CLASSROOM WITHOUT WALLS: PROSPECTS AND CHALLENGES OF USING TECHNOLOGIES FOR EFFECTIVE TEACHING IN POST-COVID-19 PANDEMIC ERA IN NIGERIAN PUBLIC UNIVERSITIES

Chukwuma-Nosike, Chika *Ph.D*
Department of Curriculum Studies
Imo State University, Owerri, Nigeria
&
Offorma, Grace Chibiko *Prof.*
Department of Arts Education
University of Nigeria, Nsukka, Nigeria

Abstract
This study is a descriptive survey that investigated the prospects and challenges of using technology for effective teaching in post-COVID-19 Pandemic era in Nigerian public universities. Three research questions guided the study. The population comprised all lecturers and students in public universities in Nigeria. The multi-stage, cluster and simple random sampling techniques were used to select a sample of one hundred and twenty (120) teachers and two hundred (200) students totaling 320 from two public universities in Imo and Abia states in South-East, Nigeria. A two-section rating scale titled Prospects and Challenges of using Technology for effective Teaching in post-COVID-19 Pandemic Era (PACTETPCE) was used for data collection. The instrument was validated by three specialists in Educational Measurement and Evaluation, Educational Psychology and Curriculum Studies. The reliability of the instrument was determined through a test re-test method and the data collected were analysed through Pearson Product Moment Correlation Coefficient (r). A coefficient index of 0.83 was obtained. The research questions were answered using mean and standard deviation. Findings of the study revealed, among others, that the use of technology promoted effective curriculum implementation. Some challenges to the application of technology in curriculum implementation were identified. The researchers recommended that provision of funds, internet services, infrastructural facilities, power supply, and security were ways of enhancing the use of technology at tertiary education level in South-East Nigeria.
Keywords: *Classroom without walls, curriculum implementation, technologies, COVID-19, pandemic.*

Introduction

The lockdown that came with COVID-19 pandemic opened up both salient and new areas, concepts and ideas in curriculum implementation and education. Before now, distance education, online learning, blended learning, were encouraged. Presently, one can come across terms such as virtual classroom, classroom without borders, chalkless classroom, and classroom without walls, all emanating and becoming relevant due to the COVID-19 pandemic major protocol of social distancing. These terms refer to endless opportunities associated with teaching and learning, made possible by digital technology as a tool. Technology over the years has improved the way things are done, especially in education. Its impact was felt more during the last COVID-19 pandemic era that shut down the whole world system. It introduced new ways of doing things including new ways of teaching and learning-personalized learning, home school/learning, virtual classes as well as classroom without walls (CWOW). The sole aim of these forms of teaching/learning used this period was to ensure that continuous learning takes place, irrespective of the situations in which both the teachers and learners find themselves.

Classroom without walls (CWOW) is a term coined by Marshall McLuhan in the late 1950's, who advocated that education needed to open up to the new emerging popular media of the time which was then primarily television (Utopian, 2020 and McLuhan,1960). The CWOW concept had over the years incorporated outdoor learning idea, that is, extension of the physical classroom thereby bringing to bear with the combination of learning, technology and the world (Utopian, 2020 and Kuskis, 2014). Currently, classroom without walls (CWOW) which is learning through the use of media has shifted far beyond the use of television to other forms of media referred to as learning platforms through the assistance of technology. This implies that classroom without wall (CWOW) is the use of technology and its varied platforms in teaching and learning. According to Utopian (2020), a good education is one where very few walls, if any, should exist. With the level of technological development globally, technology has forced the world to reconsider and re-evaluate practically every thought, every action, and every institution formerly taken for granted.

The pandemic affected teaching/learning severely making students to stay at home for about a year. Staying away of students from schools for a long period may adversely influence their academic achievement. There is every need for the government and school administrators to introduce the use of technology

and e-learning in public universities. Technology holds so many prospects in today's teaching and learning, especially in the present post-COVID-pandemic era. With the aid of technologies, students can be at the center of their own learning, discover their own pace, and move more fluidly through their education (Ellis, 2016). The integration and use of technologies in teaching/learning increases the chance of interaction within the learning environment (Keengwe, Onchwari and Wachira, (2008). This is because most of the new technologies used in education are quite interactive which makes it easy to create environment by which the students can learn by doing while building on new and additional knowledge. Pande, Wadhai, and Thakare (2016) buttressed the idea that the use of technology for teaching promotes flexibility, efficiency in knowledge, enhancement of qualification.

Some more prospects of technology towards e-teaching/learning were listed by Adeoye, Adanikin and Adanikin (2020) to include: completely reducing the issues of insufficient physical classrooms as lectures can be conducted online; allowing all learners' active participation and for learners to study at their own pace; enabling the taking of lectures at the comfort of both individual lecturers' and students' environment thereby increasing satisfaction and reducing stress. Arkorful and Abaidoo (2014) observed that the cost effect of using technology in training students is less than that of physical (face-to-face) contact. This is possible because it reduces travelling, time and use of physical facilities such as classrooms, halls and pews.

Again, the use of technology through e-learning serves as an alternative learning method especially during any hazard/pandemic (UNESCO 2020). Currently, there are several e-learning platforms that can be adopted and used by public universities to achieve effective implementation and coverage of the curriculum and school academic calendars. They include, Zoom, Microsoft teams, google hangout (meet), skype, Bamboo learning, google classroom, Docebo, WIZIQ, Adobe captivate, Elucidat, Blackboard learn, Wakelet, amongst others.

In spite of all these prospects associated with the use of technologies for effective teaching in post-COVID era, there are still challenges militating against its usage in public universities in Nigeria. Some of the challenges include teachers' conservatism towards innovation in technology usage (Chukwuma-Nosike, 2020 and Aina and Abdurrahman, 2020); inefficient bandwidth/network (Chukwuma-Nosike and Offorma, 2020). Where there are

technological facilities and tools, poor network connectivity still makes its use for on-line teaching/learning ineffective (Trucano, 2014).

Other major challenges include non-provision of funds by government for procurement of the technologies such as personal computers, modems, routers, ear piece for lecturers' and students' use. Some of the funds provided are sometimes misappropriated by those at various levels of authority due to high level of corruption in public service (Adeoye, Adanikin and Adanikin, 2020). Poverty and low supply of power make it quite difficult for effective utilization of technology both for the school, teacher and the learners. Nagoba and Mantri (2015) and Adhikary (2018), stressed that the worst of the entire challenges is poor quality of the academic staff in higher institutions in Nigeria. According to Adeoye, Adanikin and Adanikin, (2020), it is worrisome at this ICT age that many lecturers are not computer literate. The quality of higher education depends upon the quality of the teachers imparting it. The use of technology for effective teaching in post-COVID-19 era cannot be successful except where the lecturers are technologically compliant. To solve these challenges, it calls for stakeholders in education to take proactive steps.

Providing funds and subsequent accountability, training and retraining of lecturers in the use of technology Adeoye, Adanikin and Adanikin, (2020), government partnering with network providers to get data at a reduced cost for teachers and students Oladunjoye (2020), providing personal computers to lecturers/learners as the cost of these gadgets are very high and poverty and hunger make it impossible for them to do so UNESCO (2020), are some suggested ways of tackling the challenges of the use of technology for effective teaching in post-COVID-19 pandemic era. Improved electricity and internet connectivity are also required if the use of technologies in teaching/learning must succeed in Nigeria.

This study is hinged on Socially-Shared Cognitive theory, where learners are participants in a community where the cognition is shared between the participants, the artifacts and tools they are using, and the social institutions in which the learning occurs (Brown and Cole, 2000). This theory postulates that learners are required to be active participants for cognition to occur. Under this theory, cognition is also distributed, as sharing implies both the teachers/learners are experiencing something together and that the learning which occurs is being divided and distributed between the participants in their different learning communities (Bell and Winn, 2000). These ideas of sharing are relevant to this theory because no two learners can ever experience a

situation exactly in the same way. The role of technology and classroom without Walls here is that this learning theory supports the acquiring of skills needed in the 21st century. So through the use of technology both teachers/learners share both knowledge as well as skills. Thus, this learning theory believes that the use of technology for effective teaching could help to prepare students for employability in this highly digitalized world.

Recent researches done since the pandemic examined the use of technology in education and learning during COVID-19 pandemic in Nigeria. No study so far has been done on classroom without walls: the use of technologies for effective teaching in post-COVID-19 pandemic era in Nigerian public universities Thus, creating a gap which the present study filled. Classroom without walls which is the use of technologies for effective teaching outside the classroom is now the new order. With the outbreak of COVID-19 pandemic that brought academic activities in schools in Nigeria to an abrupt halt, the use of technologies as an alternative means of learning became imperative. Technology with its varied learning platforms such as Google Classroom, Zoom etc. has made it possible for teaching/learning to take place irrespective of teachers'/students' locations.

It has been observed by the researchers that since the post-COVID-19, public universities in Nigeria were yet to adopt the use of technologies in teaching/learning. What could be the prospects and challenges to the use of technologies for effective teaching in Nigerian public universities?

The purpose of this study majorly was to determine the prospects of using technologies for effective teaching in post-COVID-19 pandemic era in Nigerian public universities. It also focused on finding out the challenges of using technologies for effective teaching in post-COVID-19 pandemic era in Nigerian public universities. Again, it ascertained possible ways of tackling the challenges of using technologies for effective teaching in post-COVID-19 pandemic era in Nigerian public universities.

The following research questions guided the study.
1. What are the prospects of using technologies for effective teaching in post-COVID-19 pandemic era in Nigerian public universities?
2. What are the challenges of using technologies for effective teaching in post-COVID-19 pandemic era in Nigerian public universities?

3.   What are the ways of tackling the challenges of using technologies for effective teaching in post-COVID-19 pandemic era in Nigerian public universities?

Method
This study is a descriptive survey. The descriptive survey design was applied. The population of the study consisted all lecturers and students in public universities in Nigeria. The sample size for the study consisted one hundred and two (120) lecturers and two hundred (200) students, totaling three hundred and twenty (320), sampled from four (4) public universities in Imo and Abia States through multi-stage, cluster and simple random sampling techniques. The cluster sampling technique was used to select South-East out of the six geopolitical zones, Imo and Abia State were selected out of the five states that make up the South-East Geo-political Zone and two public universities were also selected from each of the states. The simple random sampling technique was used in sampling the students and lecturers.

The instrument used for the study is a four-point researcher-made rating scale titled: ***Prospects and Challenges of using Technologies for effective Teaching in post-COVID-19 Era* (PACTETPCE).** It was constructed on four-point scale with response options of (Strongly agree (SA), Agree (A), Disagree (D), and Strongly disagree (SD). The rating scale has three sections, made up of 36 items. The first section has 14 items, which sought the respondents' agreement on the prospects of using technologies in post COVID -19 pandemic era in Nigerian universities; while the second section, made up of 10 items, sought from them, the challenges encountered in the use of technologies in the era. The last has 12 items and it sought information on the way forward in the use of technologies in Nigerian universities in post COVID-19 pandemic era.

The instrument was validated by three specialists in Educational Measurement and Evaluation, Curriculum Studies and Educational Psychology. The reliability of the instrument was determined through test re-tests method and a coefficient of 0.77 was obtained using Pearson Product Moment Correlation Coefficient (r). The instrument was administered and re-administered after two weeks interval on the same lecturers and students in public universities in Anambra State, which is in the same geo-political zone as Abia and Imo States. The researchers made use of four trained research assistants. The instrument was collected on the spot and the analysis was done through mean and standard deviation.

The cut-off point for the mean responses was 2.5. Any item that had a mean of (Mean ≥ 2.5) represents agreement which means the respondents agreed with the statement, while items with mean scores < 2.5 were regarded as rejected (disagreed), which means that the respondents disagreed with the statement.

Results

Table 1: Teachers' and Students' Responses on the Prospects of Using Technologies for Effective Teaching In Post-COVID-19 Pandemic Era

S/N	Prospects of using technology for teaching in post-COVID era include:	TEACHERS			STUDENTS		
		Mean	SD	Result	Mean	SD	Result
1.	Makes learners to be active participants in teaching/learning processes.	3.3	0.82	Agreed	3.5	0.71	Agreed
2.	Promotes the use of learner-centered teaching methods.	3.5	0.58	Agreed	3.3	0.64	Agreed
3.	Ensures all gender participation.	3.6	0.69	Agreed	3.7	0.32	Agreed
4.	Reduces the spread of disease and deaths.	3.5	0.31	Agreed	3.4	0.34	Agreed
5.	Promotes flexibility in learning and knowledge irrespective of learners' location.	3.2	0.33	Agreed	3.1	0.31	Agreed
6.	Promotes healthy lifestyle while observing COVID-19 pandemic protocols.	3.4	0.31	Agreed	3.1	0.33	Agreed
7.	It is cost-effective.	3.3	0.33	Agreed	3.5	0.30	Agreed
8.	Promotes easy monitoring and supervision of teaching and learning.	3.5	0.34	Agreed	3.4	0.31	Agreed
9.	Enhances social and technological practical skills acquisition.	3.6	0.33	Agreed	3.4	0.33	Agreed
10.	Increases students' interaction with learning environment.	3.6	0.32	Agreed	3.0	0.31	Agreed

11.	Promotes better content delivery.	3.3	0.32	Agreed	3.1	0.68	Agreed
12	Reduces issues of inadequate physical infrastructural facilities-classrooms, pews, halls.	3.7	0.30	Agreed	3.5	0.32	Agreed
13.	Makes learning tedious and stressful.	1.7	0.44	Disagree	1.9	0.46	Disagree
14.	Reduces stress and saves time for the lecturers.	3.5	0.38	Agreed	3.4	0.31	
	Grand Mean	**46.7/3.3**			**41.9/3.0**		

Data on table 1 revealed the teachers' and students' responses on some of prospects of using technologies for effective teaching in post-COVID-19 pandemic era as shown by their mean responses to all items which are above 2.5 except one item No. 13, that was rated 1.7 and 1.9 respectively by the teachers and the students. The grand/pooled mean of 46.7/3.3 and 41.9/3.0 indicated the respondents' (teachers' and students') high rating agreement that students active participation, learner-centered teaching methods, gender participation, keeping up with COVID-19 protocol, reduction of the spread of disease and death, solving the issue of inadequate infrastructural facilities such as halls, classroom, chairs, stress for teachers and learners, better content delivery, students' interaction with learning environment/workstation, flexibility in learning irrespective of location and acquisition of social and practical technological skills are some of the prospects of using technologies for teaching in post-COVID -19 pandemic era. These show the prospects of using technologies for effective teaching and learning in post COVID-19 pandemic era.

Table 2: Teachers' and Students' Responses on The Challenges of Using Technologies for Effective Teaching in Post-COVID-19 Pandemic Era

	ITEMS	RESPONSES					
		TEACHERS			STUDENTS		
S/N	Challenges of using technology for teaching in post-COVID -19 pandemic era include:	Mean	SD	Result	Mean	SD	Result
15.	Poor bandwidth/ network in Nigeria.	3.8	0.38	Agreed	3.9	0.32	Agreed
16.	High cost of data.	3.3	0.30	Agreed	3.8	0.34	Agreed
17.	Teachers conservatism to technological innovations.	3.0	0.43	Agreed	3.4	0.40	Agreed
18.	Inadequate funding.	3.6	0.38	Agreed	3.7	0.36	Agreed
19.	Lack of administrative and government support.	3.1	0.34	Agreed	3.3	0.30	Agreed
20.	Poor quality of academic staff.	3.1	0.41	Agreed	3.5	0.43	Agreed
21.	Poverty and hunger.	3.5	0.33	Agreed	3.6	0.36	Agreed
22.	Inadequate supply of power.	3.8	0.34	Agreed	3.8	0.32	Agreed
23.	Lack of technological facilities –personal computers/laptops, modems, power banks, ear piece.	3.4	0.32	Agreed	3.5	0.73	Agreed

24.	Corruption in monitoring and supervision of projects.	3.0	0.38	Agreed	3.3	0.42	Agreed
25.	Digital divide and non-sponsorship of teachers to training.	3.3	0.34	Agreed	3.1	0.35	Agreed
26.	Insecurity and hacking of questions, results and other resources.	3.5	0.33	Agreed	3.4	0.35	Agreed
	Grand and Pooled Mean	**40.4/3.4**			**42.3/3.5**		

Data on table 2 show the teachers' and students' responses on some of the challenges to the use of technologies for effective teaching in post-COVID-19 pandemic era. Their mean responses to the items were all above 2.5 (Mean > 2.5).   The grand/pooled mean of 40.4/3.4 and 42.3/3.5 indicate teachers' and students' high rating agreement that inadequate power supply, lack of fund, infrastructural facilities such as personal computers and its accessories, teachers' conservatism to technology innovations, poor network and bandwidth, high cost of data subscription, poverty and insufficient technology literacy of academic staff, are some of the challenges that are encountered in the use of technologies for effective teaching in post-COVID-19 pandemic era in Nigerian public universities. The above items indicate the challenges of using technologies in teaching and learning in Nigerian universities in post-COVID-19 pandemic era.

Table 3: Teachers' and Students' Responses on Ways of Tackling the Challenges of Using Technology for Effective Teaching and Learning in Post-COVID-19 Pandemic Era

S/N	Ways of tackling the challenges of using technology for teaching in post-COVID-19 pandemic era include:	Mean X	SD	Result	Mean X	SD	Result
	ITEMS	RESPONSES					
		TEACHERS			STUDENTS		
27.	Providing adequate funding by the government.	3.6	0.82	Agreed	3.4	0.72	Agreed
28.	Employing more technologically compliant academic staff.	3.3	0.70	Agreed	3.3	0.54	Agreed
29.	Government providing adequate technological infrastructural facilities such as personal computers, laptops, modems, power banks for teachers/learners.	3.6	0.63	Agreed	3.7	0.70	Agreed
30.	Providing e-library-online services-internet with modern facilities-wireless, wide bandwidth.	3.7	0.64	Agreed	3.6	0.72	Agreed
31.	Government partnering with internet providers to reduce digital divide and cost.	3.1	0.53	Agreed	3.3	0.81	Agreed
32.	Improving electricity supply in the country using alternative energy supply.	3.7	0.61	Agreed	3.8	0.53	Agreed
33.	Sponsoring enhanced practical computer training for teachers.	3.5	0.73	Agreed	3.3	0.80	Agreed

34.	Providing soft wares and other devices that can curb hacking of security documents.	3.4	0.64	Agreed	3.5	0.61	Agreed
35.	Introducing the project of teaching with technologies in public universities.	3.4	0.63	Agreed	3.5	0.73	Agreed
36.	Disregarding the introduction of technology use and continuing with physical classroom teaching.	1.5	0.45	Disagreed	1.8	0.41	Disagreed
	Grand and Pooled Mean	**32.8/3.2**			**33.2/3.3**		

Data on table 3 show the respondents' mean responses on different ways of tackling the challenges of using technologies in teaching in post-COVID -19 pandemic era, which are above 2.5, (Mean > 2.5) except one item that is rated 1.5 and 1.8 ($Mean < 2.5$) by the teachers and students respectively. The grand/pooled mean of 32.8/3.2 and 32.2/3.3 which indicate teachers' and students' strong agreement, that providing funds, infrastructural facilities such as personal computers, modems, power banks, adequate power supply, enhanced internet networks and bandwidth, effective monitoring and supervision of the use of technologies during teaching, curbing teachers' conservatism through training of teachers on practical use of technologies for teaching and government partnering with internet providers to reduce cost and digital divide, are some of the ways of tackling the challenges of the use of technology for effective teaching in post-COVID-19 pandemic era in Nigerian public universities.

Discussion
The result as presented in Table1 showed that the prospects of using technology for effective teaching in post-COVID-19 pandemic era in Nigerian public universities. From the items in Table 1, the researchers found that students' active participation, use of learner-centered teaching methods, all gender participation, strict adherence to COVID-19 pandemic protocols, reduction of the spread of disease and death, reduced issues of inadequate infrastructural facilities such as halls, classroom, chairs, reduced stress for teachers and learners, better content delivery, students' interaction with

learning environment/workstation, flexibility in learning and acquisition of social and practical technological skills are some of the prospects of using technology for effective teaching in post-COVID-19 pandemic era in Nigerian public universities. This is in line with the findings of Aina and Abdurrahman (2020), and Adeoye, Adanikin and Adanikin, (2020) that technology enhances adequate content delivery and flexibility of teaching and learning, irrespective of the learners' and teachers' locations.

In further corroboration, Chukwuma-Nosike and Offorma (2020) and Arkorful, & Abaidoo, (2014) stressed that emphasizing the use of technology in teaching and learning especially, at the tertiary education level would promote continuous curriculum implementation and achievement of educational objectives, in event of any future pandemic. It is worthy to note that the private universities during the recent pandemic did not stop schooling because they used technology to continue teaching and learning irrespective of learners' locations.

The result of research question 2 as shown in Table 2, highlighted some of the identified challenges of the use of technologies for effective teaching in post-COVID-19 pandemic era in public universities in Nigeria. All the respondents agreed that inadequate power supply, lack of fund, infrastructural facilities such as personal computers and its accessories, teachers' conservatism to technology innovations, poor network and bandwidth, high cost of data subscription, poverty and insufficient technology-literate academic staff are some of the challenges that were encountered in the use of technology for effective teaching in post-COVID-19 pandemic era in Nigerian public universities. This agrees with the findings of Adhikary (2018) and Trucano (2014) that lack of fund from the government, inadequacy of Nigeria's fragile broadband network, poor infrastructure and teachers' Information and Communication (ICT) non-compliance, were their drawbacks in using technologies and e-teaching/learning. Some of these challenges constitute clogs in the wheel of progress in using technologies for effective teaching in public universities.

These findings further corroborate with UNESCO's (2020) statement that the use of Google classroom and other on-line teaching platforms cannot be successful except the lecturers are ICT compliant. Therefore, considering the importance of the use of technologies in effective teaching for the total development of the learners, it is vital that the challenges mentioned above be

highlighted and tackled to promote continuous learning through the use of technologies in post-COVID-19 pandemic era in Nigerian public universities. Again, the result in Table 3 shows the respondents' responses to the ways of tackling the challenges to the use of technologies in effective teaching in post-COVID-19 pandemic era in Nigerian public universities.   From the items in Table 3 the researchers observed that government providing more funds, personal computers and accessories to teachers/students, free data/reduced data subscription, improving internet network bandwidth, public electricity supply and exposing lecturers to training on practical use of technologies as it relates to new on-line teaching/learning packages are ways of tackling the challenges to the use of technologies for effective teaching in post-COVID-19 pandemic era. This agrees with the findings of Chukwuma-Nosike (2020) and Oladunjoye (2020) respectively, that providing teachers/learners with personal computers at a reduced price, improving the power supply and government partnering with communication agencies to reduce data tariff will help to tackle the challenges to the use of technology in schools. Data, computers, good network bandwidth and electricity are the strengths of effective technology use in any society, thus it is vital in public universities in Nigeria. Collaborating further, Pande, Wadhai, & Thakare, (2016) stressed that to achieve efficient use of technology for effective teaching, lecturers need to be re-trained on the new teaching and learning platforms thereby enhancing their quality.

Conclusion
The need to introduce classroom without walls, that is, the use of technologies for effective teaching in post-COVID-19 pandemic era in Nigerian public universities has become necessary. This is because the prospects of using technologies during teaching are enormous, especially during this period of post-pandemic. Use of technology and its tools will ensure active participation of all students irrespective of their gender and location thereby promoting better content delivery; continuous schooling that will enhance students' academic achievement. The use of technologies for effective teaching is faced with so many challenges such as inadequate power supply, lack of infrastructural facilities like personal computers, inefficient bandwidth and network, high data subscriptions and non-technology compliant lecturers. Tackling these challenges by providing funds, improved power supply, free or low data, sponsoring lecturers to practical training on the use of technology. These would promote the use of technologies for effective teaching in post-COVID-pandemic era in Nigerian public universities.

Recommendations

Based on the findings of this study, the researchers made the following recommendations:

1. Public universities in Nigeria should adopt the use of new technology-learning tools such as Zoom, google classroom, google meet, skype, Wakalet and Bamboo to facilitate teaching/earning in this post-COVID era so as to be well equipped for future occurrences.

2. The Federal Government of Nigeria needs to provide adequate funding for the take-off of the use of technologies for effective teaching project in public universities in Nigeria.

3. The Federal Government of Nigeria, through her quality assurance agencies in education, should partner with some international agencies to donate or provide personal computers, power-banks, modems other accessories to the teachers and students to reduce all digital divide, as this would help to promote the use of technologies for effective teaching in Nigeria.

4. The Government should sponsor teachers to additional practical training on the use of technologies and new on-line teaching packages to improve their efficiency, thereby reducing teachers' conservatism towards technology.

5. The government should improve power supply including provision of alternative power supply especially, in rural areas so that every learner can participate and benefit in the use of technologies during teaching, irrespective of their locations.

6. The government and school administrators should partner with communication organizations and service providers to get free data or reduced subscriptions from their varied networks for the teachers and students so as to enhance access to internet, which is required in the use of technologies for effective on-line teaching in this post-COVID-pandemic era.

References

Adeoye, I. A., Adanikin, A. F. & Adanikin, A. (2020). COVID-19 and E-Learning: Nigeria Tertiary Education System Experience. *International Journal of Research and Innovation in Applied Science (IJRIAS)*, V, (V), May 2020, 28-31. Retrieved   30 January, 2021 from   <u>www.rsisinternational.org</u>   https://www.researchgate.net/ publication/341574880_COVID-19_and_E-Learning_Nigeria_ Tertiary_ Education_System_Experience.

Adhikary, M. C. (2018). Role of teachers in quality enhancement education and human   Development. *International Journal of Humanities and Social Science Invention (IJHSSI),* 7(12), 34-41.

Aina, J. K. & Abdurrahman A. O. (2020). Mitigating the impact of COVID-19 on the teaching and learning of science in the Nigerian higher education, *International Journal of Research and Innovation in Social Science (IJRISS*). IV(VI), June 2020, 334-337. Retrieved 30 January, 2021 from www.rsisinternational.org https://www.researchgate.net/ publication/342703103_Mitigating_the_Impact_of_

Arkorful, V. & Abaidoo, N. (2014). The role of e-learning, the advantages and disadvantages of its adoption in Higher Education. *International Journal of Education and Research*, 2(12), 397-410.

Bell, P., & Winn, W. (2000). Distributed cognitions, by nature and by design. In D. Jonassen, & L. S. M., *Theoretical Foundations of Learning Environment* (pp.123-145). New Jersey: Lawrence Erlbaum Associates, Inc.

Brown, K., & Cole, M. (2000). Socially Shared Cognition: System Design and the Organization of Collaborative Research. In D. Jonassen, & L. S. M., *Theoretical Foundations of Learning Environment* (pp. 197-214). New Jersey: Lawrence Erlbaum Associates, Inc.

Chukwuma-Nosike, C. (2020). Constraints to effective technological curriculum content delivery in state universities in south-East, Nigeria, *The Nigerian Academy of Education (NAE) 2019 Conference Proceedings,* 137-145

Chukwuma-Nosike, C. & Offorma, G.C. (2020). Providing safe and equitable learning during pandemics in Nigeria. *World Council of Curriculum and Instructions (WCCI) NEWSLETTER* Special COVID-19, Issue 9, Summer 2020. 29-34 Accessed 18 July, 2020. https://www.wcci-international.org

Doak, S. (2020). Emerging Theories of Learning and the Role of Technology, https://sites.google.com/a/boisestate.edu/edtechtheories/Home/emerging-theories-of-learning-and-the-role-of-technology

Ellis, J.L. (2016). Edsurge Embracing the Wall-less Classroom https://www.edsurge.com/news/2016-11-09-will-edtech-bring-back-the-open-classroom

Keengwe, J., Onchwari, G., & Wachira, P. (2008). The use of computer tools to support meaningful learning. *AACE Journal, 16* (1), 77-92.

Kuskis, A. (2014). Classroom without walls: The traditional classroom criticized. https://.mcluhangalaxy.wordpress.com

McLuhan, M. (1960). excerpt from *"Classroom Without Walls," Explorations in Communication*, Boston: Beacon Press.

Nagoba, B. S., & Mantri, S. B. (2015). Role of teachers in quality enhancement in higher education. *Journal of Krishna Institute of Medical Sciences University,* 4(1), 117-182.

Oladunjoye, B. (2020)**.** Making on-line education accessible to all in Nigeria, BONews, October 22. *https://pulitzercenter.org/reporting/making-online-education-accessible- all-nig.*

Pande, D., Wadhai, V. M., & Thakare, V. M. (2016). E-learning system and higher education. *International Journal of Computer Science and Mobile Computing,* 5(2), 274-280.

Trucano, M. (2014). Education and technology in age of pandemics (revisited). Revised April 23, 2020, from https://www.university worldnews.com/post.php?story=2020040915003492.

UNESCO (2020). COVID-19 Educational Disruption and Response. Retrieved 13 April, 2020, from https://en.unesco.org/covid19/ educationresponse

UTOPIAN COW (2020). Innovative ideas in art and education. www.utopiancow.wordpress.com