

Stay-At-Home Order and Challenges of Online Learning Mathematics during Covid-19 Case in Nigeria

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Abstract:

Background: Stay-at-home order has led to temporal closure of all level of schools both regionally and locally in all countries which Nigeria is not excluded. For continuous teaching and learning during Covid-19 pandemic, some governments and private schools have introduced online learning to ensure that pupils have access to learning during the stay-at-home order. It is therefore necessary to examine challenges of online learning mathematics during the stay-at-home order amidst COVID-19 in Nigeria.

Methods: The study made use of snowball and purposive sampling technique due to the nature of the respondents. The study found out that Nigerian senior secondary school students were still affected with electricity shortage as some of them encountered flat battery on their devices during their online learning. The findings again indicated that Nigerian senior secondary school students encountered insufficient data to access their online class, lack of understanding, difficulties in solving mathematics questions during online classes.

Results: The findings equally indicated that Nigerian senior secondary school students were faced with the following challenges during their online learning of mathematics: teachers' online delivery method, difficulty in submitting their mathematics assignment online, teachers' inability to communicate with them during online mathematics classes. Conclusions and recommendations were made for all concerned stakeholders.

Key Word: Stay-at-home, Online learning, COVID-19 pandemic

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I. Introduction

The coronavirus disease (COVID-19) is a highly communicable and pathogenic viral infection caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). The World Health Organization declares the outbreak a Public Health Emergency of International Concern on the 30th of January, and a pandemic on the 11th of March. It has brought a complete change to the educational industry in not only Nigeria but also all around the world. The virtual or online schooling takes place in all and sundry. The developed countries however find little or no problems in keying in into the online schooling, but the developing countries like Nigeria where the physical set of classrooms is always being more prioritized to online schooling encounters several hitches. COVID-19 pandemic has resulted to total closure of school activities in more than 192 countries all over the world with 91.4% of the total number of enrolled learners in those countries temporarily forced out of school²⁰. According to United Nations Education Scientific and Cultural Organization, more than 1.6 billion pupils across the world are currently compelled to stay out of schools as social and physical distance are being enforced both regionally and locally around the world in order to contain the spread of COVID-19 pandemic.

Figure 1 below shows that more than 98% of teaching and learning cannot be conducted due to country-wide lockdown in Africa and South America. The effect of COVID-19 pandemic on educational systems across the globe is presented below. The closure of schools in North America, Australia and Northern Europe is relatively lower when compared to other parts of the world and this can be attributed to the fact that lockdown of schools is only effective in localized areas where the spread of the disease is more prevalent.

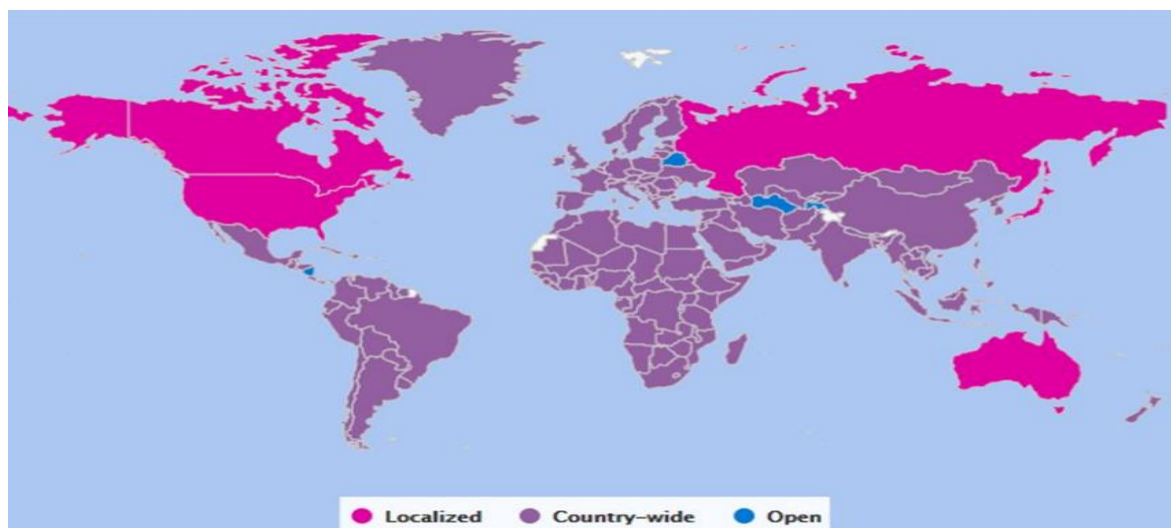


Figure 1: Closure of schools across the world²⁰

It is clear that periods of learning have been stop over since stay-at-home order, though number of cases and deaths of COVID-19 in African countries have been low compared to other continents like Asia, Europe, North America and South America, it is envisaged that the education of African countries had been most affected by COVID-19 due to economic and technological backwardness of most African countries²⁰. As COVID-19 pandemic has come to stay, stay-at-home order continue and this has led to online learning among secondary school students in developed and developing countries including Nigeria, there is a paradigm shift in terms of secondary school learning. Globally, majority of schools (private and public) around the world are moving away from the traditional classroom face-to-face to online learning. Majority of secondary school students who are presently enrolled in various educational institutions around the world are shifting their mode of learning from physical classroom to online learning education. However, this is not the case for most private and public secondary schools in Nigeria. Interestingly, extremely few private schools keep engaging their pupils with various online learning with the use of WhatsApp, Google classroom and Zoom, likewise we found some public schools that engaging pupils with various school on air learning through television and radio. Due to stay-at-home order imposed by both the federal and state government as a result of COVID-19 pandemic, virtually all level of education (primary, secondary and tertiary education) in the country have shifted to online learning. To this end, most secondary schools have informed their students on the increased awareness and adoption of technologies for online learning. Private and public secondary schools have resolved that during stay-at-home order, learning will proceed through online learning platforms. On the contrary, majority of these secondary schools' students who were guided to make sure that they are connected to the online learning platforms to avoid being rusted at home face various challenges on this online learning especially on mathematics.

Furthermore, secondary schools in Nigeria both private and public make sure that all their students who were supposed to commenced their second term examinations before the stay-at-home order will be engaged through the online learning platforms such as WhatsApp, Google classroom, Zoom and other related platforms. After spending more than four months at home since the beginning of the stay-at-home order, some states in the country had cancelled their third term, concerned parents and secondary schools will want to ensure that students do not miss out on learning or lag behind on the coverage of the third term scheme of work or curriculum. Majority of Nigerian secondary school students caught unaware with this online learning, few schools that are trying to inculcate the online learning on their pupils before COVID-19 did not do that on mathematics. During this COVID-19 pandemic, one of the major challenges of online learning mathematics among secondary school students is lack of access to computers, smartphones, data, laptops and tablets. All these and many more are things that make online learning easy for secondary school students. Perienen¹⁷ submitted that with the introduction of technology into almost all facet of life, then education sector too is not left out in this paradigm shift. Therefore, learning among secondary school students too is moving toward online learning without exception to mathematics especially during this period of stay-at-home order. Another major challenge of online learning especially mathematics among secondary school students during this stay-at-home order is their teachers. Teachers who were not used to teaching online before the stay-at-home order have now been forced to learn various online methods of teaching and delivering content to students. This stay-at-home has become a catalyst to appreciating digital devices, online resources, social media technology and online

learning activities. There is serious pressure on teachers who want to remain relevant to tap into the affordances of technology to bridge learning gaps¹⁷.

Few years ago, Osun state governor gave secondary school students tablets to enhance online learning, Lagos state embarked on training of teacher on online education, Oyo state ministry of education and other states in the northern and southern part of the country in collaboration with some television and radio stations recently stated school on air via television and radio stations. Southwestern states seem to be doing well in terms of online learning before this stay-at-home order compare to their northern states counterparts. The question that is needed to answer is that “to what extent do these and other policies enhance learning during stay-at-home order?” Online learning at all levels, especially among secondary school students have been facing serious war during these stay-at-home order. Some of the challenges likely to encounter by these students include but not limit to different applications and technical issues, burden on parents, additional tasks for working parents, mobile network issues, lack of developing social skills, duration of teaching online vs. face-to-face sessions, plenty of distractions in home environment, non-availability of teaching material and resources, too many assignments and activities, prolonged screen time and teacher’s inexperience in terms of online delivery. Almost all countries across the world have enforced the stay-at-home order in response to Covid19 pandemic. The implementation of this stay-at-home order has led to temporal closure of all level of schools both regionally and locally in all these countries which Nigeria is not excluded. To ensure continuous teaching and learning process while Covid-19 pandemic lasted, some governments and private schools had introduced online learning to ensure that pupils have access to learning during the stay-at-home order. There is no doubt that this online learning will come with learning gaps between pupils with necessary technological tools and their counterparts without needed technological tools. Even pupils with necessary technological tools still face challenges during online learning especially when it comes to learning mathematics online. It is therefore necessary to examine challenges of online learning mathematics during the stay-at-home order amidst COVID-19 in Nigeria.

Objectives

The main objective of the study is to examine the stay-at-home order in line with challenges of online learning mathematics during COVID-19 case in Nigeria. Specifically, this study focuses on the following objectives:

- To examine online learning of mathematics among secondary school students during the stay-at-home order amidst COVID-19.
- To investigate challenges of online learning of mathematics among secondary school students during the stay-at-home order amidst COVID-19.

II. Literature Review

Iwai¹⁰ argued that students stand to gain or lose during virtual classrooms on the researcher’s study that was conducted on online learning during the COVID-19 Pandemic. This shows that virtual classrooms come with merits and demerits. Agnoletto and Queiroz¹ in their paper “COVID-19 and the challenges in Education”, they posited that the logic of going “digital” is not simple but there is an ongoing outcry to launch tools of emergency measures, mostly, “adopting” the use of digital-technologies for learning. Zhao & Xu²¹ looked at how social media technology like Sina Microblog can be used to arrest the attention of the public to COVID-19 epidemic in China. It was revealed that social media platforms like the Sina Microblog can be used to disseminate information and measure public attention to public health emergencies. Through social media platforms, the government could communicate important information to the public, reviewing the health guidelines and sensitizing citizens. While Roy¹⁹ in Australia, presented some tips that could help children learn from home during the COVID19 period. In one of the tips, he suggested that teachers need to download some teleconferencing facilities (e.g., Skype, Zoom, Lifesize...) that may be used to deliver lessons remotely. Burke⁶ strongly posited that in an effort to reshape education, there are certain measures that need to be implemented during the COVID-19 school closure period. Such measures include; maintaining communication with students, parents, teachers and other staff members through e-mails and phone calls, maintaining access to learning materials like Google Apps (e.g. Google drive, dropbox, cloud...) for education, Moodle Cloud, Edmodo, or social media tools (e.g. WhatsApp, Twitter, YouTube, Facebook, Instagram, Yahoo...) and maintaining access to data via cloud computing for servers and back up in a location other than the school⁶. Perienen¹⁷ investigates the perspective of teachers on frameworks for ICT integration in mathematics education and found out that students learn mathematics better with effective and appropriate technology. Niess¹⁶ also highlights that the adoption of technology in mathematics education improves learning.

Boelens, De Wever and Voet³ found out challenges that require a significant focus in a full online learning environment. The researchers identified four key challenges related to blended learning: incorporate flexibility; facilitate students' learning processes; stimulate interaction; and foster an affective learning climate. Graham & Wendy⁸ submitted that in the online learning when teaching and learning are developed, there is need

for clear and accessible infrastructure that facilitates development, organisation and coordination of teaching and learning activities; together with good dissemination and guidance in the use of technologies. This is therefore important for transferring of new knowledge and concepts through online learning. Boelens, De Wever & Voet³ found that good designs and digital teaching are focused on interactivity and student-driven learning. Interaction has both a cognitive and social function. It is not just a matter of offering information to students about and participation in new activities and technology. Jeong and Hmelo-Silver¹² indicate how digital technology can encourage collaboration, by supporting engagement with joint tasks, communication, sharing resources, engagement in productive collaborative learning processes (joint writing, for example), monitoring and regulating collaborative learning, and finding and building groups and communities. Borge & Mercier⁴ found that using various strategies help students participate, discuss, contribute, share is much more important at times when they do not have physical contact. Sharing of information and ideas, discussion and negotiation, and good structures for coordination of activities become even more important in online teaching than when students are in the classroom.

Kearn¹³ found that the possibility to choose activities, resources, and ways of participating in online learning increases the understanding of students in abstract material and engaging in work that contributes to increased competence and knowledge. Damsa, Nerland & Andreadakis⁷ also contributed to this review by recommending that online designs of learning should be offering the students the means and support to build their own learning space, especially when teaching takes place exclusively online. This involves flexibility in the way the curriculum and activities are organised and performed and has the potential to stimulate participation and engagement, permitting students to organise their learning activities according to their own needs and pace. It also allows students to provide feedback about their experiences with types of activity, support, or guidance provided. Not least, teachers must be aware of the necessity of differentiating among learning needs and abilities, especially in online environments. Holingshead & Chellman⁹ submitted that the digital literacy of educators and others involved in the process of implementing online education is paramount. This “involves the confident and critical use of Information Society Technology (IST) for work, leisure and communication. It is underpinned by basic skills in ICT: the use of computers to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet”. Janssen et al.¹¹ also contributed and submitted that digital competences are envisioned as including: technical competence; the ability to use digital technologies in a meaningful way for working, studying and in everyday life; the ability to evaluate digital technologies critically, and motivation to participate and commit in the digital culture. Buchanan, Sainter & Saunders⁵; Littlejohn et al.¹⁵ indicated that teachers’ digital competence can often be underdeveloped, as the technology evolves very fast and teachers may not be able to keep the pace, or underestimate the value of such competence in comparison to other academic competences. It is therefore common for studies to find that academics possess diversified attitudes towards use of digital technology and teaching online will have an impact on both the frequency and quality of use, and success of innovations involving technology.

Peterson¹⁸ showed that many schools still lack a unitary approach with regard to e-learning organisational infrastructures and digital competent leadership. There are no clear conceptual frameworks that can close the gap between research on policy, organisational infrastructures, strategic leadership as well as teachers and their teaching practices, and there is a need to view digital competence not as an isolated phenomenon or through the lens of single actors. Rather, it should be regarded as an organisational task, influenced and driven by several contextual factors embedded within and across a wider institutional context. King & Boyett¹⁴ pointed out the importance of institutional infrastructure, academic employees' attitudes and digital skills, students' expectations and participation, and not least, education plans and guidance structure. While infrastructure and attitudes develop over time, education plans, forms of guidance, participation and mutual expectations are aspects where both educators and students are influential. From an organisational change perspective, Allen made it clear that there is a need for an integrated understanding of individual academic teachers’ decisions, their organisational context and the material learning technologies they use rather than dividing our understanding into separate areas of expertise and action. This implies both acknowledgment of the value and input brought in by various parties and areas, as well as the intricate and challenging process of implementing successfully drastic innovations with electronic learning. King and Boyett¹⁴ suggested that there is a need for schools to come up with strategies that will give electronic learning implementation and delivery its greater chance of success. Such a strategy: offers staff-appropriate support to develop their skills and understanding; defines e-learning, or what learning means in the given context; demonstrates institutional investment for the development of electronic learning; sets clear expectations for staff and students; provides a rationale for its use; provides frameworks for implementation that recognise different disciplinary contexts; and models the use of innovative (digital) teaching methods.

III. Methodology

This study employed a quantitative (online questionnaire) approach that reported the results of the quantitative analysis that was performed through online questionnaires google forms link to achieve the objectives of the study. One hundred and fifty (150) Nigerian senior secondary school students who successfully filled the online questionnaires were the respondents for this study. These respondents were involved in online learning of mathematics during the stay-at-home order. The study made use of snowball and purposive sampling technique due to the nature of the respondents (senior secondary school students who were involved in online learning mathematics during the stay-at-home order). Students were able to recommend their colleagues who were involved in online learning mathematics during the stay-at-home order by sharing the link and filling the questionnaire. The questionnaire comprised two main sections namely; personal information of respondents and stay-at-home order with challenges of online learning mathematics. The reliability of the scale was calculated with the Cronbach's alpha value of 0.87. Respondents indicated their challenges on online learning mathematics during stay-at-home order using the modified likert scale of SA- Strongly Agree (4), A- Agree (3), D- Disagree (2), SD- Strongly Disagree (1).

As at the time of data collection, both private and public schools were closed but there were online learning going on for senior secondary school students especially for those that were preparing for the West African Examination Council (WAEC). Since these students know themselves, administration of the questionnaires was through referral (snowballing sampling technique). Online questionnaires through google forms link were shared among these senior secondary school students, though majority of them complained of low data, yet reasonable amount was successfully filled online by these students.

Data Analysis

Data gathered online through google form link were analysed using both descriptive statistics. Descriptive statistics such as frequency counts, simple percentages were used for the personal information of the respondents. Frequency counts and simple percentages were used to achieve the research objectives.

IV. Result

Descriptive Analysis of Personal Information of Respondents

This section presents the personal information of respondents. Responses were received from one hundred and eighty-six (186) Nigerian senior secondary school students as at 25th July, 2020 (data cutoff collection date for this study). One hundred and fifty (150) respondents from Nigerian senior secondary school students had completed the online questionnaires (completion rate: 80.6%).

Table 1 below shows the sex of the respondents. It can be seen that majority 59.3% of the respondents were male. The table shows the age of the respondents. It also revealed most of the respondents 56.6% fell within the age range of 16 to 18 years. The table again revealed the present class of the respondents, with students in senior secondary school three taking the larger percentage 81.3%. Also, in the table is devices used by these students, the largest percentage of the respondents 70.7% used smartphone as gadget for their online learning during the stay-at-home order. Lastly, the table revealed that majority of the respondents 88.5% were the owner of gadget used for their online learning. The findings showed that virtually all of the respondents who successfully completed the online form made use of their smartphones.

Table 1: Personal Information of Respondents

Personal Information		Frequency (N=150)	Percentage (N=100%)
Sex	Male	89	59.3
	Female	61	40.7
Age	less than 15	52	34.7
	16 to 18	85	56.6
	19 and Above	13	8.7
Class	S.S.S, 2	28	18.7
	S.S.S, 3	122	81.3
Devices Used	Smartphone	106	70.7
	Laptop	32	21.3
	Desktop	9	6.0
	Others	3	2.0
Possession of Used Devices	Own	339	88.5
	Parent	20	5.2
	Others	6	1.6

Online Learning During the Stay-At-Home Order Amidst COVID-19

Table 2 below reveals online learning of mathematics among Nigerian secondary school students during the stay-at-home order amidst COVID-19. It shows that mere 1.3% of the respondents agreed that they had done online work in their school before the stay-at-home order. None of the respondents had engaged in an online learning on mathematics in their various schools before the stay-at-home order. 81.3% of the respondents agreed that they participated in all activities of online mathematics in their various schools during the stay-at-home order. 67.3% of the respondents agreed that they participated in all online activities of all subjects for their classes in their various schools during the stay-at-home order. 97.3% of the respondents agreed that online activities of their various schools during the stay-at-home order increased their knowledge on internet usage.

Table 2: Online Learning During the Stay-At-Home Order Amidst COVID-19

S/N	STATEMENTS	SA	A	D	SD
1)	I had done online work in my school before the stay-at-home order	- (-.)	2 (1.3)	106 (70.7)	42 (28.0)
2)	I had done online work on mathematics in my school before the stay-at-home order	- (-.)	- (-.)	98 (65.3)	52 (34.7)
3)	I participate in all activities of online mathematics in my school during the stay-at-home order	37 (24.7)	85 (56.6)	19 (12.7)	9 (6.0)
4)	I participate in all online activities of all subjects for my class in my school during the stay-at-home order	22 (14.7)	79 (52.6)	34 (22.7)	15 (10.0)
5)	Online activities of my school during the stay-at-home order increase my knowledge on internet usage	42 (28.0)	104 (69.3)	4 (2.7)	- (-.)

SA- Strongly Agree, A- Agree, D- Disagree, SD- Strongly Disagree

Challenges of Online Learning of Mathematics Amidst COVID-19

Table 3 shows various challenges of online learning of mathematics among secondary school students in Nigeria during the stay-at-home order amidst COVID-19. It reveals that 54.6 % of the respondents agreed that they missed some online classes due to flat battery on their devices. 58% of the respondents agreed that sometimes there was no enough data to access the online class. 64% of the respondents agreed that learning mathematics online was not always clear. 37.4% of the respondents agreed that looking at the teacher online made them lose attention on the topic. 72% of the respondents agreed that solving mathematics questions during online class was difficult. 77.3% of the respondents agreed that their teachers did not make online mathematics class very easy to understand. 34.7% of the respondents agreed that their teachers used different ways to make them participate during online mathematics class. 67.3% of the respondents agreed that submitting online mathematics assignment was not easy. 81.3% of the respondents agreed that their teachers did not communicate with them during online mathematics class. While 72% of the respondents agreed that they liked the online mathematics class when their teachers made it interesting.

Table 3: Challenges of Online Learning of Mathematics Amidst COVID-19

S/N	STATEMENTS	SA	A	D	SD
1)	I miss some online classes due to flat battery on my device	33 (22.0)	49 (32.6)	46 (30.7)	22 (14.7)
2)	Sometimes there is no enough data to access the online class	34 (22.7)	53 (35.3)	38 (25.3)	25 (16.7)
3)	Learning mathematics online is not always clear	41 (27.3)	55 (36.7)	49 (32.7)	5 (3.3)
4)	Looking at the teacher online makes me lose attention on the topic	22 (14.7)	34 (22.7)	79 (52.6)	15 (10.0)
5)	Solving mathematics questions during online class is difficult	45 (30.0)	63 (42.0)	28 (18.7)	14 (9.3)
6)	Teachers do not make online mathematics class very easy to understand	47 (31.3)	69 (46.0)	24 (16.0)	10 (6.7)
7)	Teachers use different ways to make me participate during online mathematics class	24 (16.0)	28 (18.7)	66 (44.0)	32 (21.3)
8)	Submitting online mathematics assignment is not easy	22 (14.7)	79 (52.6)	34 (22.7)	15 (10.0)
9)	Teachers do not communicate with me during online mathematics class	37 (24.7)	85 (56.6)	19 (12.7)	9 (6.0)
10)	I like the online mathematics class when the teacher makes it interesting	38 (25.3)	70 (46.7)	31 (20.7)	11 (7.3)

SA- Strongly Agree, A- Agree, D- Disagree, SD- Strongly Disagree

V. Discussion

This study broadly examined the stay-at-home order in line with challenges of online learning mathematics during COVID-19 case in Nigeria and specifically focused on online learning of mathematics among Nigerian senior secondary school students during the stay-at-home order amidst COVID-19. The results from the findings indicated that Nigerian senior secondary school students had not been engaging in an online learning (including mathematics) in their senior secondary schools before the stay-at-home order. The findings of this study also indicated that Nigerian senior secondary school students engaged in different activities of online learning (including mathematics) in their various senior secondary schools during the stay-at-home order. This has exposed the students to various online learning applications and increased their knowledge on benefit of internet usage. These findings are in agreement with earlier studies like ^{10,21}. These researchers reported that students stand to gain likewise lose during virtual classrooms, which means that virtual classrooms come with merits and demerits. They also submitted that social media technology like Sina Microblog and other can be used to arrest the attention of the public to COVID-19 epidemic.

This study also specifically investigated various challenges of online learning of mathematics among Nigerian senior secondary school students during the stay-at-home order amidst COVID-19. The results from the findings indicated that Nigerian senior secondary school students were still affected with electricity shortage as some of them encountered flat battery on their devices during their online learning. The findings again indicated that Nigerian senior secondary school students encountered insufficient data to access their online class, lack of understanding, difficulty in solving mathematics questions during online class. The findings equally indicated that Nigerian senior secondary school students were faced with the following challenges during their online learning of mathematics: teachers' online delivery method, difficulty in submitting their mathematics assignment online, teachers' inability to communicate with them during online mathematics class. These findings are in agreement with earlier study like ¹. These researchers posited that the logic of going "digital" is not simple but there is an ongoing outcry to launch tools of emergency measures, mostly, "adopting" the use of digital-technologies for learning.

This study's findings are also in consonant with ¹⁹ who presented some tips that could help student learn from home during the COVID19 period. The researcher suggested that teachers need to download some teleconferencing facilities (e.g., Skype, Zoom, Lifesize...) that may be used to deliver lessons remotely. This study's findings are again in consistent with ⁶ who posited certain measures like maintaining communication with students, parents, teachers and other staff members through e-mails and phone calls, maintaining access to learning materials like Google Apps during the COVID-19 school closure period.

VI. Conclusion

Considering the objectives of this study, various relevant literatures that were reviewed, methodology and the findings, this study arrived at the following conclusions; Nigerian senior secondary school students were not familiar with online learning (including mathematics) in their senior secondary schools before the stay-at-home order. Senior secondary school students in the country engaged themselves in different online learning (including mathematics) from their various senior secondary schools during the stay-at-home order. Senior secondary school students in the country have been exposed to various online learning applications that have increased their knowledge on benefit of internet usage. Challenges of online learning of mathematics among Nigerian senior secondary school students during the stay-at-home order include but not limited to: shortage of electricity supply that led to flat battery during online learning, insufficient data to access their online class, lack of understanding during online learning, difficulty in solving mathematics questions during online class, teachers' online delivery method, difficulty in submitting their mathematics assignment online, teachers' inability to communicate with them during online mathematics class.

Recommendations

Going by the objectives of this study, various relevant literatures that were reviewed, methodology and the findings, the following recommendations were made;

- i. Teachers need to update their knowledge on new techniques to deliver lessons online and familiarise themselves with them so as to make their delivery of lessons interesting to pupils.
- ii. Parents should engage their children on latest tools that are needed for online learning and make sure that their children are not using them in negative ways.
- iii. School owners should make necessary changes that will accommodate challenges generated by online learning so as to make these pupils relevant in the 21st century.
- iv. School owners should come up with online teaching and the learning activities that will accommodate both the teachers and the students even after the stay-at-home order.

- v. Government at all level should structure teaching and the learning activities to accommodate online teaching and the learning in a manner that will follow the pedagogical principles of teaching and the learning.
- vi. Teachers should Increase their level of interaction with students, ask them feedback on the online learning and provide clear information to the students.

References

- [1]. Agnoletto, R., & Queiroz, V. (2020). COVID-19 and the challenges in Education. Retrieved from <https://www.researchgate.net/publication/340385425>
- [2]. Allen, S. (2016). Applying adult learning principles to online course design. *Distance Learning*, 13(3), 25-32. Retrieved from <https://search.proquest.com/docview/1876043451?accountid=14699>
- [3]. Boelens, R., De Wever, B., & Voet, M. (2017). Four key challenges to the design of blended learning: A systematic literature review. *Educational Research Review*, 22, 1-18.
- [4]. Borge, M., & Mercier, E. (2019). Towards a micro-ecological approach to CSCL. *International Journal of Computer-Supported Collaborative Learning*, 14(2), 219-235. <https://doi.org/10.1007/s11412-019-09301-6>
- [5]. Buchanan, T., Sainter, P., & Saunders, G. (2013). Factors affecting faculty use of learning technologies: Implications for models of technology adoption. *Journal of Computing in Higher Education*, 25 (1), 1–11. doi:10.1007/s12528-013-9066-6
- [6]. Burke, J. (2020). Covid-19 Practice in Primary Schools in Ireland Report. April. <https://doi.org/10.13140/RG.2.2.14091.03369>
- [7]. Damşa, C., Nerland, M. & Andreadakis, Z. (2019). An ecological perspective on learner- constructed learning spaces, *British Journal of Educational Technology*, <https://doi.org/10.1111/bjet.12855>
- [8]. Graham, C. G., and Wendy W., J. B. H. (2013) A framework for institutional adoption and implementation of blended learning in higher education, *The Internet and Higher Education*, 18 (3), 4-14.
- [9]. Holingshead, A. & Chellman, D. (2019). Engaging Learners in Online Environments Utilizing Universal Design for Learning Principles. <https://doi.org/10.1145/3310377.3310383>
- [10]. Iwai, Y. (March 13, 2020) 'Online Learning during the COVID-19 Pandemic: What do we gain and what do we lose when classrooms go virtual?', *Scientific American*. Retrieved on 24 March 2020 from <https://blogs.scientificamerican.com/observations/online-learning-during-the-covid-19-pandemic/>
- [11]. Janssen, J, Stoyanov, S., Ferrari, A., Punie, Y., Pannekeet, K., and Sloep, P. (2017). Experts' views on digital competence: Commonalities and differences, *Computers & Education*, 68, 473-481, <https://doi.org/10.1016/j.compedu.2013.06.008>.
- [12]. Jeong, H. & Hmelo-Silver, C. E. (2016). Seven affordances of CSCL Technology: How can technology support collaborative learning. *Educational Psychologist*. 51, 247-265, doi.org/10.1080/00461520.2016.1158654 (Links to an external site.) Links to an external site.
- [13]. Kearns, L.R. (2016). The experience of teaching online and its impact on faculty innovation across delivery methods, *Internet and Higher Education* 31, 71–78
- [14]. King, E., & Boyatt, R. (2014). Exploring factors that influence adoption of e-learning with higher education, *British Journal of Educational Technology*, doi:10.1111/bjet.12195
- [15]. Littlejohn, A., Beetham, H., & McGill, L. (2012). Learning at the digital frontier: A review of digital literacies in theory and practice. *Journal of Computer Assisted Learning*, 28(6), 547–556. doi: 10.1111/jcal.2012.28.issue-6.
- [16]. Niess, M. L. (2006). Guest Editorial: Preparing teachersto teach Mathematics with technology. *Contemporary Issues in Technology and Teacher Education*, 6(2). Retrieved from <http://www.citejournal.org/vol6/iss2/mathematics/article1.cfm>
- [17]. Perienen, A. (2020). Frameworks for ICT Integration in Mathematics Education - A Teacher's Perspective. *Eurasia Journal of Mathematics, Science and Technology Education*, 16(6), em1845. <https://doi.org/10.29333/ejmste/7803>
- [18]. Peterson, F. (2018). On the issues of digital competence in educational contexts – a review of literature. *Educ Inf Technol* 23, 1005–1021. <https://doi.org/10.1007/s10639-017-9649-3>
- [19]. Roy, D. (2020). Trying to home school because of coronavirus? Here are 5 tips to help your child learn. March. <https://theconversation.com/trying-to-homeschool-because-of-coronavirus-here-are-5-tips-to-helpyour-child-learn-133773>
- [20]. United Nations Education Scientific and Cultural Organization (2020). COVID-19 Educational Disruption and Response. Retrieved from: <https://en.unesco.org/covid19/educationresponse>
- [21]. Zhao, Y., & Xu, H. (2020). Chinese Public Attention to COVID-19 Epidemic: Based on Social Media. *medRxiv*, 2020.03.18.20038026. <https://doi.org/10.1101/2020.03.18.20038026>

Umar Abdullahi, et. al. "Stay-At-Home Order and Challenges of Online Learning Mathematics during Covid-19 Case in Nigeria." *IOSR Journal of Research & Method in Education (IOSR-JRME)*, 10(4), (2020): pp. 10-17.