

Mitigating the Impact of COVID-19 on the Teaching and Learning of Science in the Nigerian Higher Education

Aina, Jacob Kola, Ph. D^{1*}, Abdulrahman Abdulgafar Opeyemi²

^{1,2}*School of Science, College of Education (Tech.) Lafiagi, Kwara State, Nigeria*

Abstract: The focus of the article is on mitigating the impact of the COVID-19 pandemic on the teaching and learning of science in Nigerian higher institutions. It argued that conventional strategies of teaching are not adequate for teaching science during the pandemic because of the lockdown and social distancing. The script is of the view that e-learning would be the best alternative: however, the various modes of e-learning required face-to-face lecturing, which may not be possible at this period. In light of this, the authors believed the Google Classroom framework, which has been in vogue in many countries of the world could be the best. The paper reviewed the benefits of Google Classroom based on the countries that had used the method. The manuscript mentioned some challenges that can militate against the implementation of the strategy in Nigeria. It was concluded that Google Classroom could be the alternative to science teaching and learning at this period if all the challenges mentioned were mitigated. Finally, the implications of the paper were highlighted.

Keywords: COVID-19, Google Classroom, Lockdown, Pandemic, Social distancing, teaching and learning

I. INTRODUCTION

The emergence of Corona virus known as the COVID-19 pandemic devastated all sectors of the global economy. The educational system of the world was halted because of social distancing and the lockdown. The conventional paradigm of teaching fails and teaching/learning suffers a severe setback all over the world including Nigeria. Teaching and learning in science education is evolving. Many decades ago in Nigeria, the conventional methods of teaching holds sway in the educational sector (Aina & Langenhoven, 2015). In recent times, teaching and learning had developed into an electronic paradigm (e-learning) that pervaded the entire schools of the world. However, in Nigeria's higher education context the issue of e-learning is not common (Ajadi, Salawu & Adeoye, 2008; Kyari, Adiuku-Brown, Abechi & Adalaku, 2018).

The world is not static but dynamic and technology is changing human endeavor rapidly. Along with the changes are various challenges the human race is facing which makes our education fragile and weak such as the current problem of COVID-19 pandemic. The pandemic has exposed the weakness in teaching and learning in Nigerian schools because the typical teaching paradigm fails.

In Nigeria, the current lockdown in the country occasioned by the COVID-19 pandemic is severely impacting science education. The advent of Coronavirus (COVID-19) in Nigeria has dealt a severe blow to the education of the nation in 2020. The effect of the pandemic is alarming in the educational system of the nation (Sahu, 2020). Within short months the virus entered the country it spread widely to nearly all the states. The government short downs all schools in the nation and clamoring for social distancing to curtail the spread of the virus.

Social distancing is one of the community mitigation measures that are recommended during influenza pandemics (Ahmed, Zviedrite & Uzicanin, 2018). Social distancing has been considered effective to curb the spread of COVID-19 (Blocken, Malizia, van Druenen & Marchal, 2020). Social distancing is a step taken to reduce physical contact with other individuals (European Centre for Disease Prevention and Control, 2020). It is a measure taken during a pandemic to restrict when and where people can gather to stop the spread of an infectious disease.

The period of COVID-19 pandemic is a typical example of times when conventional teaching paradigm could not work in schools. During this period, as a measure of social distancing, students and teachers are not allowed to interact physically. Schools are closed down for many weeks thus teaching and learning are disrupted (UNESCO, 2020). Teaching and learning in science required interactions between students and the teachers which may not only be physical (Akhtar, Hussain, Afzal) & Gilani, 2019).

Therefore, students staying away from schools for a long period may adversely impact their academic performance. It is, therefore, essential the Nigerian government is more committed to e-learning in our tertiary institutions. Although, e-learning is not new in the Nigerian educational system, but the quality and effectiveness are critical. One of the learning framework that enable students to connect with the teacher to learn outside the school context is Google classroom.

II. THE E-LEARNING INTERVENTION

The e-learning is classified as computer-based and internet-based (Arkorful & Abaidoo, 2014). The type depends on the user mode. The computer-based involves the use of ICT,

while the internet-based is purely online. The computer-based includes the use of computer software and hardware (Algahtani, 2011); the internet-based comprises e-mail, blog, and other references (Almosa in Arkorful & Abaidoo, 2014). Upon this, the e-learning could be classified by this thesis to blended and online learning. The definition of blended learning varies according to the individual perspective (Bryan & Volchenkova, 2016). The blended learning is rotation, self-blended, and enriched virtual (Bryan & Volchenkova, 2016). Cleveland-Innes and Wilton (2018) categorized blended learning to three, which are blended presentation and interaction, blended block, and fully online. Some tools are peculiar to e-learning for effectiveness depending on the types.

The e-learning required the utilization of some tools for instructions in higher education for its effectiveness. According to Pande, Wadhai, and Thakare (2016), Weblog, Social bookmarking, Wiki, RSS, Podcasting, Instant messaging, Text chat, and internet forums are essential tools for any e-learning. The benefits or advantages of e-learning are enormous. Some of the advantages according to Pande, Wadhai, and Thakare (2016), includes flexibility, efficiency in knowledge and qualification enhancement, motivation of students' interaction, cost-effective, and others.

Despite the vital roles e-learning plays in tertiary education in many countries of the world: most developing nations including Nigeria are yet to unlock the full potentials of it (Kyari, Adiuku-Brown, Abechi, Pyochi & Adhlakun, 2018). E-learning attempts to shift the focus of the educational environment away from the physical teacher-student context while disseminating information (Franklin & Nahari, 2018). The e-learning in some parts of the globe is not a new phenomenon in promoting education; Nigeria schools are using it to promote distance education and lifelong learning (Ajadi, Salawu & Adeoye, 2008).

Several studies had been documented on e-learning how students receive instructions from teachers and learn adequately at all times including the vacation period (Zare, Sarikhani, Salari & Mansouri, 2016; Franklin & Nahari, 2018; Aina & Olanipekun, 2018). Different types of e-learning could be explored as practiced in most developed nations. The typical e-learning in most Nigerian universities is the distance learning programme. There are concerns about how the distance learning programme could effectively teach online students by exploiting ICT technologies and collaboration to enhance in-depth interactive engagement (Magen-Nagar & Shonfeld, 2017). Some devices used for this distance learning programme are TV, CD-ROM, and Radio (Kyari, Adiuku-Brown, Abechi & Adhlakun, 2018) and recently the mobile phones (Aina & Olanipekun, 2018). E-learning is critical to higher education as it is the use of information and communication technologies in various processes of education to support and enhance learning (Pande, Wadhai & Thakare, 2016). Therefore, to mitigate the impact of COVID-19 on the learning of science education in higher education required the

adoption of e-learning during the period of lockdown. However, due to the rule of social distancing, any e-learning that requires physical contact during teaching and learning may not be effective.

Given this, any of the blended learning may not be the best for science education at this period except for the full online mode. Therefore, making an extensive literature search shows that the best e-learning suitable for teaching and learning at this period could be the Google Classroom.

III. GOOGLE CLASSROOM

Google Classroom is a Google Apps for Education that helps the teachers to create and organize assignments quickly, provide feedback efficiently, and communicate with their learners easily (Shaharane, Jamil & Rodzi, 2016). The application has been used as e-learning (Henekh, Rosdianto & Oikawa, 2020). Research studies indicate the application helps students to learn more electronically and teachers spend more time with students than with papers (Basher, 2017; Rabbi, Zakaria & Tonmoy, 2018). Google classroom is an emerging technology in education since 2014 which had impacted teaching and learning in most developed and developing nations (Shaharane, Jamil & Rodzi, 2016; Basher, 2017; Rabbi, Zakaria & Tonmoy, 2018; Henekh, Rosdianto & Oikawa, 2020). Previous studies show that google classroom enhances ongoing learning on the basis that the students and the teacher can be sited in various geographical contexts (Mafa, 2018; Henekh & Rosdianto, Oikawa, 2020).

Previous studies had suggested that e-learning has challenges that could make them not suitable at this period of COVID-19. The inadequacy of Nigeria's weak and underdeveloped broadband infrastructure is a significant shortcoming (Trucano, 2014). For Mohamedbhai (2014), inequalities could be one problem of distance e-learning because of the differences existing between urban and rural students; between the rich and the poor who cannot afford the cost of internet.

Ajadi, Salawu, and Adeoye (2008), the problem of bandwidth and diversion of intention on the net are some of the problems associated with e-learning. Earlier studies show that Google Classroom enhances learning on the basis that the students and the teacher can use it in different geographical locations (Mafa, 2018; Henekh & Rosdianto, Oikawa, 2020). Google Classroom launched less than a decade ago has been one of the compelling ways technology is impacting teaching and learning in the world (Azhar & Iqbal, 2018).

Given the above, it is apparent that one way to mitigate the impacts of COVID-19 on science education may be to adopt e-learning mode to teach science in Nigeria higher institutions. Therefore, the online e-learning, which does not depend on traditional paradigms like the Google Classroom would be the best for instruction in science education. The Google Classroom framework would provide the same instruction to every student irrespective of their parents'

background. It will offer the students the same classroom context as against the present situation where some students attend school well equipped with learning resources while some do not.

The three fundamental menus when anyone logs in to the Google Classroom account are *streams*, *classwork*, or *student activities*, and *people* (Henekh & Rosdianto, Oikawa, 2020). The *stream* is used for creating announcements, to discuss ideas, or see the flow of assignments, materials, quizzes from the topics taught. The teachers use *Classwork* to make test questions, pretests, quizzes, upload materials, and hold reflections (Henekh & Rosdianto, Oikawa, 2020). The teachers use the *people* menu to invite students by using the access code that is available in the people bar.

Research shows that many countries are using Google Classroom in their schools because of its effectiveness. Studies conducted at the Bostwana College (Mafa, 2018), Baret Hodgson University (Azhar & Iqbal, 2018), Musamus University (Henekh & Rosdianto, Oikawa, 2020); Basher (2017); Rabbi, Zakaria & Tonmoy(2018) shows it develops students' skills. Google Classroom has lots of educational benefits that could be excellent for science education. According to Hussaini, Ibrahim, Wali, Libata, and Musa (2020), it allowed teachers to post notes, assignments, create different groups in one class, invite another teacher to the class and it is flexible.

Google Classroom can be accessed anytime and anywhere. Students do not need to get to a designated building called classroom before receiving lectures and parents and guardians can track the progress of their wards (Mafa, 2018). It minimizes the paperwork for the teachers, helps classroom management. It enhances the student-teacher interaction as well as communication (Azhar & Iqbal, 2018).

However, there is no perfect system without any challenge. Studies indicate that Google Classroom has some instructional challenges (Mafa, 2018; Henekh & Rosdianto, Oikawa, 2020). Some of the challenges may not be peculiar to it only, but to all the e-learning strategies. For instance, laboratory experiments cannot be taught with Google Classroom except to demonstrate. Therefore, the laboratory experiment for students during the COVID-19 may not be possible through the Google Classroom. The best alternative is to teach the practical aspects of science by demonstration through the Google Classroom and the laboratory works come later in a safe environment. Nevertheless, some factors may make the adoption of Google Classroom unsuccessful for science education in Nigerian schools.

IV. FACTORS MILITATING AGAINST THE USE OF GOOGLE CLASSROOM IN NIGERIA

The first problem is the government insensitivity to innovation in the education sector. The Nigerian governments in all the three levels are not ready for innovation in education. The only type of innovation the government

welcome is the one that would help the government official award contracts to their cronies or family members. The people in government today and in the past also do not cherish any innovation that will not enhance their pecuniary desires no matter how credible and good the innovation may be. Many innovations in education have been frustrated because of this point. This is the reason the nation is changing from one system of education to another almost every time there is a new government. The 6-3-3-4 system of education was not successful because of many reasons one of these is the attitude of the government and people (Nwaifo & Uddin, 2009).

Another problem is the poor bandwidth (Ajadi, Salawu, & Adeoye, 2008). The inadequacy of Nigeria's fragile and underdeveloped broadband infrastructure is a drawback (Trucano, 2014) to e-learning. This is a problem that could be attributed to the government and heads of tertiary institutions in Nigeria. Funds are not made available to buy good internet materials to improve bandwidth or broadband infrastructure. Where such monies are made available the heads of institutions often misplaced their priorities. There are cases where monies budgeted for e-libraries were misappropriated due to a high level of corruption in higher institutions.

The worst of the entire problem is the poor quality of the academic staff in higher institutions in Nigeria. It is worrisome at this ICT age that many lecturers are not computer literates. The quality of higher education depends upon the quality of the teachers imparting it: the teacher's use of ICTs makes the lecture effective and improves the quality of teaching (Nagoba & Mantri, 2015). According to Adhikary (2018), quality teachers who are active user of ICT for teaching is indispensable for any quality teaching and learning process. The use of Google Classroom cannot be successful except the lecturers are ICT compliance.

In conclusion, the Google Classroom is an educational Google App which many countries have been using in schools since 2014. Several previous studies show it is an effective paradigm that could be used at this period of COVID-19 to teach science in Nigeria higher institutions. Some challenges associated with the framework are not strong enough to discourage its implementation. However, some factors that could militate against its success in Nigeria schools should not be downplayed as the script identified.

V. THE IMPLICATIONS OF THE PAPER

The paper has lots of implications for the Nigerian educational system. The Google Classroom would be an innovation in the educational system of the nation. Therefore, to adopt it for the teaching of science implies the following:

- The government should be prepared fully to adopt the paradigm without any political bias
- The government should make adequate money available to strengthen and develop the Nigerian broadband infrastructure.

- There should be proper monitoring to ensure the correct software and hardware are purchased and adequately installed in every higher institution.
- Academic personnel of every institution must be adequately trained through seminars and conferences. Those who are not computer literate must make use of staff development to update their computer's knowledge.

REFERENCES

- [1]. 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
- [2]. Ahmed, F., Zviedrite, N., & Uzicanin. A. (2018). Effectiveness of workplace social distancing measures in reducing influenza transmission: a systematic review. *BMC Public Health*, 18(518), 1-13
- [3]. Aina, J. K., & Langenhoven, K. (2015). The likely implications of active learning in physics through peer instruction (PI) in Nigerian schools. *International Journal of Law, Education, Social and Sports Studies (IJLESS)*, 2(3), 8-15
- [4]. Aina, J. K., & Olanipekun, S. S. (2018). Mobile-learning (m-learning) through WhatsApp messaging, Facebook, and YouTube, Nigeria. *Education Journal*, 1(1), 111-121. DOI: 10.31058/j.edu.2018.13008
- [5]. Ajadi, T. O., Salawu, I. O., & Adeoye F. A. (2008). E-learning and distance education in Nigeria. *The Turkish Online Journal of Educational Technology*, 7(4), 1-10
- [6]. Akhtar, S., Hussain, M., Afzal, M., & Gilani, S. A. (2019). The impact of teacher-student interaction on student motivation and achievement. *European Academic Research*, 7(2), 1201-1222
- [7]. Algahtani, A.F. (2011). *Evaluating the Effectiveness of the E-learning Experience in Some Universities in Saudi Arabia from Male Students' Perceptions*, Durham theses, Durham University.
- [8]. 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
- [9]. Azhar, K. A., & Iqbal, N. (2018). Effectiveness of google classroom: teachers' perceptions. *Prizren Social Science Journal*, 2(2), 52-66
- [10]. Basher, S. A. O. (2017). The impact of Google classroom application on the teaching efficiency of pre-teachers. Retrieved from <https://www.researchgate.net/publication/>
- [11]. Blocken, B., Malizia, F., van Druenen, T., & Marchal, T. (n.d). Towards aerodynamically equivalent COVID19 1.5 m social distancing for walking and running. Retrieved April 16, 2020, from http://www.urbanphysics.net/Social%20Distancing%20v20_White_Paper.pdf.
- [12]. Bryan, A., & Volchenkova, K. N. (2016). Blended learning: Definition, models, implications for higher education. *Education Educational Sciences*, 8 (2), 24-30. DOI: 10.14529/ped160204
- [13]. Cleveland-Innes, M., & Wilton, D. (2018). *Guide to blended learning*. Burnaby: Commonwealth of Learning
- [14]. European Centre for Disease Prevention and Control (2020). Considerations relating to social distancing measures in response to the COVID-19 epidemic. Stockholm: ECDC.
- [15]. Franklin, U. E., & Nahari, A. A. (2018). The impact of e-learning on academic performance: Preliminary examination of king Khalid university. *International Journal of Academic Research in Progressive Education and Development*, 7(1), 83-96
- [16]. Henukh, A., Rosdianto, H., & Oikawa, S. (2020). Implementation of google classroom as multimedia learning. *Journal of Physics Education*, 5(1), 38-44
- [17]. Hussaini, L., Ibrahim, S., Wali, B., Libata, I., & Musa, U. (2020). Effectiveness of google Classroom as a digital tool in teaching and learning: students' perceptions. *International Journal of Research and Innovation in Social Science (IJRISS)* 4(4), 52-54
- [18]. Kyari, S. S., Adiuku-Brown, M. E., Abechi, H. P., & Adelakun, R. T. (2018). E-learning in tertiary education in Nigeria: Where do we stand? *International Journal of Education and Evaluation*, 4(9), 1-10
- [19]. Mafa K. R. (2018). Capabilities of google classroom as a teaching and learning tool in higher education. *International Journal of Science Technology & Engineering*, 5(5), 30-34
- [20]. Mohamedbhai, G. (2020). COVID-19: What consequences for higher education? Retrieved April 23, 2020, from <https://www.universityworldnews.com/post.php?story=20200407064850279>
- [21]. 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
- [22]. 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
- [23]. Rabbi, M. M. F., Zakaria, A., & Tonmoy, M. M. (2018). Teaching listening skill through google classroom: A study at tertiary level in Bangladesh. Retrieved April 16, 2020, from <https://www.researchgate.net/publication/324561428>
- [24]. Sahu P (April 04, 2020). Closure of universities due to coronavirus disease 2019 (COVID- Impact on education and mental health of students and academic staff. *Cureus* 12(4), 1-6. e7541. DOI 10.7759/cureus.7541
- [25]. Shaharane, I. N. M., Jamil, J. M., & Rodzi, S. S. M. (2016). Google classroom as a tool for active learning. *Proceedings of the International Conference on Applied Science and Technology 2016 (ICAST'16)*. AIP Conf. Proc. 1761, 020069-1-020069-6; doi: 10.1063/1.4960909
- [26]. Trucano, M. (2014). Education and Technology in age of Pandemics (revisited). Revised April 23, 2020, from <https://www.universityworldnews.com/post.php?story=20200409150034920>
- [27]. UNESCO (2020). COVID-19 Educational Disruption and Response. Retrieved 13 April, 2020, from <https://en.unesco.org/covid19/educationresponse>
- [28]. Uwaifo, V.O., & Uddin, P.S (2009). Transition from the 6-3-3-4 to the 9-3-4 System of Education in Nigeria: An Assessment of Its Implementation on Technology Subjects. *Stud Home CommSci*, 3(2), 81-86
- [29]. Zare, M., Sarikhani, R., Salari, M., & Mansouri, V. (2016). The impact of e-learning on university students' academic achievement and creativity. *Journal of Technical Education and Training (JTET)*, 8(1), 25-33.