

Retrospective investigation into Nigerian response to COVID-19 education crisis as compared to other developed countries

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ABSTRACT

The educational system has been severely impacted by the abrupt closure of schools in numerous nations during the COVID-19 pandemic in an effort to contain the virus. Nonetheless, there is insufficient information available about Nigeria's response to the education issue and the factors influencing it in comparison to other countries. In light of this, this study examines Nigeria's response to the COVID-19 educational crisis in comparison to other countries. The research method used was a systematic literature review. Only 40 of the 753 publications that were first found using internet databases like Web of Science, ERIC, Scopus, and Google Scholar satisfied the requirements for inclusion in the research. It was found that concerns with the availability, awareness, accessibility, and utilization of e-learning facilities posed serious obstacles for Nigeria and other developing nations trying to continue remote learning during the COVID-19 pandemic. The differences in the utilization of e-learning during the pandemic were made worse by the digital divide that exists between low- and high-income, rural and urban populations. In order for remote education to be effective, parents, students, and teachers must get system adaptation training. In light of global disruptions, this research offers fresh empirical insights into the critical elements impacting the use of ICTs for teaching and learning. It was recommended that the school sector receive increased funding in order to provide a technical support team, train parents and teachers, and purchase the required equipment.

Keywords: retrospective investigation, COVID-19, education crisis, Nigeria, comparative study, other nations

INTRODUCTION

The SARS-CoV-2 pandemic, which led to COVID-19, significantly affected education, alongside other sectors of society. The ensuing "COVID-19 education crisis" severely disrupted the educational system, impacting parents, teachers, students, and society as a whole. In an effort to curb the spread of the virus, schools were abruptly closed in various countries beginning in March 2020 (Bozkurt & Sharma, 2020; Ndibalema, 2022). This disruption affected millions of students across all educational levels, halting traditional classroom-based learning (Eli-Chukwu et al., 2023; Nannim et al., 2021). Many institutions quickly transitioned to online learning to maintain educational continuity. However, this shift presented challenges. Not all students had access to the necessary technology and internet, and teachers had to rapidly adapt to remote teaching methods (Carrillo & Flores, 2020; Mpungose, 2020; Nannim et al., 2021).

The pandemic exacerbated pre-existing educational disparities, bringing them into sharp focus. According to Laufer et al. (2021) and Liu (2021), students from underprivileged backgrounds often lacked access to computers, reliable internet, or quiet study spaces, making it difficult for them to succeed in the new learning environment. Teachers also faced challenges in shifting to online or hybrid models, often lacking the necessary resources and training (Singh et al., 2021; Woldegiorgis, 2022). Prolonged school closures and inadequate resources for both teachers and students raised concerns about a potential "learning loss" or "learning gap," with fears that these changes could have long-term consequences for students' academic performance and future employment readiness. Schools play a vital role in social and emotional development as well as academic learning. The absence of in-person interactions with peers and teachers hindered students' social and emotional growth (Chen & O'Donnell, 2023). Maintaining student engagement and delivering effective instruction in a digital environment proved challenging (Lukas & Yunus, 2021; Moustakas & Robrade, 2022). Additionally, parents and caregivers faced the stress of balancing work, childcare, and educational support, particularly those with limited resources (Lafferty et al., 2022). This could be responsible for the findings by Uğraş et al. (2023) who carried out a systematic review from 2020-2023 and found a significant increase in early childhood learning losses, and also an increase in inequality, while certain demographic groups experienced more learning loss than others during the COVID-19.

In response to these challenges, governments and educational institutions implemented various measures, such as providing technology and internet access to underserved students, offering teacher training programs, and updating curricula (Dewi & Wajdi, 2021; Faturoti, 2022; Hove & Dube, 2021). Despite these efforts, the transition to e-learning was far from seamless. The literature on this topic reveals inconsistencies in the availability and utilization of e-learning resources, even in developed countries (Elumalai et al., 2021; Maatuk et al., 2022). Moreover, there is limited information on how schools have adapted to the “new normal.” Therefore, this study examines Nigeria’s approach to the COVID-19 education crisis in comparison to other countries. Specifically, the study explored the: educational concerns with the availability, awareness, accessibility, and utilization of e-learning during the COVID-19 pandemic; and the influence of digital divide on low- and high-income, rural and urban populations.

The COVID-19 Educational Crisis

The outbreak of the COVID-19 pandemic in late 2019 led to an unprecedented global education crisis. While school closures were necessary to protect public health (Gostin & Wiley, 2020), they had long-term repercussions, deepening educational disparities and challenging traditional learning methods. In developed countries, studies indicated a relatively smooth transition to e-learning (Perera & Gamage, 2021; Puma, 2022; Quezada et al., 2020), although the digital divide persisted (ElSaheli-Elhage, 2021; Howard et al., 2021). In contrast, developing countries struggled with digital inequality despite efforts to support online learning (Egielewa et al., 2022; Eli-Chukwu et al., 2023; Maphalala et al., 2021), with disparities rooted in income, location, and gender (ElSaheli-Elhage, 2021).

Over 1.5 billion children experienced educational disruptions due to school closures (Bao et al., 2020), leading to significant learning losses. Many students faced difficulties with online learning due to limited access to technology and the Internet (Baticulon et al., 2021). Additionally, the shift to online learning negatively affected students’ mental health, increasing anxiety, depression, and loneliness (Dziedzic et al., 2021; Robb et al., 2020). Teachers also faced heightened stress as they adapted to new teaching methods while addressing students’ emotional needs (Mosleh et al., 2022). The crisis exacerbated existing educational disparities, particularly impacting underprivileged students, those in under-resourced schools, and students with disabilities (Morgan, 2020; Simba et al., 2020). However, it also catalyzed educational innovation, promoting the adoption of new technologies and teaching methods, and emphasizing the importance of flexibility and digital literacy.

In Nigeria, the pandemic’s effects reflected global trends, with school closures disrupting academic calendars and worsening inequalities in access to online learning (Adeoye et al., 2020; Pensiero et al., 2020). Many Nigerian students, particularly in rural areas, lacked the necessary devices and internet access for online learning, with low-income families and marginalized communities facing additional barriers (Adigun et al., 2021). Teacher training and preparedness for remote teaching were also inadequate (Azubuike et al., 2021; Olatunde-Aiyedun et al., 2021). The disruption of high-stakes exams further impacted students’ academic progress and mental health (Atueyi, 2020; Dziedzic et al., 2021; Robb et al., 2020). Nigerian schools faced challenges in transitioning to e-learning largely due to insufficient government preparation and inadequate investment in e-learning infrastructure (Adeoye et al., 2020; Ugochukwu-Ibe & Ibeke, 2021). Unlike developed countries, where strong education systems facilitated smoother transitions to online learning (Buchanan et al., 2022; Zheng et al., 2021), Nigeria’s lack of e-learning facilities and trained teachers hindered progress (Murphy et al., 2020; Puma, 2022). The experiences of other nations, such as the United States (USA), the United Kingdom (UK), various Asian countries, Russia, Ukraine, and South Africa, were examined to draw comparisons with Nigeria’s situation.

In USA, the quick shift to online learning was supported by the preparedness of teachers, students, and parents (ElSaheli-Elhage, 2021; Zheng et al., 2021). Similarly, England managed a rapid transition to remote learning, though significant learning losses in subjects like math and literacy were reported (Howard et al., 2021; Puma, 2022). The pandemic underscored the importance of digital resources and parental involvement in education (Lucas et al., 2020). Universities in Asia also quickly adapted to online teaching, though they encountered significant challenges. In Singapore, success was largely attributed to technical competency and robust IT infrastructure (Rudolph et al., 2023). In China, parents often resisted online learning for young children due to perceived inadequacies and hardships (Dong et al., 2020), while Chinese university students’ satisfaction with online learning was influenced by their digital skills and regional disparities (Jiang et al., 2021). In Russia, remote learning became standard practice, supported by strong infrastructure and digital literacy (Valeeva & Kalimullin, 2021). However, the digital divide persisted, particularly affecting children in low-income households (Kosaretsky et al., 2022). Ukraine’s transition to distance learning was hindered by technical issues and a lack of preparedness, with both teachers and students struggling to adapt (Bakhov et al., 2021). South African universities faced significant challenges in online learning, including a lack of guiding policies and digital training (Mpungose, 2020). The digital divide, limited pedagogical approaches, and inadequate living conditions for students further complicated the situation (Maphalala et al., 2021). The global education response to COVID-19 was varied, with developed countries generally better equipped for a swift transition to online learning, while developing countries faced more significant challenges due to pre-existing inequalities and insufficient infrastructure.

Prior to COVID-19, ICT facilities were primarily concentrated in developed countries (Nebel, 2018) and were rare in developing regions (Bhuasiri et al., 2012; Msomi & Bansilal, 2018). Utilization of ICT also varied across regions, genders, and economic statuses (Cruz-Jesus et al., 2016; Yoo et al., 2015). For instance, in South Africa, digital divides based on gender and economic status were well-documented (Giannakouloupoulos & Limniati, 2018; Seifert, 2017), with low e-learning availability in rural areas and higher usage in universities (Irene & Zuva, 2018). Also, before the pandemic, e-learning resources such as computers, tablets, smartboards, and internet connectivity were limited, especially in rural primary and secondary schools (Adelabu & Adu, 2015; Msomi & Bansilal, 2018). Universities, however, were better equipped (Irene & Zuva, 2018). During the pandemic, universities primarily relied on platforms like Blackboard, Google Classroom, Moodle, Microsoft Teams, and Zoom (Maphosa, 2021; Mpungose, 2020, 2021). Despite this, a digital divide persisted between rural and urban schools (Krönke, 2020; Maphosa, 2021), with rural schools facing inadequate e-learning resources and poor internet connectivity (Aruleba & Jere, 2022; Lembani et al., 2020). Some

tertiary institutions also lacked the infrastructure necessary for continuous academic activities, leading to suspensions (Maphalala & Adigun, 2021; Mpungose, 2020). Additionally, teachers were generally unprepared for the integration of new technologies (Msomi & Bansilal, 2018). Despite government efforts to provide more e-learning resources, internet facilities, and to broadcast educational content via television and radio (Jere, 2020), challenges persisted in ensuring effective e-learning during the pandemic.

Critical Variables for a Successful E-Learning Program

The sudden outbreak of the COVID-19 pandemic led to a significant shift in education, presenting both challenges and opportunities. Countries worldwide were compelled to close schools and cancel traditional classes, transitioning to online learning to mitigate the spread of the virus. Several factors influenced the extent of e-learning adoption during the pandemic, including availability, accessibility, awareness, literacy, competency, and technical and social support. The availability of e-learning resources encompasses the readiness and presence of digital tools and platforms essential for online learning (Saekow & Samson, 2011). This includes digital content such as online courses, video lectures, e-books, interactive simulations, and quizzes (Kör et al., 2014), as well as learning management systems (LMS) like Moodle, Blackboard, and Google Classroom (Al-Hunaiyyan et al., 2020; Badaru & Adu, 2022). Additionally, it involves internet access, hardware such as computers and tablets, and open educational resources (Boychev & Boycheva, 2019).

Nigeria and critical e-learning variables

The COVID-19 pandemic resulted in prolonged school closures in Nigeria (Samuel, 2020), necessitating efforts to sustain education through online and remote learning (Chukwuemerie & Ugwu, 2021). Both the government and non-governmental organizations (NGOs) undertook initiatives to ensure effective instructional delivery, including the provision of e-learning facilities and training for teachers and students (Adeoye et al., 2020; Ekpo-Eloma et al., 2023; Osode & Lautenbach, 2021). Prior to the pandemic, e-learning resources in Nigeria were limited across all educational levels (Anene et al., 2014; Eze et al., 2018). Available resources included computers, projectors, and internet connectivity, though LMS such as Moodle and video conferencing tools were underutilized (Kpolovie & Lale, 2017; Yakubu & Dasuki, 2019).

During the pandemic, various factors, including infrastructure, government policies, and socioeconomic disparities, affected the availability and utilization of e-learning (Eze et al., 2020; Olanrewaju et al., 2021). Educational institutions adopted online tools like Google Classroom, Moodle, Microsoft Teams, and Zoom (Adeyeye et al., 2022; Nannim et al., 2023). The government also promoted e-learning by providing guidelines for transitioning to online education (Oyediran et al., 2020; Samuel, 2021). Additionally, state governments developed e-learning platforms, and educational content was broadcast on television and radio to reach students without internet access (Ephraim, 2020).

Despite these efforts, the digital divide remained pronounced, particularly in rural areas where schools lacked essential resources and infrastructure (Azubuike et al., 2021; Eze et al., 2021). Urban and private schools were generally better equipped to transition to online learning. Training programs were implemented to help teachers effectively use e-learning platforms, though the improvement in teachers' e-learning adoption was limited (Lawal et al., 2020; Ogunji et al., 2022). Parents also faced challenges with home-based teaching, often lacking the necessary e-learning facilities and expertise (Akinwumi & Itobore, 2020; Onyema et al., 2020). Common issues included unstable electricity, poor internet connectivity, high data costs, and a lack of digital devices (Adeoye et al., 2020; Olanrewaju et al., 2021; Ugochukwu-Ibe & Ibeke, 2021). Moreover, awareness and technical support for e-learning were inadequate (Bada & Jita, 2021; Nwagwu, 2020).

Theoretical Framework

The digital divide theory and the technology acceptance model (TAM) serve as the framework for this study. In 1986, Fred Davis proposed the TAM model. According to this theory, people's decisions to accept and use technology are mostly influenced by how useful and easy they believe it to be. Perceived usefulness is the extent to which an individual believes that a specific technology will improve his performance at work, whereas perceived ease of use is the extent to which an individual believes that a specific technology would be easy to use and require little effort. According to the TAM theory, these two elements have an impact on a user's attitude towards technology, which in turn has an impact on their intention to use it and how they actually use it. Therefore, people are more likely to adopt a technology if they believe it to be useful and easy to use. This theory is pertinent to the current study because it examines how different populations in urban and rural areas, as well as different countries with varying income levels, viewed e-learning during COVID-19 and how this perception affected their awareness of and perception of the technology's usefulness, adoption, and utilization.

The digital divide theory additionally stresses the disparities in digital literacy, accessibility, and ability to use technology for learning that are caused by economic issues. Researchers and policy analysts such as Pippa Norris (2001) and Mark Warschauer (2003), who looked at the split's effects on education and social inclusion and its political implications, popularised the term "digital divide" in the mid-1990s. This theory focuses on the differences between various demographic groups' access to and use of information and communication technology. It highlights multiple levels of inequality, including the inequalities in access, use, quality of access, and empowerment. This theory is relevant to the current study because it is crucial to comprehending educational challenges surrounding the accessibility, availability, and use of e-learning during the COVID-19 epidemic. For instance, during the pandemic, who should engage in online learning may depend on the access divide.

METHODOLOGY

Design

This study adopted a systematic literature review (SLR) approach to retrospectively investigate the Nigeria's COVID-19 educational crisis as compared with other nations. The SLR is a methodical approach to gathering, analyzing, integrating, and presenting data from various studies on a certain research subject or topic (Pati & Lorusso, 2018). It offers a method for evaluating the quantity and quality of available evidence on an issue or topic of interest. Compared to a conventional literature study, it provides a deeper and more precise degree of understanding.

Search Strategy

Bibliographic databases such as Web of Science, Scopus, ERIC, and Google Scholar were used to search for literature on COVID-19 educational crisis in USA, UK, Asia (China and Singapore), Russia and Ukraine, South Africa and Nigeria.

Eligibility Criteria

The inclusion criteria for this study include COVID-19 and e-learning and USA, Asia, MENA, UK, South Africa, Russia/Ukraine and Nigeria. Challenges of e-learning in the identified countries during COVID-19. Also, the articles must be written in English, and from Scopus, ERIC, and Google Scholar databases.

Study Selection

Search strings used were: "COVID-19 AND Education Crisis OR Educational Crisis." Was used for a search within the title, abstract, and keywords of the manuscripts. This was then followed by a search "COVID-19 AND Education Crisis OR Educational Crisis AND ('the selected countries') one after another. A total of 753 manuscripts were retrieved, these articles were screened using our inclusion and exclusion criteria, and 40 papers were found eligible (Figure 1).

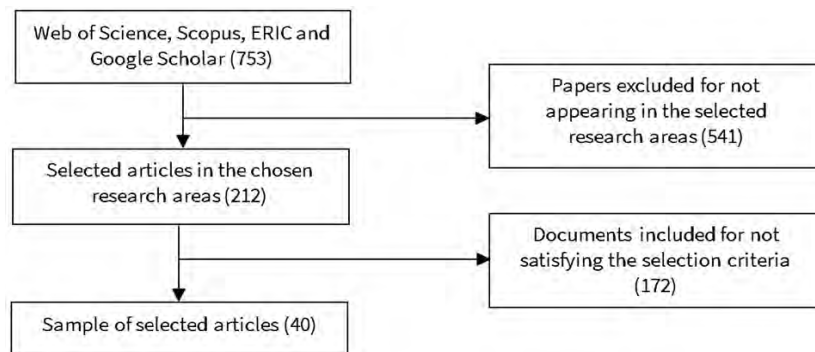


Figure 1. Inclusion and exclusion criteria flowchart (Source: Authors' own elaboration)

Article Coding

The following coding procedure was used to extract the data from the articles:

- (1) author(s) and year of publication,
- (2) research title,
- (3) area/country under study,
- (4) research core ideas, and
- (5) critical variable (see Table 1).

The qualitative data analysis software ATLAS.ti was used in analyzing and making sense of the text, through thematic analysis.

Table 1. Summary of reviewed literature

Reference	Title	Country	Key findings	Critical variable
ElSaheli-Elhage (2021)	Access to students and parents and levels of preparedness of educators during the COVID-19 emergency transition to e-learning	USA	<ul style="list-style-type: none"> • The study revealed low levels of preparedness in relation to teaching remotely in general, teaching students with disabilities in particular, and using technology tools. • The study also revealed challenges of educators reaching students and parents. 	Accessibility, students, parents, teachers, and preparedness
Murphy et al. (2020)	College student transition to synchronous virtual classes during the COVID-19 pandemic in Northeastern United States	USA	<ul style="list-style-type: none"> • Students indicated that their professors utilized the LMS effectively with virtual coursework • that their professors adapted and communicated changes in course content during the transition, • indicating their preferences that professors communicate changes in course syllabi or schedules in a timely manner, • that both course syllabi and grades be available on the LMS. 	Utilization, availability, competency, anxiety, and nervousness

Table 1 (Continued). Summary of reviewed literature

Reference	Title	Country	Key findings	Critical variable
Zheng et al. (2021)	Online learning during COVID-19 produced equivalent or better student course performance as compared with pre-pandemic: Empirical evidence from a school-wide comparative study	USA	<ul style="list-style-type: none"> Students expressed negative emotions like uncertainty, anxiety, and nervousness when transitioning to virtual classes. Most online courses were well accepted by the students, and 80% of them wanted to continue with some online instruction post-pandemic. Students' perceived engagement with faculty and classmates predicted their perceived effectiveness of the online course. In 16 out of the 17 courses compared, the online cohort during the summer quarter of 2020 was equally or more likely to get an A course grade than the analogous face-to-face cohort during the summer quarter of 2019. 	Acceptability and competency
Anderson (2020)	COVID-19 outbreak highlights critical gaps in school emergency preparedness	USA	<ul style="list-style-type: none"> School closures caught students, their teachers, and families by surprise. Missing class altogether. Difficulties with online connections, as well as motivational and psychosocial well-being challenges. A critical gap in school-based contingency planning within broader education sector preparedness planning and emergency management. 	Students, teachers, parents, internet connection, motivation, and psychological well-being
Garcia and Weiss (2020)	COVID-19 and student performance, equity, and U.S. education policy: Lesson from pre-pandemic research to inform relief, recovery and rebuilding	USA	<ul style="list-style-type: none"> Millions of pupils have experienced disruptions to their learning and development. Well-established opportunity disparities that harm children with limited resources compared to their more advantaged peers have been made worse by the pandemic. Uneven access to the equipment and internet necessary for online learning is one of the biggest opportunity gaps. The epidemic has made standardised tests' shortcomings worse since they only reward a limited set of abilities and benefit wealthier students who can afford specialised training. 	Students, disparities, digital divide, and accessibility
Puma (2022)	How universities have responded to e-learning as a result of COVID-19 challenges	UK	<ul style="list-style-type: none"> Technology advancements have grown exponentially because of COVID-19 in the classroom, and this progress has coincided with the process of teaching and learning. Virtual classrooms necessitated an e-learning process since it was the most user-friendly teaching method. Students may use communication technologies and the Internet to improve their teaching and to learn via self-learning. 	Teaching and learning and self-learning
Howard et al. (2021)	Learning during the pandemic: Review of research from England	UK	<ul style="list-style-type: none"> The pandemic has been a challenging period for teachers, schools and colleges, students and parents as they took on additional responsibilities that went above and beyond their usual roles and duties. The quality and quantity of learning students undertook declined as a result of the pandemic. students have some learning losses, while some have severe learning losses and some experienced learning gains. 	Teacher, students, parents, learning losses, and learning gains
Newton et al. (2021)	Learning during the pandemic: A collection of 5 reports from Ofqual studying aspects of learning during the coronavirus (COVID-19) pandemic in 2020 and 2021	UK	<ul style="list-style-type: none"> Practical skills were also identified as being behind. Experiences of teaching and learning during the pandemic were diverse, but disadvantage and deprivation appear to be most associated with effective and overall learning losses. 	Practical skills, experiences, and learning losses
Mishra et al. (2021)	Comparing the responses of the UK, Sweden and Denmark to COVID-19 using counterfactual modelling	UK	<ul style="list-style-type: none"> Several aspects of teaching and learning acted as barriers to learning in England or were protective against the negative impact of the pandemic. They are categorised into three factors thus: school and college provision; home learning provision and students' intrinsic factors. 	Teaching, learning, barriers, school, home, and students
Buchanan et al. (2022)	Schools closed during the pandemic: revelations about the well-being of 'lower-attaining' primary-school children	UK	<ul style="list-style-type: none"> Schools and colleges closure to curb the spread of COVID-19 ensured a rapid transition to remote/online learning. Overall, students in primary and secondary schools were spending much less time learning than they would have done pre-pandemic. 	Primary schools, secondary schools, and colleges
Cattan et al. (2020)	Inequalities in responses to school closures over the course of the first COVID-19 lockdown	UK	<ul style="list-style-type: none"> Children locked down at home in the UK spent an average of only 2.5 hours each day doing schoolwork. This figure is about half that suggested by a previous survey, suggesting that learning losses are much greater than feared. Most homework consisted of assignments, worksheets and watching videos. On average children were given two such pieces of homework a day. 	Students, learning losses, and availability

Table 1 (Continued). Summary of reviewed literature

Reference	Title	Country	Key findings	Critical variable
Green (2020)	Schoolwork in lockdown: New evidence on the epidemic of educational poverty	UK	<ul style="list-style-type: none"> The extent of online lessons provision in state schools was minimal: 71 percent of state school children received no or less than one daily online lessons. Children locked down at home in the UK spent an average of only 2.5 hours each day doing schoolwork. Most homework consisted of assignments, worksheets and watching videos. On average children were given two such pieces of homework a day. The extent of online lessons provision in state schools was minimal: 71 percent of state school children received no or less than one daily online lessons. 	Availability and utilization
Williams et al. (2020)	Coronavirus and homeschooling in Great Britain	UK	<ul style="list-style-type: none"> 87% of parents said a child in their household had been homeschooled because of the coronavirus (COVID-19) pandemic. Over half (52%) of parents with school-aged children said a child in their household was struggling to continue their education while at home, with just over three in four of these parents (77%) giving lack of motivation as one of the reasons. Under 1 in 10 (9%) parents with a child who was struggling gave a lack of devices as a reason for struggling. 43% of homeschooling parents agreed that it was negatively affecting the well-being of their children. 	Parents, students homeschooling, utilization, and competency
Chinna et al. (2021)	Psychological impact of COVID-19 and lock down measures: An online cross-sectional multicounty study on Asian university students	Asia	<ul style="list-style-type: none"> There was a sudden switch to online learning in Asian universities to curb the spread of COVID-19, which left many students helpless. More than 20% of the students from China and Bangladesh reported severe to extreme level of anxiety compared to below 10% of the students from Indonesia, Malaysia and India. Among the female students, 15.9% experienced severe to extreme level of anxiety compared to 10.6% among the males. Females from Bangladesh, China, Malaysia, Pakistan and Saudi Arabia experienced significantly higher levels of anxiety compared to their male counterparts. Acceptance was the most used and Seeking Social Support was the least used coping strategy among the students. 	Anxiety, psychological impact, acceptability, and support
Rudolph et al. (2023)	Perceived quality of online learning during COVID-19 in higher education in Singapore: perspectives from students, lecturers, and academic leaders	Singapore	<ul style="list-style-type: none"> The critical success factors for online course resources in Singapore are human factors, instructors and students' technical competency, instructors and students' mindset about online learning, level of collaboration, and IT infrastructure. IT managers had to ensure students' safety while continuing learning and engagement. Opportunities as a result of the pandemic include increased knowledge about, and more practice in, e-learning and EdTech functionality. 	Human factors, teachers factor, students' technical competency, and technical support
Dong et al. (2020)	Young children's online learning during COVID-19 pandemic: Chinese parents' beliefs and attitudes	China	<ul style="list-style-type: none"> Online learning replaced the traditional face-to-face learning. Most parents (92.7%) in the study reported that their children had online learning experiences during the pandemic. 	Students and parents
Yan et al. (2021)	Students' experience of online learning during the COVID-19 pandemic: A province-wide survey study	China	<ul style="list-style-type: none"> Students' online learning experiences are significantly different across school years. Identify the different needs of students in primary, middle, and high school. Identify the challenges of delivering online learning to students of different ages. 	Students, primary school, middle school, high school challenges, and utilization
Jiang et al. (2021)	Online learning satisfaction in higher education during the COVID-19 pandemic: A regional comparison between Eastern and Western Chinese universities.	China	<ul style="list-style-type: none"> Chinese university students' satisfaction with online learning platforms is directly and indirectly impacted by their computer self-efficacy and the perceived ease of use and usefulness of the platforms. Regional differences moderate the associations among these components. 	Satisfaction, self-efficacy, utilization, and disparities
Tauhidah et al. (2021)	Utilization of e-learning platforms by lecturers during the COVID-19 pandemic in Indonesia	Indonesia	<ul style="list-style-type: none"> WhatsApp, Google Classroom, and Zoom remain the most used e-learning platforms in Indonesian universities due to their accessibility and affordability. Limited network and quota as well as controlling aspects. 	Accessibility and affordability

Table 1 (Continued). Summary of reviewed literature

Reference	Title	Country	Key findings	Critical variable
Valeeva and Kalimullin (2021)	Adapting or changing: The COVID-19 pandemic and teacher education in Russia	Russia	<ul style="list-style-type: none"> Russian schools were only partially closed for a few months as a result of the COVID-19 pandemic, which disrupted the education system. Universities, technical colleges, and schools switched to online instruction. 	Availability and utilization
Novikov (2020)	Impact of COVID-19 emergency transition to on-line learning onto the international students' perceptions of educational process at Russian university	Russia	<ul style="list-style-type: none"> The speed of adaptation to online learning in Russia was found to depend on various psychological and technical factors as well as the students' learning abilities. The potential ways of improving online learning for students and teachers is by implementing such features as risk management plans, and knowledge bases, focusing on making the content user-friendly. 	Psychological factors, technical factors, and students' learning abilities
Kosaretsky et al. (2022)	General education in Russia during COVID-19: Readiness, policy response, and lessons learned.	Russia	<ul style="list-style-type: none"> Raised awareness of the issue of the digital divide and, more broadly, educational poverty. The most impacted children were those from low-income and multi-child homes. 	Awareness and digital divide
Prokopenko and Berezhna (2020)	Higher education institutions in Ukraine during the coronavirus, or COVID-19, outbreak: new challenges vs new opportunities	Ukraine	<ul style="list-style-type: none"> E-learning was provided in Ukrainian universities during the pandemic through offline and online courses via web servers, platforms, resources, and social media: Moodle, Zoom, Skype, Viber, Telegram, Messenger, Google-class etcetera,etc. 	Availability and utilization
Bakhov et al. (2021).	Emergency distance education in the conditions of COVID-19 pandemic: Experience of Ukrainian universities	Ukraine	<ul style="list-style-type: none"> The level of readiness for online learning during the pandemic varied across Ukraine. The technical issues experienced include lack of an internet connection, computers, or educational resources on the network, but more importantly, teachers were not prepared to conduct distance learning. 	Readiness, technical support availability, and preparedness
Mpungose (2021)	Lecturers' reflections on use of Zoom video conferencing technology for e-learning at a South African university in the context of coronavirus	South Africa	<ul style="list-style-type: none"> Zoom was found to be a useful platform for enhancing effective and synchronous e-learning. Promote autonomy is a challenge, and Enhance emotional connectedness is another challenge. 	Psychological factors and utilization
Mpungose (2020)	Emergent transition from face-to-face to online learning in a South African University in the context of the coronavirus pandemic	South Africa	<ul style="list-style-type: none"> It was found digital divide is a hindrance to students realising the full potential of e-learning, yet lecturers still want students to submit assessment tasks and engage with course activities on the Moodle LMS. 	Digital divide
Maphalala et al. (2021)	Student teachers' experiences of the emergency transition to online learning during the COVID-19 lockdown at a South African university	South Africa	<ul style="list-style-type: none"> The study found that universities had to deal with the challenge of digital divide Constrained pedagogical approaches Inadequate proficiency in the use of the LMS The fact that the quality and integrity of the assessment were somewhat compromised. Students' unfavourable living conditions which make learning from home difficult. 	Digital divide, pedagogical approaches, and competency
Ndibalema (2022)	Constraints of transition to online distance learning in higher education institutions during COVID-19 in developing countries	Developing countries	<ul style="list-style-type: none"> Digital inequalities, Lack of reliable internet access, Low readiness and technological competence among instructors and students, Limited availability of digital solutions. Most students faced social emotional challenges due to rapid and blind transition to online distance learning. Lack of digital culture even before the outbreak of COVID-19 pandemic. 	Digital inequalities, technical competency, availability, and internet connectivity
Perera and Gamage (2021)	Learning remotely during a pandemic: Are students in a developing country fully equipped with tools for swift changes?	Developing countries	<ul style="list-style-type: none"> The result stressed the importance of smartphones in the online learning experience, considering their affordability, relatively long battery life, inbuilt internet capabilities, and portability. 	Availability and affordability
Ugochukwu-Ibe and Ibeke (2021)	E-learning and COVID-19: The Nigerian experience: challenges of teaching technical courses in tertiary institutions	Nigeria	<ul style="list-style-type: none"> Lack of the requirements needed for remote education during the worldwide lockdown caused by the COVID-19 pandemic has impeded teaching and learning 	Availability

Table 1 (Continued). Summary of reviewed literature

Reference	Title	Country	Key findings	Critical variable
Ogunji et al. (2022)	Higher education and the new normal: Implications for sustainable post COVID-19 era in Nigerian tertiary institutions	Nigeria	<ul style="list-style-type: none"> Private universities adopt e-learning platform for use before and during the COVID-19 lockdown. Majority of tertiary institutions did not adopt any e-learning platform for use before and during the COVID-19 lockdown Lack of basic resources, logistics, and inadequate capacity for the effective adoption and implementation of e-learning within Nigerian tertiary institutions. 	Adoption and availability of resources
Eli-Chukwu et al. (2023)	Challenges confronting e-learning in higher education institutions in Nigeria amid COVID-19	Nigeria	<ul style="list-style-type: none"> Findings indicate that Nigeria's higher education institutions (HEIs) are still in the early stage of adopting the e-learning mode of study. There was no existing e-learning curriculum before the pandemic. The adopting e-learning mode of teaching was an uphill task for both the lecturers and the learners. Lack of experience in information and communications technology usage and inadequate infrastructure to support e-learning. 	Adoption, availability, and technical competence
Lawal et al. (2020)	COVID-19 pandemic and pharmacy education in a developing country: A case study from Nigeria	Nigeria	<ul style="list-style-type: none"> The university, with the full support of the state government, was making plans to ensure a fixed structure for the integration of e-learning into the syllabus. E-learning activities had not been taking place at the University prior to the emergence of COVID-19. 	Utilization
Ordu and Abdulkarim (2020)	Integrating e-learning technologies in business education course delivery during COVID-19 lockdown in south-south, Nigeria	Nigeria	<ul style="list-style-type: none"> Business educators utilized e-learning technologies to a very low extent during the pandemic. 	Utilization
Sanni et al. (2022)	Knowledge and uptake of e-learning among African students during the COVID-19 lockdown: Online education, impacts of COVID-19	Nigeria	<ul style="list-style-type: none"> Knowledge of e-learning was (28.4%); 14.7% have ever participated in e-learning, 8.4% participated during the lockdown. Only 26.6% had access to the internet, Had computers (1.1%), and Had phones/tablets (5.5%). Lack of awareness (78.2%). 	Knowledge, utilization, and awareness
Olanrewaju et al. (2021)	Left behind? The effects of digital gaps on e-learning in rural secondary schools and remote communities across Nigeria during the COVID-19 pandemic	Nigeria	<ul style="list-style-type: none"> Lack of ICT strategies and policies in Nigeria Socioeconomic status Poor internet connectivity, electricity A high poverty level as the primary driver of digital gaps in remote communities 	Policies, disparities, internet connectivity, and digital gaps
Nannim et al. (2023)	Exploring the use of learning management system for instructional delivery during the COVID-19 pandemic: A case of University of Nigeria, Nsukka	Nigeria	<ul style="list-style-type: none"> Some lecturers have never seen nor used LMS. 	Awareness and utilization
Nannim et al. (2021)	Rethinking post COVID-19 education: A migration to ubiquitous learning environment	Nigeria	<ul style="list-style-type: none"> Pandemic has pushed stakeholders in education to rethink the current. There is also the case of unpreparedness of the Nigerian education system to implement online. 	Preparedness and utilization
Egielewa et al. (2022)	COVID-19 and digitized education: Analysis of online learning in Nigerian higher education	Nigeria	<ul style="list-style-type: none"> Students of higher education in Nigeria have a low acceptance of online learning technology, preferring the traditional classroom setting. 	Acceptability
Adeoye et al. (2020)	COVID-19 and e-learning: Nigeria tertiary education system experience	Nigeria	<ul style="list-style-type: none"> Varying degree of preparedness of the institutions Lack of infrastructures, paucity of funds and policy issues in the Nigeria education sector 	Preparedness and availability,

RESULTS

Based on a critical analysis of the relevant COVID-19 educational problem in other countries during the pandemic and a comparison of Nigeria's reaction, the findings of the research are presented. The key findings were broken down per nation.

United States

ElSaheli-Elhage (2021) found that educators in the US were not well-prepared for remote teaching during COVID-19, particularly for students with disabilities, and faced challenges in reaching students and parents. Murphy et al. (2020) noted effective use of LMS by professors but highlighted student anxiety during the transition to virtual classes. Zheng et al. (2021) reported that most students preferred continuing some online instruction post-pandemic, with perceived engagement predicting

course effectiveness. Anderson (2020) highlighted the surprise and unpreparedness for school closures, affecting motivation and well-being. Garcia and Weiss (2020) emphasized exacerbated disparities in learning opportunities and resources during the pandemic.

United Kingdom

Puma (2022) noted significant technological advancements in UK education due to COVID-19, with virtual classrooms becoming essential. Howard et al. (2021) discussed the added responsibilities on teachers and parents, and the varied impact on students' learning. Newton et al. (2021) highlighted practical skills falling behind and significant learning losses, especially in disadvantaged areas. Mishra et al. (2021) identified barriers in teaching and learning, with school, home, and intrinsic student factors playing a role. Buchanan et al. (2022) and Cattani et al. (2020) both noted significant reductions in learning time and minimal online lesson provision in state schools. Williams et al. (2020) found that homeschooling caused struggles for children, affecting their well-being and motivation.

Asia

Chinna et al. (2021) reported high anxiety levels among Asian university students due to the sudden switch to online learning, with females experiencing more severe anxiety. Rudolph et al. (2023) identified critical success factors for online learning in Singapore, including technical competency and IT infrastructure. Dong et al. (2020) noted that Chinese parents overwhelmingly reported their children's online learning experiences during the pandemic. Yan et al. (2021) found significant differences in online learning experiences across school years, highlighting various challenges. Jiang et al. (2021) discussed factors affecting Chinese university students' satisfaction with online learning platforms, including self-efficacy and regional differences.

Russia and Ukraine

Valeeva and Kalimullin (2021) reported partial school closures in Russia and the subsequent shift to online instruction. Novikov (2020) found that psychological and technical factors influenced the speed of adaptation to online learning. Kosaretsky et al. (2022) highlighted the digital divide and educational poverty, with low-income children being the most affected. Prokopenko and Berezhna (2020) noted the extensive use of various e-learning platforms in Ukrainian universities. Bakhov et al. (2021) discussed varying levels of readiness for online learning and significant technical issues in Ukraine.

South Africa

Mpungose (2021) found that Zoom was effective for e-learning but highlighted challenges in promoting autonomy and emotional connectedness. Mpungose (2020) and Maphalala et al. (2021) emphasized the digital divide as a major barrier to e-learning, with issues in pedagogy, proficiency, and assessment integrity. Ndibalema (2022) noted digital inequalities, internet access issues, and low technological competence in developing countries.

Nigeria

Ugochukwu-Ibe and Ibeke (2021) highlighted the lack of remote education infrastructure during COVID-19 in Nigeria. Ogunji et al. (2022) found that most tertiary institutions did not adopt e-learning platforms. Eli-Chukwu et al. (2023) reported early-stage adoption of e-learning with significant infrastructure and competency challenges. Lawal et al. (2020) discussed plans to integrate e-learning in university curricula. Ordu and Abdulkarim (2020) noted low utilization of e-learning technologies in business education. Sanni et al. (2022) reported low awareness and participation in e-learning among Nigerian students. Olanrewaju et al. (2021) highlighted the digital gaps in rural areas due to poor ICT strategies and socioeconomic factors. Nannim et al. (2023) found low awareness and utilization of LMS among lecturers. Egielewa et al. (2022) noted a preference for traditional classrooms over online learning. Adeoye et al. (2020) highlighted varying degrees of institutional preparedness and infrastructure challenges.

DISCUSSION OF FINDINGS

The discussion is based on findings from the 40 research papers that satisfied the inclusion criteria for this study. The distribution of these studies by country is thus: USA (5), UK (8), Asia (1), Singapore (1), China (3), Indonesia (1), Russia (3), Ukraine (2), South Africa (3), developing countries (2), and Nigeria (11). The literature shows that: the outbreak of the COVID-19 pandemic resulted in the shutdown of traditional face-to-face learning activities and necessitated an emergency transition to remote/online learning to curtail the spread of the virus (Alon et al., 2020; Gautam & Gautam, 2021). Even though no country in the world recorded a 100% transition to online/remote learning during the COVID-19 pandemic.

However, the rate of transition differs from one country to another. Developed countries had a higher rate of transition compared to developing countries (Murphy et al., 2020; Ndibalema, 2022; Perera & Gamage, 2021). This makes sense in light of the digital gap concerning availability, utilization, and technological competence and adaptability of educators and learners, as well as their readiness to adopt online and remote teaching and learning environments. The disparity in income between high- and low-income households is another manifestation of the digital divide in developed nations. This had an impact on their ability to access and use e-learning resources during the COVID-19 pandemic.

There was no adequate investment in remote education solutions before the lockdown in March 2020 in most developing countries such as Nigeria (Ugochukwu-Ibe & Ibeke, 2021). The insufficiency of infrastructure to support online teaching made teachers feel unprepared to deliver teaching remotely (Adeoye et al., 2020; Nannim et al., 2021). Students have both positive and negative opinions regarding online classes. Online classes provide markedly fewer or zero chances to attend school; this can lead

to isolation and mental fatigue. The result further shows how social injustice, inequity and the digital divide have been exacerbated during the pandemic and need unique and targeted measures if they are to be addressed. Parents were overburdened between regular daily/professional duties and emerging educational roles, and all parties are experiencing trauma, psychological pressure and anxiety to various degrees, which necessitates a pedagogy of care, affection and empathy (Lawal et al., 2020; Olanrewaju et al., 2021; Ugochukwu-Ibe & Ibeke, 2021).

Overall, the study suggested some critical variables which made it possible for the adoption of e-learning and migration to online learning or discourage the smooth migration to online learning. These variables gave rise to the framework for successful implementation of e-learning in times of global disruptions such as the COVID-19 pandemic and other natural disasters which could hinder face-to-face interactions or teaching. **Figure 2** shows a word cloud of these critical variables as extracted from the reviewed literature.



Figure 2. Word cloud of e-learning critical variables (Source: Authors' own elaboration)

The word cloud in **Figure 2** suggests that the critical e-learning variables are utilization, availability, awareness, accessibility, technical competencies/experiences, knowledge, and affordability among others. Other important categories which emerged from the word cloud are issues of preparedness to use e-learning, the disparities of digital gap/divide/inequalities, the psychological factors such as lack of motivation, and anxiety among others. Teachers, students and parents were found to be very important stakeholders in response to COVID-19 lockdown and the subsequent migration to ubiquitous learning environment through the use of e-learning. Based on the data obtained from the reviewed literature, the conceptual framework in **Figure 3** was developed for e-learning critical variables.

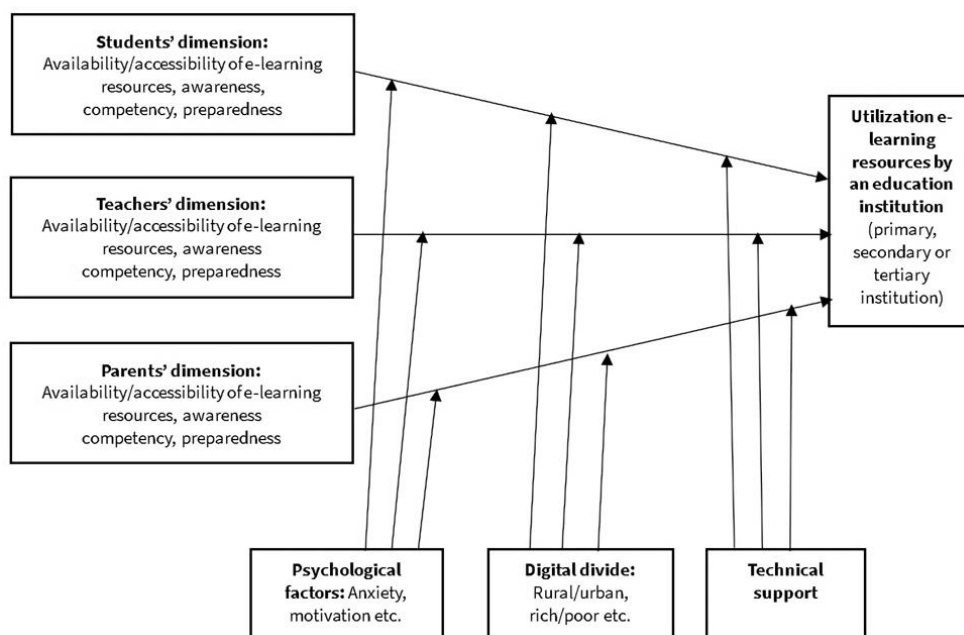


Figure 3. E-learning framework for response to COVID-19 education crisis (Source: Authors' own elaboration)

The framework in **Figure 3** relates the e-learning critical variable for response to the COVID-19 pandemic to three dimensions which are students', teachers' and parents' dimensions. Each of these dimensions has similar critical variables such as availability, accessibility, awareness, competency and preparedness. These variables have been shown to determine the level of utilization of e-learning facilities or the speed with which e-learning were adopted or utilized during the pandemic (ElSaheli-Elhage, 2021; Murphy et al., 2020). Also, the level of influence of availability, accessibility, awareness, competency and preparedness on utilization of e-learning is influenced or moderated by other factors such as psychological factors: anxiety, motivation (Chinna et

al., 2021; Murphy et al., 2020), digital divide: rural/urban, low income/high income (Kosaretsky et al., 2022; Maphalala et al., 2021; Garcia & Weiss, 2020; Mpungose, 2020), and technical support (Bakhov et al., 2021; Novikov, 2020; Rudolph et al., 2023).

The finding of this study on the level of availability of e-learning facilities at different level of the education systems suggests that there are more facilities and utilization of e-learning at the university level as compared to the primary and secondary education level (Murphy et al., 2020; Valeeva & Kalimullin, 2021; Yan et al., 2021). Also, pupils and students in developed countries had access to and were using e-learning facilities to a larger extent (Buchanan et al., 2022; Cattani et al., 2020; Dong et al., 2020; Green, 2020) as compared with their counterparts in the developing countries like Nigeria (Eli-Chukwu et al., 2023; Maphalala et al., 2021; Ndibalema, 2022; Sanni et al., 2022). There was no evidence of using LMS, and a very low utilization of other forms of online learning platforms at primary and secondary schools level in Nigeria (Nannim et al., 2023; Sanni et al., 2022), except for offline platforms such as radio, television and printed hard copies (Efe, 2020; Iwunna et al., 2022). There was also limited availability, awareness and utilization of e-learning by teachers and parents at the primary and secondary school level (Olanrewaju et al., 2021). Teachers and parents are supposed to have access to these facilities and should be competent enough to guide their students' or pupils' learning while at home. However, Nigeria's case is pathetic because most parents are poor and cannot afford the cost of acquiring these e-learning facilities (Olanrewaju et al., 2021) to guide their children's learning. Where parents have the required smartphones, computers, internet connectivity and other e-learning facilities, they lack awareness and the required ICT skills and competency to use the facilities and guide their children's learning (Sanni et al., 2022). Sanni et al. (2022) also identified the insufficient skills and competencies for the use of e-learning facilities by teachers and students during the COVID-19 pandemic in Nigeria. This calls for the need for a competent technical support team to guide and assist teachers, students and parents during e-learning programs.

The results on the availability and utilization of e-learning facilities at the HEIs show a more positive availability and utilization of e-learning as compared to the lower level of education (primary and secondary school level). It was found that most universities were swift to migrate to the use of e-learning, most especially the private universities (Ogunji et al., 2022; Ugochukwu-Ibe & Ibeke, 2021). However, most staff and students still lack the essential training and guidance on the use of most components of e-learning (Adeoye et al., 2020; Nannim et al., 2021, 2023). Hence, most of the studies recommended prompt provision of technical support to teachers and students for effective teaching and learning (Eli-Chukwu et al., 2023).

The findings from the reviewed literature showed that Nigeria and some developing countries shut down most of their schools throughout the pandemic period (Ndibalema, 2022; Ogunji et al., 2022; Perera & Gamage, 2021). This is plausibly due to a lack of essential e-learning facilities for teaching and learning or due to a lack of teachers' technical skills in the utilization of these technologies for instructional delivery. However, countries like USA, UK and Russia were quick to switch to the use of remote learning immediately after the imposition of the lockdown order in order to curb the spread of COVID-19 (Kosaretsky et al., 2022; Mishra et al., 2021; Murphy et al., 2020; Novikov, 2020; Puma, 2022; Valeeva & Kalimullin, 2021; Williams et al., 2020; Zheng et al., 2021). The smooth migration to remote learning is plausibly as a result of availability and accessibility of e-learning facilities for teaching and learning in those countries. The teachers in these developed countries also had the required training and technical support for effective implementation of remote learning (Elsaheli-Elhage, 2021; Newton et al., 2021; Novikov, 2020; Valeeva & Kalimullin, 2021; Zheng et al., 2021).

Comparison of Nigeria to Other Nations Regarding Critical E-Learning Variables

Availability and accessibility

Before the pandemic, Nigeria had limited availability and accessibility to e-learning infrastructure, lagging significantly behind nations like USA and UK, where e-learning platforms and resources were already in place (Anderson, 2020; Buchanan et al., 2022; Ugochukwu-Ibe & Ibeke, 2021). During the pandemic, Nigerian institutions struggled with inadequate resources and internet connectivity, while countries like USA and UK quickly adapted their existing platforms (Garcia & Weiss, 2020; Williams et al., 2020). Post-pandemic, Nigeria continues to face challenges with resource availability, whereas developed nations have integrated e-learning more seamlessly (Adeoye et al., 2020; Lawal et al., 2020).

Awareness and literacy

Awareness and digital literacy were low in Nigeria pre-pandemic, with minimal prior engagement in e-learning (Nannim et al., 2023; Sanni et al., 2022). In contrast, countries like China and Singapore had higher levels of digital literacy and awareness, facilitating a smoother transition to online learning during the pandemic (Dong et al., 2020; Rudolph et al., 2023). Post-pandemic, efforts to raise awareness and improve digital literacy in Nigeria are ongoing, while other nations continue to leverage their established digital cultures (Eli-Chukwu et al., 2023; Jiang et al., 2021).

Competency

Nigeria faced significant challenges in technical competency among educators and students both during and after the pandemic, with many lacking the skills to effectively engage in e-learning (Eli-Chukwu et al., 2023; Mpungose, 2020). Developed nations, having more advanced technological training programs and support systems, experienced fewer competency-related issues (Mishra et al., 2021; Murphy et al., 2020).

Technical and social support

Technical support in Nigeria was inadequate, marked by poor internet infrastructure and limited access to necessary devices (Olanrewaju et al., 2021; Ugochukwu-Ibe & Ibeke, 2021). Conversely, countries like USA and Singapore had robust IT support systems and infrastructure in place, facilitating a smoother e-learning experience (Garcia & Weiss, 2020; Rudolph et al., 2023).

Social support in Nigeria, including psychological and emotional support systems for students, was less developed compared to the extensive support available in countries like USA and UK (Chinna et al., 2021; Howard et al., 2021).

CONCLUSION

A review of the literature on critical variables related to e-learning resources highlights significant challenges that hinder the effective adoption and utilization of e-learning technology in education, both in Nigeria and globally. These challenges vary across different educational levels (primary, secondary, and tertiary), countries, and regions, with distinct differences between rural and urban settings. Developed countries face fewer obstacles in transitioning to remote learning via e-learning technologies. However, without sufficient availability and access to e-learning resources, adequate training for teachers, students, and parents, the effective implementation of e-learning in education remains challenging. Additionally, the literature reports a low level of awareness regarding e-learning facilities, coupled with minimal technical and social support for teachers, students, and parents during e-learning programs.

Recommendation

Based on the findings of this study, the following were recommended:

1. The government, NGOs and the Ministry of Education should provide adequate funding to the lower level of the education system (primary and secondary schools) for the purchase of relevant e-learning tools and resources
2. A biannual training should be organized for teachers and parents to create their awareness of the available e-learning facilities and also teach them how to use the tools for remote learning
3. A technical/social support team should be on standby to help students, teachers, and parents. The social support should be aimed at curbing the psychological stress, anxiety and motivation-related problems associated with the use of these e-learning resources for remote learning.

Suggestions for Further Studies

1. More empirical studies should be carried out to ascertain the exact level of availability, awareness, accessibility, utilization, competency, and provision of technical/social support for the use of e-learning for remote learning during global disruptions.
2. A correlational study should be carried out to determine the moderating role of psychological factors (anxiety, motivation), digital divide (rural/urban, Low income/high income), and technical support on students' dimension, teachers' dimension and parents' dimension of e-learning critical variables on their utilization of e-learning resources at the various levels of our education systems (primary, secondary and tertiary institutions).

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