a child engages in daily at home to determine how much learning they are getting. For instance, Hudson (2020) argues that students in elementary schools also learn through play and while interacting with their families. Consequently, the focus should not be on how many hours students spend learning but on how much learning they are getting. A promising approach might be to divide the content and standards that must be covered into manageable chunks. Unarguably, the same content will take each student a different amount of time to work through (Noonoo, 2020).

Theme 3: Provision of Support during Remote Learning.

The abrupt shift to remote learning during the pandemic led to stress for teachers, students, and parents due to low engagement and inadequate preparation (Khlaif et al., 2020). Insufficient resources hindered effective class preparation, assignment completion, and progress monitoring, potentially worsening student outcomes (Galusha, 1997). Nigerian students faced diverse

economic, cultural, and educational challenges, with many families unable to afford necessary technologies. Brom *et al.* (2020) explained that parental support for learning, a determinant to successful homeschooling was often lacking, exacerbated by challenges such as unstable internet in remote areas (Nashruddin *et al.,* 2020) and low-income levels (Eze et al., 2021; Human Rights Watch, 2020). Additionally, limited teacher training and inadequate access to infrastructure (Olaitan; 2020; Onojah et al., 2021) hindered the adoption of remote learning strategies in Nigeria, highlighting the need for professional development and technological support in schools.

External assistance, a key theme in effective remote learning, involves support from various sources such as the government, telecommunication companies, teacher colleagues, and parents. Strategies from China, as outlined by Zhang et al. (2020), emphasized partnerships between government, educational institutions, and internet companies to provide free and accessible resources. Government support includes providing access to essential technologies, formulating relevant policies, and offering training platforms for teachers. Such assistances will be beneficial to Nigerian teachers as students reported a lack of understanding of the teachers' teaching style and a low level of interaction during remote instructional delivery (Samuel et al., 2019). However, challenges persist in accessing technology and internet facilities, as highlighted by Onojah et al. (2021) and Olaitan (2020). Telecommunication companies also played a role in ensuring robust internet connections for schools, with support from large IT companies like Microsoft, Google, and Zoom (Molla, 2020). Examples, Microsoft offered its premium Teams version for six months and lifted existing user limits; and Zoom lifted the time limit of video calls in different countries by request.

Parental involvement is also crucial, with initiatives like regular contact between teachers and parents, negotiated teaching session times, and collaborative efforts to support students' learning (Ames et al., 2020; Iivari et al., 2020; Lau & Lee, 2020; Pozas et al., 2020; Swain et al., 2021). Such support fosters improved academic achievement, particularly for younger children learning from home. Remote teaching and learning offer stakeholders increased flexibility, convenience, communication, and a sense of community, while also allowing for customized learning experiences (Curtain, 2002). It reduces transportation costs and enables reallocation of classroom spaces for other purposes (Bates & Poole, 2003). Online interactions among students, teachers, and parents in large classes often surpass those in face-to-face settings (Watts, 2003). Better access to instructional materials improves learning outcomes (Scagnoli, 2009). In Nigeria, remote learning can mitigate disruptions caused by ongoing unrest, such as intercommunal violence and enforced sit-at-home orders identified by Human Rights Watch (2021) and Obianeri (2022).. Embracing remote learning ensures continuity of education during physical school closures, providing students with learning opportunities from their homes.

RECOMMENDATIONS

In the quest to fulfill UNESCO's educational mandate and bridge the growing digital gap in Nigerian elementary schools, this study delved into remote learning strategies employed by other nations during the pandemic. The insights contribute significantly to the existing literature on remote learning in Nigeria. The burgeoning demand for ICT integration and alternative learning approaches underscores the necessity for effective remote teaching methodologies. Therefore, adapting and refining remote learning strategies from global experiences holds promise in minimizing disruptions to the elementary school academic calendar and narrowing the digital divide. The lessons from these strategies concerning the macro and micro contextual, situated peculiarities of the public and private Nigerian education systems is drawn with respect to four

pivotal strategies as seen in Figure 2. These strategies form the objectives of this study that the Nigerian government and policy makers should address.

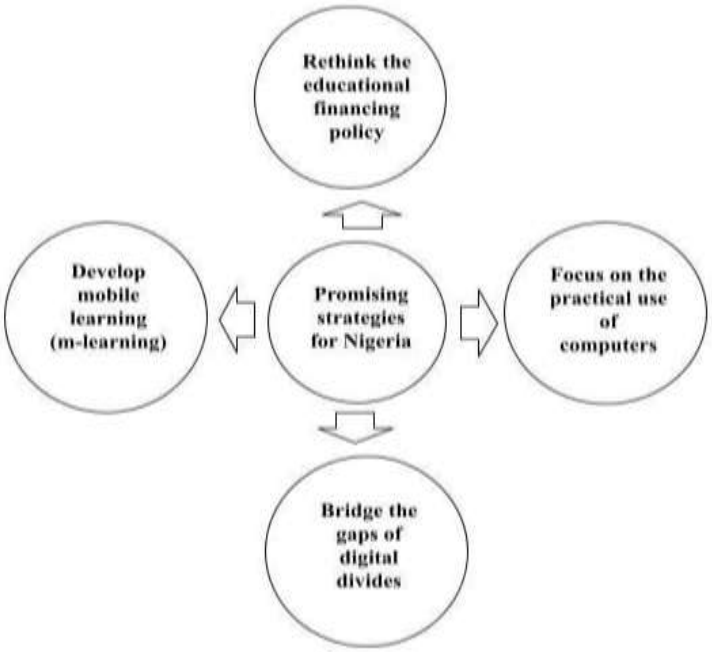

Figure 2. Four Pivotal Strategies for Nigeria

Rethinking Educational Financing Policy: The Nigerian government should reconsider the allocation, disbursement, and utilization of educational grants, particularly in light of the pressing need to enhance remote learning capabilities. Moreover, urgent reforms in education policies are essential to prioritize the practical use of computers and digital skills development, aligning with global shifts towards a knowledge-driven economy just like was done with China's educational financing policy reform in 2003 which targeted significant improvements in school infrastructure and the integration of distance education and information technology (Du & Sun, 2016).

Focus on Practical Computer Skills: There should be a curriculum reformation of existing topics and the rethinking of the importance of topics like identifying the parts and benefits of a computer, computer ethics, computers' historical development, and computer safety measures (NERDC, 2014). Topics should be more practical ones that teach students essential digital skills for learning remotely.

Bridging Digital Divides: Discrepancies in access to technology and infrastructure significantly impact students' learning experiences, as observed during the Covid-19 school closures. These discrepancies should be addressed with targeted interventions that provide equitable access to suitable technologies and infrastructure.

Embracing Mobile Learning (m-learning): Introducing mobile learning (m-learning) emerges as a viable solution to bridge digital divides and enhance educational access in Nigeria. With the

widespread availability of smartphones and increasing internet penetration (Correa et al., 2018; Kemp, 2021), m-learning presents an opportunity to reach diverse communities, including those in remote areas. Leveraging mobile devices for education promotes flexibility, personalized learning experiences, and collaboration, transcending traditional barriers to education (Alsswey & Al-Samarraie, 2019; Khan et al., 2015). Additionally, the affordability and simplicity of mobile technology make it accessible to students across social backgrounds, fostering inclusivity and equal opportunities for learning (Khan, 2018) and increases motivation to learn (Adedoja et al., 2013).

CONCLUSION

The findings of this study offer valuable guidance to school administrators on establishing and managing remote learning environments effectively. Nonetheless, the constrained timeframe for completing this research presents a notable limitation. Further exploration into the collaboration between the ICT sector and education sector to promote remote learning would enrich this discourse.

Nevertheless, it is evident that while challenges persist, particularly regarding infrastructure deficiencies in Nigerian schools, the issue of technology access for virtual elementary education is not insurmountable. However, it requires concerted efforts from all education stakeholders to find sustainable solutions. Cosmetic measures from the government have often fallen short of addressing long-term needs, highlighting the need for a more robust financing policy. The federal government, as a key player in pursuing SDG goals for quality and equitable elementary education, should develop reliable funding mechanisms for integrating remote learning into elementary schools. Similar to the Education Trust Funds (ETF) and State Universal Basic Education Boards (SUBEB) that have alleviated inadequate classroom infrastructure, collaboration with the private sector is essential. Wealthy individuals, multinational companies, and philanthropic organizations can provide or subsidize the cost of necessary educational technology tools.

Furthermore, the implementation of identified remote learning strategies must be grounded in educational technology management principles to significantly enhance the quality of remote teaching in Nigerian elementary schools. By prioritizing sustainable financing, fostering public-private partnerships, and leveraging educational technology management expertise, Nigeria can navigate the challenges of remote learning and ensure inclusive and effective elementary education for all.

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