

Online Teaching Platform and Effective Teaching and Learning of Science Education in Nigerian Public Universities

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Abstract

The study investigated the online teaching platform and effective teaching and learning of science education in Nigerian public universities. A survey research design was adopted for the study, and it was carried out in three public universities committed to science education courses in Nigeria. Sixty-five teaching staff and sixty students were selected using a stratified random sampling technique to respond to questionnaires from the three tertiary institutions. The instruments used for data collection were questionnaires titled: Science Education Students Online Questionnaire (SESOQ) and Science Education Lecturers Online Questionnaire (SELOQ). The questionnaires gathered information from both lecturers and students based on the online teaching and learning platform. Mean, and standard deviation (SD) were used to analyze the data generated in the study. Results from the study revealed that the teaching and learning platform of science education in Nigerian public universities need a dramatic turnaround on the part of the lecturers and students, among other. Therefore, the study recommends, among others, that stakeholders in education should help to resolve problems confronting science education lecturers' effective teaching and students' effective learning using the online platform in Nigerian public Universities.

Keywords: online teaching platform, science education, public universities

Introduction

Change is the only constant thing in life. The world, things, occurrences, and people therein are constantly changing over time. The advent of time and space cannot be denied in science education today. Even if the people concerned refused to move, occurrences over the world have changed the strategies, pedagogies modes, and methodologies in teaching and learning. Teaching and learning, which start from blackboard and chalk styles, whiteboard and makers, transparencies, projectors, and other means, have migrated today to online platforms. Reasons for this necessity are numerous, among which is the link with other lecturers and learners, to share materials, and collaboration for self-development, among others, but online platform teaching and learning prevailed immediately after the COVID-19 pandemic, which held education globally to stand still.

Education and COVID-19

Public places across nations were shut down to prevent the spread of this deadly disease, and amid all, institutionalized

education became the biggest casualty. Schools across the globe have been shut down, impacting the learning of over 90% of the world's student population (UNESCO, 2020). In low and medium-income countries, the impact of COVID-19 is particularly threatening to education, given that education systems have been working on substandard platforms (Dan-Nwafor et al., 2020; Yinka & Adebayo, 2020). The pandemic has a peculiar dissipating impact on education in Africa and other countries through the decreased level of education, broadened existing divide in learning access and outcomes, and increased school dropouts (Blundell et al., 2020; Dorn et al., 2020). In Nigeria, the threat posed to education is compounded due to peculiar vulnerabilities, including poor health systems, poverty and inequality, hunger, internally displaced populations, high population densities, urban-rural divide, and out-of-school population (Obiako & Adeniran, 2020). Prior to COVID-19, Nigeria accounts for one in every five of the world's out-of-school children. A situation that has been worsened at the pandemic itself, corruption, banditry, kidnapping, Boko-haram saga, and other vices happening in the country. Today, the effect of COVID-19 has induced schools to shift gradually to online teaching,

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which has a potent tool to support students' learning and lecturers' teaching without being present on schools' premises.

Online Teaching and Learning Platform

Online teaching platforms for the purpose of this study can be defined as teaching based in or out of the classroom with the use of various technology devices and applications. The study sees the online teaching platform as one of the innovative ways that will ensure teaching and learning processes happen irrespective of the occurrences, distance, and unavailability of the lecturer or apparatus in a science classroom. Students view lecturer feedback as a key dimension of the lecturer-student interaction process. Online learning offers the convenience of time and space, the capability of reaching the student, and draws the attention of a new group of digital learners.

Arkorful and Abaidoo (2014) refer to online education as the use of educational technologies to enable access to learning and teaching material online. Thus, the importance of online learning taking place using the internet in 21st-century university education is undeniable, particularly for the students of today as digital natives. Today's learning must be fostered in a technology-rich environment that encourages interaction and connectedness to the international community. There is also a concern for students' critical thinking, skill development involving problem-solving, performance, and the application of acquired skills which the online environment can be designed to address. Institutions of higher learning, especially within the science discipline, are constantly concerned with preparing lecturers to cultivate best practices for addressing the progressing educational needs of their students. Technology allows lecturers to connect with one another and learn from each other, enabling them to be more effective in the teaching and learning environment.

The Practical Usage of Online Teaching and Learning Platform

The practical usage of online teaching can be seen in diverse forms such as WebEx, ZOOM, Microsoft Team, WhatsApp, Google Meet, and Say Namaste, as well as learning management systems like Moodle, Blackboard, etc. Unlike developed countries, Nigeria is yet to tap the online teaching and learning opportunities fully. The differences between online and classroom instruction go beyond medium alone. It entails how lecturers deliver their information, interact with students, and assess learning is much different in a virtual learning environment. Online teaching platforms allow students to learn at their comfort and requirement. It also demands more independence, so students must be able to learn at least some of the material when lecturers are unavailable.

Even on the part of the students, their day-to-day activities with their appliances may have somehow exposed them to the use of those applications and sites meant for learning. This is to say that technology novice is not an excuse in any form for university lecturers and students. Nowadays, the higher education system is in a continuous process of change, with universities having to keep pace with the needs, desires, and requirements of students. Thus, information technologies and online learning platforms are seen as essential factors in carrying out the activity of universities. These institutions investing more and more in online systems and devices should justify the end needs (Popovici & Mironov, 2015).

Benefits of Online Teaching and Learning Platform

Apart from adaptability to the usage of online teaching, it brings some benefits to the lectures as it opens more opportunities for materials, linkages/collaboration, and develops more skills in online teaching. The students enjoy their parts; according to Nycz and Cohen (2010), they are evaluated only by lecturers, who also represent their main source of information, and the quality of education is dependent on the lecturer's knowledge and skills in the traditional classroom, while in online learning, the evaluation may be done with the help of tools and systems, students can procure information from various documents uploaded on the platform. In addition, online platforms are seen to project quality education as they influence the level of training that lecturers have in using

technology and their teaching style. Differences between traditional and online learning may also be acknowledged in terms of principal sources of information, assessment, or quality of education.

Challenges of Online Teaching and Learning Platform

There are some issues and challenges that are related to online teaching and learning, such as accessibility, affordability, flexibility, learning pedagogy, life-long learning, and policy (Dhawan, 2020). Also, lecturers of all backgrounds and ages had to prepare and deliver their lectures and practicals online; this process may be challenging without proper technical and financial support (Hodges et al., 2020). This poses a major challenge to the effective utilization of the online platform in teaching and learning. Another major factor that can possess as a challenge to science students learning using the online platform is access to facilities, readiness, and attitude.

The sum of difficulties from both the lecturers and students will largely determine the suitability of an online platform for teaching, and this calls for the awakening of all stakeholders in education, which comprises the summation of all citizens and residents, government at all levels, and external bodies that directly or indirectly benefit from Nigeria. Nigeria today has gone through many stages to the point we are now, and deliberate efforts to enlighten all citizens using education cannot be over-emphasized. Education, as it is, remains one of the key factors for transformation in Nigeria. Today, technology has infiltrated all aspects of our daily lives in the country presently; this factor might have somehow created a soft landing for the use of online teaching in science education.

The challenges faced by lecturers changing their face-to-face lectures to online: include the difficulties of conducting practicals in laboratories, students' involvement, and online materials, among others. Another area of difficulty encountered by the lecturers was dissecting topics that were largely experiential and making them alive in the online environment, which is presently resolved with animation and simulation interaction depending on the lecturer's technology dependence. However, these challenges imply that what may work well pedagogically in the face-to-face science education lecturer room may need expertise and technicality to work within an online science education platform, which is more task for beginners of technologically inclined lecturers. Jimoh (2015) affirmed that infrastructure, lack of adequate funding, and technical know-how impede the usage of online teaching platforms greatly in higher institutions. Online learners may easily get distracted, lose focus, or miss deadlines, while the lecturers may depend on other colleagues' prepared lessons and become lazy to develop themselves along the line.

Science Education and Online Teaching and Learning Platform

The importance of science education is rising rapidly. As a society and as individuals, having access to it has become vital. The establishment of educational systems of the past has served us well, but their limitations are becoming more apparent. There is a very real and growing demand by students for more flexible approaches to learning science. Online delivery offers practical alternatives to traditional on-campus education for students facing barriers such as classroom scheduling, physical location, and financial status, as well as job and family commitments. As educators in science and science-related disciplines, we recognize that pursuing online teaching not only provides equal access for students but also gives us several more teaching options that can lead to quality learning. Science education presents some unique opportunities to students as they come to their science courses with understandings created from their interactions with the world (Chi, 2015). This necessitates the use of investigating activities that aid student understanding of complicated topics such as the nature, composition, and interaction of constituents and matters in sciences.

As technologies transform the global world, the science education sector, in response, must be at the forefront of usage. Currently, technologies have turned the schools' environment globally into a small community where the students should be

satisfied and want to stay longer to learn. Betrus (2015) noted that the process of learning science education could instill in students a passion for inquiry and discovery and foster skills such as persistence, teamwork, and application of gained knowledge to new situations. In a knowledge-driven world, hauled by globalization and speedy technological advancement, there is a global awareness that all nations, especially developing nations to brace up and update their preparedness for science education.

Online teaching calls for immediate preparedness on the part of the science education lecturers first to acquire skills and expertise on how to combine both the theoretical and the practical contents in audio-visual forms. This is a generation whereby pandemics, disasters, and any form of disruption should not stop education in our locality. Kennedy and Archambault (2012) believed that online classrooms did not support lecturers' learned practice, and there is a need for teacher training that focuses on the online learning environment. This justifies the fact that at the onset of a teaching career, professionals should be acquitted to and taught the utilization of various platforms of online teaching, alongside subjects' knowledge and other necessary ethic and norm of the profession. In addition, textbook production that will aid the use of audio and audio-visual teaching and learning should be another mountain to summon by the book manufacturers with the help of the lecturers at the initial stage.

Various institutions must also be prepared for the usage of online teaching mode in terms of facilities and the constant source of light which stand as a strong impediment to online teaching and learning. However, students are at the receiving and consuming end of online teaching and learning; thus, they must brace up for proper usage of the platform to avoid its abuse and help to close the gap of educational backwardness. Although the online teaching and learning platform brings some challenges, as mentioned above. Thus, this study intends to carry out an investigation on online teaching platforms and effective teaching and learning of science education.

Statement of the Problem

The platform for teaching and learning is very vital for the successful implementation of school courses, and the last decade has witnessed a renewed interest in the teaching and learning of higher education. It is pertinent to note that infusing an effective teaching and learning environment into an online platform for science education students is not a trivial one. This start with the concepts and skills that a student must master for proper learning using the platform and lecturers' capability to master appropriate technological practicality or logistical support to create their courses. To make matters worse, many lecturers still want to do it alone with a sort of 'lone ranger' attitude. While this might be okay for a chalk talk in the classroom, many modern courses with multimedia resources really do require a team approach to develop. Onyema (2019) stated that the integration of emerging technologies in the teaching and learning process is no longer a choice but a need due to; the changing learning environment, demand for flexibility in methodology, and the need to enhance creativity and productivity in learning.

Also, the literature available specific to online platform teaching and learning of science education courses (especially the laboratory component) has appeared in widely scattered sources. Science

educators, who bring with them very strong disciplinary and research backgrounds, often do not have any formal pedagogical training on online platform teaching, a situation that is compounded with no support from the appropriate channel. Another problem surrounding the online platform for teaching and learning is the practical or laboratory component. The challenge of teaching and learning science education online is very real. Therefore, it is necessary to carry out this study on an online teaching platform and effective teaching and learning of science education.

Objectives

The main objectives of this study are to examine online teaching platforms and effective teaching and learning of science education in Nigerian public Universities. Specifically, the study intends to find out:

1. The effective use of online teaching platforms among Nigerian public Universities lecturers.
2. Problems associated with the effective use of online teaching platforms among Nigerian public Universities lecturers.
3. The ability of students to learn effectively using online learning platforms in Nigerian public Universities.
4. Problems confronting Nigerian public Universities students' effective learning with the use of the online platform.

Research Questions

The following research questions were formulated to guide the study:

1. To what extent do lecturers use online teaching platforms effectively in Nigerian Public Universities?
2. What are the problems associated with the effective use of online teaching platforms among Nigerian public Universities Lecturers?
3. What is the ability of students to learn effectively using online learning platforms in Nigerian Public Universities?
4. What are the problems confronting Nigerian public Universities students' effective learning with the use of the online platform?

Methodology

A survey research design was used, and it was carried out in three public universities committed to science education courses in Nigeria. Sixty-five teaching staff and sixty students were selected using a stratified random sampling technique to respond to questionnaires from the three tertiary institutions offering science education courses in Nigeria. The data was collected from both the lecturers and students from various institutions. The instrument used for data collection were questionnaires titled: Science Education Students Online Questionnaire (SESOQ) and Science Education Lecturers Online Questionnaire (SELOQ). The questionnaires gathered information from both lecturers and students based on the online teaching and learning platform. Mean, and standard deviation (SD) were used to analyze the data generated in the study. The section began with general information about the lecturers and students. The distribution of teaching staff by ranks and students by their levels were shown in the bar chart below:

Figure 1
Distribution of teaching Staff by Ranks

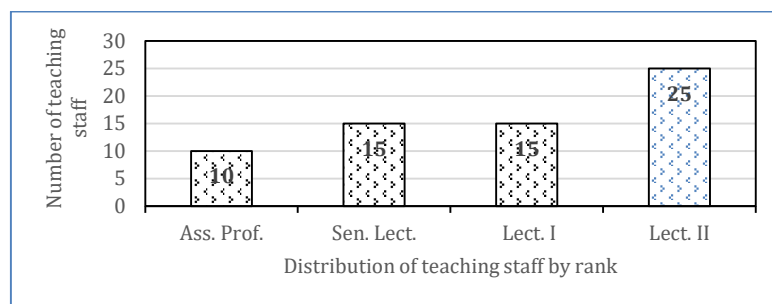
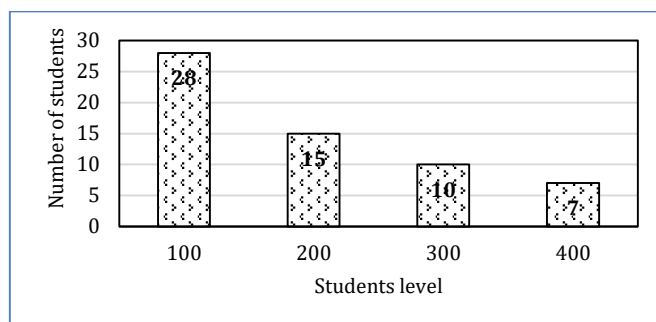


Figure 1 shows the number of teaching staff in the three Nigeria public universities chosen that participated in the study. 10 (15.4%) Associate Professors participated in the study, and 15 (23.1%) Senior Lecturers were also involved in the study. 15(23.1%) lecturers I was involved in the study, along with 25 (38.5%) Lecturer II also participated the study.

Figure 2 shows the number of students in the three Nigeria public universities chosen that participated in the study. 28(46.7%) 100 level students, 15(25%) 200 level students, 10(16.7%) 300 level students and 7(11.7%) 400 students were involved in the study.

Figure 2

Distribution of Students by their Levels



Results

Research Question 1: To what extent do lecturers use online teaching platforms effectively in Nigerian Public Universities?

Table 1

Teaching Staff Response to the Use of Online Teaching Platform

Items	No of respondents	M	SD	Decision
I started using the online platform to deliver my lecture above three years ago	60	1.91	.56	Disagree
I often communicate my lectures and assignments using an online teaching platform	60	1.92	.51	Disagree
I have a collaborative website with colleagues on courses to teach my students	60	1.43	.65	Strongly disagree
I have adequate use of the internet and several websites to visit to enrich my lectures	60	1.90	.50	Disagree
I have functional Zoom, Microsoft team, WhatsApp, Facebook account, and other social media platforms I can make use of	60	1.44	.63	Strongly disagree
I can develop animation/simulation for my practical classes by myself	60	1.24	.75	Strongly disagree
I encourage students to interact with other experts using online platforms	60	1.45	.62	Strongly disagree
The online teaching platform allows me to use a variety of techniques to monitor and evaluate students' performance and responds to identified needs	60	1.43	.65	Strongly disagree
I encourage my students to participate in the development of animation/simulation use for their teaching	60	1.42	.68	Strongly disagree
I respond to students' assignments promptly and give them the opportunity to check up on feedback via the online platforms	60	1.41	.69	Strongly disagree

Table 1 reveals the situation of science education teaching staff with the effective usage of online teaching platforms in Nigerian public Universities.

Research Question 2: What are the problems associated with the effective use of online teaching platforms among Nigerian public Universities Lecturers? Table 2 shows the mean and standard

deviation scores of problems confronting science education lecturers with the effective use of online teaching platforms among Nigerian Public Universities.

Table 2

Teaching Staff Response to the Use Problems Associated with Effective Use of Online Teaching Platform

Items	No of respondents	M	SD	Decision
Internet facilities are not available in my institution for effective use of the online teaching platform	60	2.75	.15	Strongly agree
The regular power supply is not available in my institution for effective use of the online teaching platform without interruption	60	2.85	.11	Strongly agree
My institution does not have a functional ICT laboratory for effective usage of the online teaching platform	60	2.75	.11	Strongly agree

Items	No of respondents	M	SD	Decision
My students do not have access to uninterrupted internet facilities to make use of the online platform	60	2.75	.11	Strongly agree
Over-populated lecture rooms disturb the effective use of online teaching platform	60	2.75	.11	Strongly agree
My institution does not have skilled computer personnel who assist with the usage of the online platform	60	1.40	.68	Strongly disagree
Online teaching platform will not assist me in teaching practical thoroughly with details	60	1.40	.68	Strongly disagree
My institution does not have adequate provisions for the online teaching platform	60	2.75	.11	Strongly agree
Online teaching platform does pose some challenges to me	60	2.75	.15	Strongly agree
My institution does not prepare me adequately for the use of the online teaching platform	60	2.75	.11	Strongly agree

Research Question 3: What is the ability of students to learn effectively using online learning platforms in Nigerian Public

Universities? Table 3 reveals the ability of students to learn effectively using online learning platforms in Nigerian Public Universities.

Table 3
Students' Response to Ability to Learn Effectively Using Online Platform

Items	No of respondents	M	SD	Decision
I enjoy learning using the online platform in all my courses	60	2.75	.15	Strongly agree
I have access to Interact with my lecturers on any difficult topics after the lecture	60	1.23	1.25	Strongly disagree
I have access to learn more through a practical online platform with the opportunity to view equipment that is not on the ground in my institution	60	1.23	1.35	Strongly disagree
Access to online platforms enables me to learn using qualitative ideas for solving problems	60	1.23	1.35	Strongly disagree
Access to online platforms eliminates the time gap between information provided by lecturers and their applications	60	1.23	1.35	Strongly disagree
Access to online platforms enables me to have a better learning experience	60	1.23	1.35	Strongly disagree
Access to online learning platforms helps me to address common misconceptions during and after instruction	60	1.23	1.35	Strongly disagree
Access to an online learning platform enables me to enjoy the rich archive of common students' difficulties for further development research in my course of study	60	1.23	1.35	Strongly disagree
Access to an online platform enables me to have access to a rich collaborative learning experience	60	1.23	1.35	Strongly disagree
Access to online learning platform enables me to solve complex problems	60	1.23	1.35	Strongly disagree

Research Question 4: What are the problems confronting Nigerian Public Universities students' effective learning with the use of the online platform?

Table 4 shows problems confronting Nigerian Public Universities students with effective learning using an online platform.

Table 4
Students' Response to Problems Confronting with Effective Learning Using Online Platform

Items	No of respondents	M	SD	Decision
I do not have personal access to online platform facilities	60	2.85	11	Strongly agree
My institution does not provide an uninterrupted network for students with the use of an online platform	60	2.85	.11	Strongly agree
I do not get rapid responses to questions from my lecturers using the online platform	60	2.75	.15	Strongly agree
A regular power supply is not available in my institution for effective learning using the online platform	60	2.85	.11	Strongly agree
The online platform does not allow me to participate actively during lectures	60	0.10	2.65	Strongly disagree
We do not have a functional ICT laboratory in my institution for effective learning	60	2.85	.11	Strongly agree
An overpopulated classroom is a barrier to my effective learning using the online platform	60	2.75	.15	Strongly agree
I do not have an interest in adapting to the new strategy of an online learning platform	60	.10	2.65	Strongly disagree
My institution does not have adequate computer-skilled personnel that attend to students' difficulties with the use of the online platform	60	2.75	.15	Strongly agree
The online platform does not help me to transfer qualitative ideas for solving problems both in theoretical and practical aspects of all my courses	60	.10	2.65	Strongly disagree

Discussion

The results of this study from table 1 reveal that in Nigerian Public Universities, effective usage of online teaching platforms among science education lecturers is still silent. This means that online teaching platform is yet to gain ground among the teaching strategies used in Nigerian Public Universities. This affirms that Nigerian Public Universities need to brace up with the usage of online teaching platforms as the novice is not an excuse in any form among university lecturers. However, online teaching platform calls for immediate preparedness on the part of the science education lecturers first to acquire skills and expertise on how to combine both the theoretical and the practical contents into audio-visual forms. This supports Popovici and Mironov (2015), who submitted that information technologies and E-learning systems are seen as essential factors in carrying out the activity of universities. Also, the creative ability of science education lecturers in today's Nigerian universities may depend on the utilization of modern strategies like the online teaching platform to promote effective science education teaching, diversity, and expansion of knowledge coupled with an increase in productivity.

Results from table 2 confirmed that there are problems confronting science education lecturers with the effective use of online teaching platforms among Nigerian Public Universities. Those problems range from lack of internet facilities, lack of regular power supply, and lack of functional ICT laboratory to overpopulated lecture rooms and technicality challenges on the part of the lecturer to get himself /herself acquitted to the usage of online teaching platform. This result corroborated with the finding of Jimoh (2015), that affirmed that infrastructure, lack of adequate funding, and technical know-how impede the usage of online teaching platforms greatly in higher institutions. The situation in most higher institutions, particularly public universities, in terms of infrastructure is of serious concern, such as internet facilities, regular power supply, ICT and functional science laboratories, sufficient and functional computers, conducive lecture rooms, etc. Also, the in-serving benefits/sponsors to keep lecturers abreast with innovative strategies, skills, and knowledge development through workshops, seminars, conferences, and collaboration with other higher institution are gradually degrading. And all these put together will serve to combat problems confronting science education lecturers with the effective use of online teaching platforms among Nigerian Public Universities.

Table 3 shows the ability of students to learn effectively using online learning platforms in Nigerian Public Universities. Betrus (2015) noted that the process of learning science education could instill in students a passion for inquiry and discovery and foster skills such as persistence, teamwork, and application of gained knowledge to new situations. The new situation, such as the use of online teaching platforms, should be motivated even for the students who are the latter receiver of any process of teaching. Today's generation virtually does everything online via their mobile phone, and even the finding revealed that they enjoy learning using the online platform in all courses. But then, access to the online platform itself is the key inhibitor to the use of online learning platforms in Nigerian Public Universities. Most students lack access to facilities that aid online learning platforms, and this could inhibit their learning using the platform.

Finally, table 4 reveals problems confronting Nigerian Public Universities students with effective learning using the online platform. These problems range from lack of access to personal online platform facilities, lack of rapid response to a question by lecturers, lack of personal power supply, students' participation, lack of functional laboratories, overcrowded lectures rooms, and others that could deter the students from taking advantage of the use of online platform form. The fact that students do not have access to adequate facilities that support the use of online learning platforms, there will be a barrier to smooth usage among the students. And that online teaching platforms are yet to gain popularity in Nigerian Public universities. However, challenges such as the issues of access to facilities and rapid response to students by their lecturers and others must be overcome to integrate students into the use of online teaching platforms.

Conclusion

In the world today, science education changes and Nigeria's science education cannot remain static. The world has become a global village, and the education system has undergone tremendous changes whereby no nation should be left behind. Effective teaching and learning of science education in Nigerian Public universities need a dramatic turnaround on the part of the lecturers and students. The lecturers' immediate preparedness, creative ability, and utilization of online platforms are of immediate utilization to advance teaching and to suit the changing society. Also, the government, on their part, should look into and provide the solution to those problems confronting science education lecturers with the effective use of online teaching platforms among Nigerian Public Universities; like; lack of internet facilities, lack of regular power supply, lack functional ICT laboratory to overpopulated lecture rooms.

Students are already familiar with the online platform; thus, education stakeholders should take advantage of this to provide them with facilities that will foster the use of the online platform, as these will facilitate students' ability to learn effectively using online learning platforms in Nigerian Public Universities. In addition, students combat challenges likewise to their lecturers with the use of online learning platforms, such as lack of access to personal online platform facilities, lack of rapid response to a question by lecturers, lack of personal power supply, students' participation, lack of functional laboratories, overcrowded lectures rooms among others. They are the primary recipients of the whole teaching and learning process. For the development of Nigeria as a nation, adequate provision for teaching and learning facilities should be provided promptly. Based on the findings of this study, it is evident that Nigerian Public universities are yet to fully utilize online teaching and learning platform. It is also concluded that science education lecturers and students will desire the use of online teaching and learning platforms. Nevertheless, for the Nigerian science education system to successfully adapt to online teaching and learning platform, actions that can stimulate and enable its adaptation to this new form of teaching must be encouraged.

Recommendations

The following recommendations are made based on the results of the findings:

1. Lecturers should be encouraged to take the opportunity of the online teaching platform.
2. Stakeholders in education should help to resolve problems confronting science education lecturers with the effective use of online teaching platforms among Nigerian Public Universities.
3. Access should be given to students to utilize their ability to learn effectively using online learning platforms in Nigerian Public Universities.
4. Stakeholders in education should provide means to solve problems confronting Nigerian Public Universities students with effective learning using the online platform.

References

- Arkorful, V., & Abaidoo, N. (2014). The Role of E-learning, advantages, and disadvantages of its adoption in higher education. *International Journal of Education and Research*, 2(12), 393-410.
- Betrus, A. L. (2015). Science teaching and learning Institution: Results of a national study. *Research in Science Education*, 31, 455-498.
- Blundell, R., Costa Dias, M., Joyce, R., & Xu, X. (2020). COVID-19 and Inequalities. *Fiscal Studies*, 41(2), 291-319. <https://doi.org/10.1111/1475-5890.12232>
- Chi, L. (2015). Re-conceptualizing the teaching of controversial issues. *International Journal of Science Education*, 30, 102-117.
- Dan-Nwafor, C., Ochu, C. L., Elimian, K., Oladejo, J., Ilori, E., Umeokonkwo, C., Steinhardt, L., Igumbor, E., Wagai, J., Okwor, T., Aderinola, O., Mba, N., Hassan, A., Dalhat, M., Jinadu, K., Badaru, S., Arinze, C., Jafiya, A., Disu, Y., Saleh, F., ... Ihekweazu,

- C. (2020). Nigeria's public health response to the COVID-19 pandemic: January to May 2020. *Journal of global health*, 10(2), 020399. <https://doi.org/10.7189/jogh.10.020399>
- 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>
- Dorn, E., Hancock, B., Sarakatsannis, J., & Viruleg, H. (2020). *COVID-19 and student learning in the United States: The Hurt could last a lifetime*. McKinsey and Co. <https://www.mckinsey.com/industries/education/our-insights/covid-19-and-student-learning-in-the-united-states-the-hurt-could-last-a-lifetime>
- Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). *The difference between emergency remote teaching and online learning*. Educause Review. <https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning>
- Jimoh, O. (2015). *A practical guide for science education teachers*. Cassell Educational Limited.
- Kennedy, K., & Archambault, L. (2012). Offering preservice teachers field experiences in K-12 online learning: A national survey of teacher education programs. *Journal of Teacher Education*, 63(3), 185-200. <https://doi.org/10.1177/0022487111433651>
- Nycz, M., & Cohen, E. B. (2010). The basics for understanding e-learning. In N. A. Buzzetto-More (Ed.), *Principles of effective online teaching* (pp. 1-17). Informing Science.
- Obiakor, T., & Adeniran, A. P. (2020). *COVID-19: Impending situation threatens to deepen Nigeria's education crisis*. Centre for the study of the Economies of Africa (CSEA). <https://www.africaportal.org/publications/covid-19-impending-situation-threatens-deepen-nigerias-education-crisis/>
- Onyema, E. M. (2019). Integration of emerging technologies in teaching and learning process in Nigeria: The challenges. *Central Asian Journal of Mathematical Theory and Computer Sciences*, 1(1), 35-39.
- Popovici, A., & Mironov, C. (2015). Students' perception on using eLearning technologies. In E. Soare & C. Langa (Eds.), *Proceeding of the The 6th International Conference Edu World 2014 "Education Facing Contemporary World Issues," 7th - 9th November 2014* (1514-1519). <https://www.sciencedirect.com/science/article/pii/S1877042815016468>
- UNESCO (2020). *Adverse consequences of school closures*. <https://en.unesco.org/covid19/educationresponse/consequences>
- Yinka, D. L., & Adebayo, A. (2020). *COVID-19 is exacerbating the problem of educational inequity in Nigeria*. Nairametrics. <https://nairametrics.com/2020/04/18/covid-19-is-exacerbating-the-problem-of-educational-inequity-in-nigeria/>

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