



## **Rethinking Post Covid-19 Education: A Migration to Ubiquitous Learning Environment**

**Fadip Audu Nannim<sup>1</sup>; Nnenna Ekpereka Ibezim<sup>1</sup>; Chukwuma Mgboji<sup>1</sup> & Ukala, Geoffrey<sup>2</sup>**

<sup>1</sup>Department of Computer and Robotics Education, University of Nigeria, Nsukka

<sup>2</sup>Department of Science Education, University of Nigeria, Nsukka

**Corresponding Author:** [fadip.nannim@unn.edu.ng](mailto:fadip.nannim@unn.edu.ng)

### **Abstract**

This study adopted the explanatory sequential mixed methods design to investigate the way forward for education in the post-COVID-19 pandemic. The instrument for quantitative data collection was a validated online questionnaire that had an overall reliability index of 0.826. The qualitative data were collected through open-ended online interview questions. The quantitative data was analyzed using mean and standard deviation, while thematic analysis with the help of atlas.ti was used for qualitative data analysis. The results showed that the pandemic has pushed stakeholders in education to rethink the current digital platform for online learning. There is also the case of unpreparedness of the Nigerian education system to implement online learning due to weak infrastructure. The recommendations made include the use of ubiquitous learning environments in our education system, training of teachers, students, and parents to keep pace with changes in the field of education among others.

**Keywords:** Post COVID-19; Education; Ubiquitous; Lesson Learned; Priority of Education

### **Introduction**

The global pandemic caused by the outbreak of Coronavirus Disease 2019 (COVID-19), which led to the prolonged closure of schools and disruptions of academic activities worldwide has necessitated countries around the world to rethink an alternative way of ensuring the continuity of education without any break. The report has shown that more than a billion students, constituting about 90% of the world student population have been affected as a result of these disruptions of learning activities due to social distancing policies put in place by the government (Azevedo et al., 2020; Owusu-Fordjour, 2020). Because of education continuity, most countries of the world rushed and embraced the ubiquitous learning environments via online learning platforms including learning management systems such as Moodle, Canvas, Google Classroom among others. The ubiquitous technology enables everywhere and anytime

access to learning, hence breaking the place and time barrier to education. This unplanned and sudden paradigm shift in the education sector has opened doors to new opportunities, and also new challenges.

Concerning this sudden switch to online education, the World Economic Forum (2020) highlighted that the way forward is to leverage further on the existing technologies and internet education, which will serve as a pivot to school education. This abrupt shift as a result of school closures due to the COVID-19 pandemic has forced most teachers around the world to deliver online classes without proper training or skills (Radha et al., 2020; Ramya & Variyar, 2020). There was no time to prepare for the use of the various new tools for the digitalization of learning contents and the development of new contents (Iivari et al., 2020). There also existed disparities in access to online education across countries (Watts, 2020;



Shama, & Ikbai, 2020), as the economic status of countries or individuals influences internet access (World Bank, 2020; World Economic Forum, 2020). According to UNESCO (2020), groups of students such as those from low-income home, religious or ethnic minorities, migrants, in precarious home situations, those in the rural area, and the ones with special need require special attention and specific strategy during this COVID-19 pandemic when it comes to online distance learning. In a nutshell, the education sector faced and is still facing challenges as a result of the COVID-19 breakout. These challenges resulted in some abrupt paradigm shifts to sustain the education sector. It is therefore imperative to investigate the lessons learned from the challenges which confronted education during the COVID-19 pandemic and what should be the priority of the education system in building its plans and programs for the future.

### **Challenges of Education during COVID-19 pandemic**

The COVID-19 pandemic adversely affected the education sector and is rapidly changing the way learning and teaching are taking place. Some of the critical lessons learned from the challenges that confront the education sector during the pandemic included: unpreparedness of some education systems to provide remote learning, weak educational infrastructure, inequality in accessing the internet, and teachers' unpreparedness to switch to remote learning (UNESCO, 2020). Students were prevented from going to schools as a result of lockdown (Jonson et al., 2020; Brom et al., 2020), hence, most schools and universities worldwide adopted distance learning approaches (Dhawan, 2020; Huang et al., 2020). This is a shift from the normal school or university's instructional approach which normally

involves some element of a one-on-one or face-to-face encounter with the teachers from time to time. The benefits of online or distance education have been reported to include an increase in the level of students' motivation, increased academic engagement, expanded educational access, better quality learning opportunities, increased educational choice, and instructional flexibility, as well as administrative efficiency (Avgerinou & Moros, 2020). According to Avgerinou and Moros (2020), this transition led to increased faculty confidence in planning, teaching and assessing online with just-in-time and content-specific professional development. Parents' satisfaction is also observed despite the difficulty they experienced in providing the necessary online schooling facilities due to insufficient preparedness throughout the prolonged pandemic.

### **The Education System and Building Future Programs**

The COVID-19 pandemic has revolutionized how education will operate, most especially in Nursery, Primary, and Secondary schools. In light of this, it has been suggested that some urgent measures need to be taken to facilitate this transition. With rising concern on the future of education after COVID-19, UNESCO (2020) recommended that the education system should explore new methods to train and prepare teachers and educators to equip them with the necessary skills and competencies to keep pace with changes in the field of education. The system should review and upgrade the range of skills provided for students to ones that will equip and prepare them for the future, undertake a new measure for benchmarking the quality of education and tackling the current digital divide, and developing of a worldwide



framework for cooperation, coordination and effective partnership between the public and private institution to provide equitable and quality education to all students around the world.

Another study on teaching, technology, and teacher education during the COVID-19 pandemic by Avgerinou and Moros (2020), recommended clear objectives which are aligned with the core subjects and presents students with daily PowerPoint lessons without necessarily replicating a school day teaching; hosting of weekly meetings with faculty and scheduled meetings with parents; maintaining a communication line by providing weekly or biweekly parent letter about next step; maintaining a strong and continuous communication among school leadership, recognizing that everyone's need is different and be prepared to support students learning needs with personalized sessions both academic and psychological; collecting of feedback from the ongoing quantitative and qualitative survey as a necessary way to adjust the school's performance in a virtual learning setting; and most importantly teacher preparation and professional development. According to Hu et al. (2019), online and blended education is still a relatively new field for practice and research, hence the need for relevant teacher preparation programs and professional development cannot be overemphasized. Hu et al. (2019) also emphasized the need to support pre-service teachers to develop those skills and find their online teaching voices while being research and theory-informed. To achieve transformation during the COVID-19 pandemic, UNESCO (2020) asserts that effort must be made to exploit Information Technology (IT), vocational training for teachers and improve their capacities, review assessment method,

undertake an all-inclusive digital transformation, build an effective partnership structure, and review educational philosophies as well as goals and outputs of educational systems to align with the current development as well as requirements for surviving in today's world.

### Research Questions

The following research questions guided the study

1. What are the lessons learned from the challenges that confronted the education system during the COVID-19 pandemic?
2. What should be the priority of the education system in building their plans and programs in the future?

### Methodology

The study adopted a mixed-methods approach, in particular, the explanatory sequential design to investigate the lesson learned from the challenges which confront education during the COVID-19 pandemic and what the way forward for the education system is in building its plan and programs for the future. This design involved collecting data in two phases, first, the quantitative data followed up with the qualitative data to refine, explain, and triangulate the quantitative results (Creswell, 2012).

A total of 680 respondents participated in the study. The instrument for quantitative data collection was a 16-item closed-ended online questionnaire. It is divided into three sections: Section A contains the demographic information, section B contains items on lesson learned from challenges that confront education during COVID-19 pandemic, and section C contain items on the priority of education system in building their plans and programs in the future. The items were rated on a four-

point rating scale of Strongly agree (4), Agree (3), Disagree (2), and Strongly Disagree (1). The instrument was validated by three experts, two from the Department of Computer and Robotics Education, University of Nigeria, Nsukka, while one from the Measurement and Evaluation Unit, Department of Science Education, University of Nigeria, Nsukka. The instrument had internal consistency reliability of 0.674 and 0.795 for cluster 1 and Cluster 2 respectively, with an overall reliability index of 0.826. The qualitative data were collected through open-ended online interview questions.

The online questionnaire/interview questions were shared with the respondents via e-mails; and social networking sites such as Facebook, and WhatsApp. The data collected from the stakeholders in education who included lecturers/teachers, students,

parents/guardians, and policymakers were analyzed using frequency count, percentages, mean, standard deviation, and text analysis with the help of SPSS (for quantitative data) and atlas.ti (for qualitative data). Items with mean ratings of 2.5 and above were accepted while mean ratings less than 2.5 were rejected. All ethical issues in conducting research such as seeking participants' consent and their confidentiality were strictly adhered to.

## Results

### Demographic Information

Six hundred and eighty (680) respondents participated in the online survey. Among them, 480 were male while 200 were female. Also, 460 of the participants were teachers/lecturers, 60 parents/guardians, 140 students, and 20 policymakers.

**Table 1. Demographic Information**

Count		Stakeholder's Category				
		Teacher/lecturer	Parent/Guardian	Students	Policymaker	Total
Gender	Male	340	40	80	20	480
	Female	120	20	60	0	200
Total		460	60	140	20	680

Table 1 shows that there were more male respondents (480) as compared to the female respondent (200). It was also noted that no female policymaker responded to the item of the online questionnaire.

**Research Question 1:** What are the lessons learned from the challenges that confronted education during the COVID-19 pandemic?

To answer research question one, the frequency count, percentages, means, and standard deviation were computed for responses on section B items. Items with a mean rating of 2.5 and above were accepted as a lesson learned from the challenges that confront education during the COVID-19 pandemic, while mean ratings less than 2.5 were rejected. The result is presented in Table 2.



**Table 2. Frequency Count, Percentage, Mean, and Standard Deviation of Lesson learned from the challenges that confront education during the COVID-19 pandemic**

S/N	Item Statement	N	Strongly Disagree	Disagree	Agree	Strongly Agree	Mean	Std. Dev.	Remark
1	There was unpreparedness of the Nigerian educational systems in providing remote learning	680	20 (2.9%)	20 (2.9%)	140 (20.6%)	500(73.5%)	3.65	0.68143	Accepted
2	The pandemic pushed us to assess and rethink current digital platforms for distant and life-long learning.	680		20 (2.9%)	280 (41.2%)	380 (55.9%)	3.53	0.55535	Accepted
3	COVID-19 pushed governments to accelerate their efforts in the educational sector	680	80 (11.8%)	320 (47.1%)	200 (29.4%)	80 (11.8%)	2.41	0.84490	Rejected
4	There is weak infrastructure for supporting online learning	680	40 (5.9%)		140 (20.6%)	500 (73.5%)	3.62	0.76809	Accepted
5	Inequality in accessing the internet	680	20 (2.9%)	20 (2.9%)	160 (23.5%)	480 (70.6%)	3.62	0.68713	Accepted
6	Teachers' unpreparedness to switch to remote learning	680	20 (2.9%)	100 (14.7%)	260 (38.2%)	300 (44.1%)	3.24	0.80714	Accepted
7	Decrease in academic attainment due to lack of technological means for distance learning	660		40 (5.9%)	140 (20.6%)	480 (70.6%)	3.67	0.58648	Accepted
<b>Cluster1 Mean</b>		<b>680</b>					<b>3.39</b>	<b>0.41077</b>	

Table 2 shows that items 1, 2,4,5,6, and 7 had mean ratings above 2.5. Therefore, the items were accepted as some of the lessons learned during the COVID-19 pandemic. It can also be observed that these items had percentage scores above 50 for strongly agree, with exception of item 6 which had 44.1% for strongly agree, and 38.2% for “agree”. Only item 3 was rejected as not a lesson learned during the pandemic, since it had a mean rating of 2.41. Most respondents 47.1% disagree and 11.8% strongly disagree with this statement which said that “COVID-19 pushed governments to accelerate their efforts in the educational sector”. A cluster mean of 3.39 shows that lessons have been learned from the challenge that confronts education during the COVID-19 pandemic.

Respondents' responses to the open-ended interview questions of the research

question were coded using atlas.ti and the word cloud was presented in Figure 1.



**Figure 1. Word cloud on lessons learned from the challenges that confronted education during the COVID-19 pandemic**

The word frequency query cloud in Figure 1 showed the most frequently



occurred word from the respondents' responses to the lesson learned during the COVID-19 pandemic. The larger the word font size, the more the frequency of occurrence of the word. According to the responses, some of the lessons learned included lack of government commitment to educational growth, lack of human capital development, lack of adequate power (electricity), and an internet connection to support and sustain e-learning, among others.

**Research Question 2:** What should be the priority of the education system in building their plan and programs in the future?

In other to answer research question two, frequency counts, percentages, means, and standard deviation were computed for the participant response to section C of the questionnaire. Items with mean ratings of 2.5 and above were accepted as what should be the priority of the education system in building their plans and programs in the future, while mean ratings less than 2.5 were rejected. The result is presented in Table 3.

**Table 3. Frequency Count, Percentage, Mean, and Standard Deviation of the Priority of the Education System in Building their Plans and Programs in the Future**

S/N	Items Statement	N	Strongly Disagree	Disagree	Agree	Strongly Agree	Mean	Std. Dev.	Remark
8	Effort must be made to capitalize on ICT	680			200 (29.4%)	480 (70.6%)	3.71	.45598	Accepted
9	Enable infrastructure, make it available for everyone and ensure that it can accommodate all updates occurring in educational platforms and resources	680			260 (38.2%)	420 (61.8%)	3.62	.48632	Accepted
10	Ensure mutual collaboration and support among organizations, institutions to empower underprivileged areas	680			320 (47.1%)	360 (52.9%)	3.53	.49950	Accepted
11	Establish regulatory policies and frameworks to handle emergencies and ensure quality and equity in education in all circumstances	680			260 (38.2%)	420 (61.8%)	3.62	.48632	Accepted
12	Improve curricula to accommodate different teaching and learning methods, especially the practical ones	680		20 (2.9%)	220 (32.4%)	440 (64.7%)	3.62	.54352	Accepted
13	Habilitate, train, and enable teachers and education authorities to develop their teaching and learning methods for lifelong learning	680			240 (35.3%)	440 (64.7%)	3.65	.47824	Accepted
14	Optimize distance learning and adapt to the changing reality of the educational process	660			320 (47.1%)	340 (50.0%)	3.52	.50015	Accepted
15	Creating specialized platforms for capacity-building and skill-development targeting students, teachers, and education authorities	680			300 (44.1%)	380 (55.9%)	3.56	.49689	Accepted
16	Training of parents and guardians to support their children's learning	680		40 (5.9%)	360 (52.9%)	280 (41.2%)	3.35	.58867	Accepted
<b>Cluster2 Mean</b>		<b>680</b>					<b>3.57</b>	<b>.31233</b>	

Table 3 shows that the respondents agreed to all the nine items (item 8 to 16) in section C as what should be the priority of education systems in building their plans and programs in the future. Almost all the items except for item 16 had their mean ratings above 3.5 and

a percentage above 50% for strongly agreed. The cluster mean of 3.57 shows that the respondents were unanimous about these statements as what should be the priority of the education system in building their plans



## Discussion

The discussion of results was conducted based on the two research questions guiding the study: what are the lessons learned from the challenges that confronted education during the COVID-19 pandemic? And what should be the priority of the education system in building their plans and programs in the future? Relevant literature were used in discussing the results.

## Lesson learned from the challenges that confront education during the COVID-19 pandemic

The outbreak of COVID-19 has opened up an opportunity for rethinking the goals of education. This has necessitated the stakeholders in education to push for a paradigm shift from the traditional face-to-face teaching approach to an online or distance learning approach with the help of technology. This has become the “new normal!”

Results in Table 2 show that about 73.5% of the respondent strongly agreed that there was the unpreparedness of the Nigerian education systems in providing remote learning. This could be observed in the manner in which the schools were locked down due to social distance policies imposed by the government to curbed the spread of the virus. Even when other countries of the world continued with classes online, most Nigerian schools remained closed with no academic activities (Lawal et al, 2020; Jacob et al., 2020). Also, 55.9% of the respondents

Figure 2. Word Cloud on what should be the Priority of the Education System in Building their Plans and Programs in the Future

The frequency cloud in Figure 2 shows the most commonly reported concerns by respondents. The bigger the word font size, the higher the frequency of occurrence of the word in the query cloud. For example, the issue of providing free data and LMS subscriptions to teachers and students was mentioned 24 times! Other important words identified in the query cloud included: students, online, bandwidth, data, monthly, subscription, training, teachers, learning, laptops, smartphones, train, afford, etc. The respondents identify training of students and teachers on Technology-Enabled Learning (TEL), making the Learning Management System (LMS) free for teachers, providing monthly data subscription to students and teachers among others.



strongly agreed that the pandemic pushed them to assess and rethink current digital platforms for distant and life-long learning, 73.5% strongly agreed that there is a weak infrastructure for supporting online learning, 70.6% strongly agreed that there is inequality in accessing the internet, the same percentage also strongly agreed that there is a decrease in academic attainment due to lack of technological means for distance learning. Furthermore, 44.1% strongly agreed, and 38.2% agreed on teachers' unpreparedness to switch to remote learning, which also agrees with (UNESCO, 2020). Avgerinou and Moros (2020) found that teachers were not trained to teach using technology. However, 47.1% of the respondents disagreed that COVID-19 pushed governments to accelerate their efforts in the educational sector. Meaning that the government is not doing enough to accelerate its efforts in the education sector. This item statement also falls below the acceptance mean benchmark of 2.5, as its mean rating is 2.41. The qualitative findings further proved that the government was not doing enough. Some of the comments extracted from the respondents included: lack of government commitment to educational growth, lack of human capital development, lacks of adequate power (electricity), and internet connection to support and sustain e-learning, among others.

### **The Priority of the Education System in Building their Plan and Programs in the Future**

To adapt to the new normal post-COVID-19 education, the education system must prioritize building its plans and programs to sequence with present realities. This pushed the researcher to sample the opinions of stakeholders in education to find out what

the priority of the education system should be in building their plans and programs for the future.

Results in Table 3 show that a majority of the respondents strongly agreed to the nine items under this theme as what should be the priority of the education sector in building their plans and programs for the future. The mean ratings for almost all the items is between 3.7 to 3.52 (with between 70.6 % and 50.0% of the 680 respondents strongly agreeing to the statements). Only item 16 (training of parents and guardians to support their children's learning) has a mean rating of 3.35, which is still within the acceptable range (agreed).

Results from this study show that effort must be made to capitalize on ICT; enable infrastructure, make it available for everyone and ensure that it can accommodate all updates occurring in educational platforms and resources; ensure mutual collaboration and support among organizations, institutions to empower underprivileged areas; establish regulatory policies and frameworks to handle emergencies and ensure quality and equity in education in all circumstances; improve curricula to accommodate different teaching and learning methods, especially the practical ones; and habilitate, train and enable teachers and education authorities to develop their teaching and learning methods for lifelong learning. Others are to optimize distance learning and adapt it to the changing reality of the educational process; creating specialized platforms for capacity-building and skill-development targeting students, teachers, and education authorities; and Training of parents and guardians to support their children's learning. The cluster mean of 3.57 (with a standard deviation of 0.031) shows that overall, the respondents accepted





these items as what should be the priority of education systems in building their plans and programs in the future. The standard deviation of 0.031 also shows how closely spread the scores are among the respondents. This result is in agreement with numerous studies that have shown that the new normal now is adapting to online distance learning for every time and everywhere access to learning (Dhawan, 2020; Huang, 2020). Here, there is no barrier to place and time. Studies have also recommended making available ICT infrastructure to students and teachers to cope with this challenge (Sari & Nayir, 2020, Kanwar, 2020). Reimers et al. (2020); and Drane et al. (2020) identified the creation of a special platform for capacity building and skill development targeting students, teachers, parents, and all stakeholders in education. The overall goal is to facilitate and rapidly design processes and implement adaptive responses to the emerging education challenges and to also make provision for and protect students learning opportunities during and after the COVID-19 pandemic.

### Conclusion

This study focused on lessons learned from the challenges that confront education during the COVID-19 pandemic, and what should be the priority of the education system in building their plans and program in the future. It was found that the pandemic is pushing people to rethink the current digital platform for online learning. There was also unpreparedness of the Nigerian education system to implement it due to weak infrastructure. The study also shows that the priority of the education system must be capitalizing on ICT by building infrastructure that can accommodate all updates occurring in the educational platform and resources.

Other priorities should include establishing regulatory policies and frameworks to handle emergencies and ensure quality and equity in education in all circumstances, and training of teachers and parents to support their children's learning.

### Recommendations

Based on the results of this study, the following recommendations were made:

1. The education system must ensure a shift from the use of technology in the classroom to beyond the classroom innovatively and creatively. This could be achieved through enforcing the use of ubiquitous learning environments such as the Learning Management Systems (LMS) in our education system
2. The government must ensure that everyone has access to the internet and digital devices for teaching and learning purposes
3. The education system should devise new ways of training teachers to acquire skills and competencies that will keep them relevant to the changes in the field of education
4. The education system must review and upgrade the range of skills provided to students to better prepare them for the future.

### References

- Avgerinou, M. D., & Moros, S. E. (2020). The 5-Phase Process as a Balancing Act during Times of Disruption: Transitioning to Virtual Teaching at an International JK-5 School. In R. E. Ferdig, E. Baumgartner, R. Hartshorne, R. Kaplan-Rakowski & C. Mouza (Eds.), *Teaching, technology, and teacher education during the covid-19 pandemic: Stories from the field* (pp. 583-594). Waynesville, NC, USA: Association



- p for the Advancement of Computing in Education (AACE).
- [https://media-aacs.zentech.gr/filesystem/Multimedia/pdf/Pages from ebook online teaching and learning-2\\_id393.pdf](https://media-aacs.zentech.gr/filesystem/Multimedia/pdf/Pages from ebook online teaching and learning-2_id393.pdf)
- Azevedo, J. P., Hasan, A., Goldemberg, D., Iqbal, S. A., & Geven, K. (2020). Simulating the potential impacts of covid-19 school closures on schooling and learning outcomes: A set of global estimates. <https://doi.org/10.1596/1813-9450-9284>
- Brom, C., Lukavský, J., Greger, D., Hannemann, T., Straková, J., & Švaříček, R. (2020, July). Mandatory Home Education During the COVID-19 Lockdown in the Czech Republic: A Rapid Survey of 1st-9th Graders' Parents. *In Frontiers in Education*, 5, 103. <https://doi.org/10.3389/feduc.2020.00103>
- Creswell, J.W., (2012). *Educational research: planning, conducting, evaluating quantitative and qualitative research* (4<sup>th</sup> ed.). Boston. Pearson education inc.
- Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems*, 49(1), 5-22. <https://doi.org/10.1177/0047239520934018>
- Drane, C., Vernon, L., & O'Shea, S. (2020). The impact of 'learning at home on the educational outcomes of vulnerable children in Australia during the COVID-19 pandemic. [https://www.dese.gov.au/system/files/document/other/final\\_literaturereview-learningathome-covid19-final\\_28042020.pdf](https://www.dese.gov.au/system/files/document/other/final_literaturereview-learningathome-covid19-final_28042020.pdf)
- Hu, M., Arnesen, K., Barbour, M. K., & Leary, H. (2019). A Newcomer's Lens: A Look at K-12 Online and Blended Learning in the Journal of Online Learning Research. *Journal of Online Learning Research*, 5(2), 123-144. <https://www.learntechlib.org/p/195231/>
- Huang, R., Tlili, A., Chang, T. W., Zhang, X., Nascimbeni, F., & Burgos, D. (2020). Disrupted classes, undisrupted learning during COVID-19 outbreak in China: application of open educational practices and resources. *Smart Learning Environments*, 7(1), 1-15. <https://doi.org/10.1186/s40561-020-00125-8>
- Iivari, N., Sharma, S., & Ventä-Olkkonen, L. (2020). Digital transformation of everyday life—How COVID-19 pandemic transformed the basic education of the young generation and why information management research should care?. *International Journal of Information Management*, 55, 102183. <https://doi.org/10.1016/j.ijinfomgt.2020.102183>
- Jacob, O. N., Abigeal, I., & Lydia, A. E. (2020). Impact of covid-19 on the higher institutions development in Nigeria. *Electronic Research Journal of Social Sciences and Humanities*, 2(2), 126-135. <http://www.eresearchjournal.com/wp-content/uploads/2020/04/0.-Impact-of-COVID.pdf>
- Johnson, C. L., Moon, M. M., & Hendry, J. A. (2020). One size does not fit all: Traditional lockdown versus multi-option responses to school shootings. *Journal of school violence*, 19(2), 154-166. <https://doi.org/10.1080/15388220.2018.1553719>



- Kanwar, A. (2020). Challenges for eLearning during COVID-19. <http://hdl.handle.net/11599/3665>
- Lawal, B. K., Haruna, A., Kurfi, F. S., & David, K. B. (2020). COVID-19 pandemic and pharmacy education in a developing country: A case study from Nigeria. *Pharmacy Education*, 20(2), 15-16. <https://doi.org/10.46542/pe.2020.202.1516>
- Owusu-Fordjour, C., Koomson, C. K., & Hanson, D. (2020). The impact of Covid-19 on learning: the perspective of the Ghanaian student. *European Journal of Education Studies*. <https://www.oapub.org/edu/index.php/ejes/article/view/3000>
- Radha, R., Mahalakshmi, K., Sathis Kumar, V., & Saravanakumar, A. R. (2020). E-learning during lockdown of Covid-19 pandemic: a global perspective. *International journal of control and automation*, 13(4), 1088-1099.
- Ramya, K., & Variyar, A. (2020). Impact of lockdown on teachers in higher education institutions. *Aut Aut Research Journal*, 11(5), 33-38. <http://www.autrj.com/gallery/6-aut-may-4113.pdf>
- Reimers, F., Schleicher, A., Saavedra, J., & Tuominen, S. (2020). Supporting the continuation of teaching and learning during the COVID-19 Pandemic. *Organisation for Economic Co-operation and Development*, 1(1), 1-38. <https://globaled.gse.harvard.edu/files/gpii/files/supporting-the-continuation-of-teaching-and-learning-during-the-covid-19-pandemic.pdf>
- Sari, T., & Nayir, F. (2020). Challenges in Distance Education During the (Covid-19) Pandemic Period. *Qualitative Research in Education*, 9(3), 328-360. <http://dx.doi.org/10.17583/qre.2020.5872>
- Shama, S., & Ikbali, J. (2020). EDUCATION DURING A PANDEMIC: A feasibility study of online classes in Bangladesh to counteract potential study gaps caused by COVID-19 related lockdowns. <https://doi.org/10.31235/osf.io/p6mws>
- UNESCO (2020). The future of education after COVID-19: Regional Dialogue, Synthesis Report. UNESCO Beirut. [https://en.unesco.org/sites/default/files/synthesis\\_report\\_future\\_of\\_education\\_webnair\\_1.pdf](https://en.unesco.org/sites/default/files/synthesis_report_future_of_education_webnair_1.pdf)
- Watts, G. (2020). COVID-19 and the digital divide in the UK. *The Lancet Digital Health*, 2(8), e395-e396. [https://doi.org/10.1016/S2589-7500\(20\)30169-2](https://doi.org/10.1016/S2589-7500(20)30169-2)
- World Bank (2020). How countries are using edtech (including online learning, radio, television, texting) to support access to remote learning during the COVID-19 pandemic. <https://www.worldbank.org/en/topic/edutech/brief/how-countries-are-using-edtech-to-support-remote-learning-during-the-covid-19-pandemic>
- World Economic Forum (2020). The COVID-19 pandemic has changed education forever. This is how. <https://www.weforum.org/agenda/2020/04/coronavirus-education-global-covid19-online-digital-learning/>