Survey of the Limitations Inhibiting the Deployment of E-LEARNING for Biology Teaching in Delta State

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ABSTRACT: The study examined the limitations inhibiting the deployment of e-learning for biology teaching in secondary schools in Delta State, Nigeria. Descriptive survey research design was adopted for the study. One hundred and twenty-five (125) biology teachers in public secondary schools in Ika federal constituency were the sample. A 35 item, self-developed instrument; Questionnaire on Limitation Inhibiting E-learning Deployment (QLHED) was used for data collection. The reliability coefficient of the instrument was 0.82 established using Cronbach's Alpha. The three-research question were answered using mean and standard deviation (SD) and decision rules was pegged at 2.50 grand mean score. Findings revealed the challenges of deploying e-learning in classroom in Delta state to include; lack of technology for distance learning/e-learning, lack of funds to purchase e-learning instructional technologies, non-availability of Wi-Fi in schools and high cost of buying ICT gadgets are the hindrance to e-learning deployment. Also, poor power supply to schools, high cost of data for access to the internet, poor/no power supply to schools and inadequate ICT and e-learning infrastructure are some of the challenges teachers face while using e-learning. The study found some solutions to the challenges to include; provision of stand-by generators to ensure regular power supply, prioritize funding of schools, employment of more skilled teachers. Based on the findings, recommendations and conclusion were made.

KEY WORDS: E-learning, Biology teaching and Challenges of teaching

INTRODUCTION

In this era of technological advancement, the growth of every society and institution depends greatly on the amount of attention it gives to the acquisition of skills and delivery of quality and practical knowledge. In this century, a functional system of education is driven by information and communication technology (ICT) as it is a veritable tool for improving both teachers and students' learning outcome and the overall standard of education. According to Ukala and Ugwu (2019) ICT is seen as a set of technological tools and resources used to communicate, create, organize, disseminate, store, retrieve and manage information. ICT has revolutionized or changed not just the manner in which skills and knowledge are acquired and delivered to individuals from the traditional face to face method of learning to a blended and distance method of learning (Omobolaji et al., 2019, Obro & Enayemo, 2022). In agreement, Ja'ashan (2020) opined that ICT is currently used in education to assist students in learning more efficiently and at the same time helping teachers undertake both academic and administrative tasks more effectively in relation to biology learning.

Biology is the scientific study of life. It is a natural science which deals with the study of living organisms (plant and animal) involving their origin, function, growth, evolution, distribution and classification. The teaching and learning of Biology in secondary school is undergoing a slow but steady shift, in the way instruction is being delivered. This paradigm shift was catalyzed mostly by the ravaging covid-19 pandemic that almost brought the world to a standstill and Nigeria is not left out. The pandemic forced governments globally to closed their borders, schools, religious centers, and entertainment centers among others. Other strict policies were implemented, like restriction of movement of people except those on essential services like doctors, nurses, security officials, etc who were strictly advised to observed social distance rules while providing necessary services as a way of curtailing the spread of the virus (Olowo, 2021). The heightened number of individuals seeking to acquire skill and knowledge from various educational institutions while on lockdown calls for a review of policies and adoption of new strategies for teaching at the time. According to United Nations Educational, Scientific and Cultural Organization (UNESCO) (April, 13th 2020) an estimated over 1.725 billion learners were affected by lockdown worldwide, representing about 99.9% of the world's student population. This led to the recommendation of e-learning (distance learning programs, open educational applications and platforms) for schools and teachers to reach learners as a way to limit disruption of academic calendar.

E-Learning also known as electronic learning simply means education in which instruction and content are delivered primarily via the internet. Integration of ICT into the education system and with particular reference to the adoption of e-learning as instructional delivery alternative is the current trend in the Nigerian education sector and indeed all over the world (Onovo & Okorie, 2017, Obro, 2021). Although, according to Adepoju (2021) e-learning as an aspect of ICT is relatively new in Nigeria's educational system but adopting and deploying it as a mode of instructional delivery in educational institutions especially at primary and secondary school level would be of immense influence and assistance in the desire and efforts towards the improvement of the standard of education in Nigeria. According to Omobolaji et al. (2019) e-learning implies the utilization of ICT, electronic and network-enabled technology means of acquisition and delivery of knowledge and skill through the techniques and applications which includes but not limited to Web-Based Training (WBT), Digital Collaboration, CBT (Computer Based Test) and VLE (Virtual Learning Environment).

Furthermore, Omobolaji et al. (2019) explained that in e-learning means of education, educational materials and content are disseminated via the internet, or a CD-ROMs which contains audio, video or text, these materials can be easily accessed and utilized by both the learner and instructor. In addition, Gordon and Gabriel (2021) explained that e-learning comes in diverse forms, applications and platforms, some of which include phone-in radio programme, interactive television programmes, cable or satellite broadcasts, the Web or Internet, ethernet, extranets, intranets, audio/video tapes, CDs, DVDs, digital textbooks or e-textbooks, (eBooks), cloud computing, instant messaging, video conferences, i-pods, podcasts, teleconferences, mobile technologies, web-based technologies, e-learning platforms and CDROM. Others include a multimedia sharing platforms: Skype, audio/video conferencing tools, WhatsApp, Adobe Connect, webinars, blogs, video blogging (vlogging) wikis, podcasts, YouTube, Flicker, Twitter, ScoopIt, and learning management system (LMS). Utilizing these applications, platforms and tools, teaching and learning occurs in diverse modes, ranging from face-face interactions with teacher presence (synchronous learning) to online/offline presentations with teacher presence (hybrid synchronous learning) or without teacher presence (asynchronous learning).

According to Pande et al., (2016); Ukala and Ugwu (2019); Mohammadi et al., (2020) and Ja'ashan (2020), e-learning is critical to secondary education as it is the use of information and communication technologies in various processes of education to support and enhance learning. Pande et al. (2016) added that e-learning in education is the wholesome integration of modern telecommunications equipment and ICT resources, particularly the internet, into the education system. E-learning is therefore defined as instructional strategy that allow teacher and learners to be physically separated but link together by electronic medium through the internet. In Nigeria for instance, the closure of schools nationwide on March 19th, 2020 led to the adoption of e-learning programmes as a remediating strategy of engaging students and bridging the gap of schools' closure (Federal Ministry of Education (FME), 2020). Federal, states and local governments swung into action and adopted radio and television teaching as a way of learning while the students are at the comfort of their homes. In addition, some schools especially private schools also utilized other medium such as google classroom, WhatsApp etc, to facilitate teaching and learning while on lockdown (Misan-Ruppee, Obro & Akpochafo, 2023).

However, this came with it challenges as it tends to widen the gaps in education between the children from higher-income families and urban areas and those from low-income families and rural areas. This is because a lesser percentage of learners who hail from higher-income families and urban areas, stand more chance to access education through technology than learners from poor homes and rural areas (Obiako & Adeniran, 2020, Leung & Sharma, 2020, Zhong, 2020). Studies before the outbreak of covid-19; Omiko (2016) revealed that e-learning as a powerful source of learning that leads to more effective understanding. In another study, Omiko (2018) found that majority of students (especially those in urban center) were familiar with e-learning especially through radio and television programmes. This made the adoption and acceptance of electronic learning through radio and television during the covid-19 outbreak easier among students. According to studies conducted by Basher (2017), Rabbi, Zakaria and Tonmoy (2018) and Omiko (2018) they maintained that e-learning application helps students to learn more electronically and teachers spend more time with students than with papers. Also, studies by Mafa (2018) and Henukh, Rosdianto and Oikawa (2020) show that e-learning enhances learning on the basis that the students and the teacher can be sited in various geographical contexts. However, Ogbole (2019) highlighted some challenges of e-learning among students to include lack of access to radio sets, ignorance of the benefits inherent in radio educational programmes and non-inclusion of these programmes in school's lesson plans.

The rapid evolution of e-learning platforms in Nigeria is influenced by different determinant which includes but not limited to flexibility and ease of access, reduced cost of training, availability, and convenience. Despite the general acceptance of e-learning, its ability to improve students learning outcome and the growth recorded over the years, Gordon and Gabriel (2021) decries that several Nigeria institutions (primary, secondary and higher institutions) still prefer the traditional face to face method of teaching Biology than the use of e-Learning mode to transfer and acquire knowledge and skill. In agreement, Eze, Chinedu-Eze, and Bello (2022) also opine that, despite the noticeable benefits the integration of e-learning offers to the developing countries especially Nigeria, its adoption has been somewhat low chiefly due to low literacy rates and the meagre funding education receives from governments at all levels. This therefore created a gap in literature which this present study tends by investigate the challenges inhibiting the deployment of e-Learning in the teaching of biology in Delta state.

Research Questions

The following research question guided the study

1. what factors are inhibiting the deployment of e-learning for biology teaching in Delta state?
2. What challenges do teachers face that inhibiting the deployment of e-learning for biology teaching in Delta state?
3. What possible solutions could ameliorate the challenges teachers face deploying e-learning for biology teaching in Delta state?

METHODS

The study employed a descriptive survey design. This is a research design mainly use for scientific investigation to describe the state of events or phenomena. The study was carried out in Ika federal constituency consisting of Ika North East and Ika South LGA of Delta State. The population consist of eight hundred and eighty-seven (887) teachers in 42 public secondary schools in the area, out of which 125 biology teachers were purposively sampling for the study. The justification for using purposively sampling was because, the study only concerns biology teacher in the area. Data was collected using a 35-item researcher developed instrument called "Questionnaire on Limitation Inhibiting E-learning Deployment (QLHED)". QLHED was divided into section A and B. Section A contain respondents Bio data, while section B contains 35 items, divided into three clusters of 11, 13 and 11 items, answering the research questions respectively. QLHED was design using 4-point likert scale of Strongly Agree, Agree, Disagree and Strongly Disagree with score ranging from 4 - 1.

Three experts validated the instrument, both from the Department of Science Education, University of Nigeria, Nsukka. They were given the questionnaire, purpose of the study, research questions and requested to vet the items for clarity of expression, wording and appropriateness of the items. To standardize the instrument, their corrections and suggestion were fixed. It was trial tested on 25 teachers randomly administered in five selected secondary schools outside the study area. The internal consistency of the instrument was 0.82, established using Cronbach's Alpha technique. Out of the 125 biology teachers sampled for the study only 106 responded to the instruments. The collected data were analyzed using mean and standard deviation and decision taken using grand mean. Based on the modified 4-point Likert-rating scale adopted for the study, 2.50 grand mean score was used as a benchmark for each cluster in the study. Therefore, items with mean scores of 2.5 and above were regarded as agreed or positive responses while items with mean scores less than 2.50 were regarded as disagreed or negative responses.

RESULT

Results of the data collected are presented in the table below based on research questions

Table 1: Mean and SD of the challenges inhibiting e-learning in biology teaching

S/N	Items	Mean	SD	Decision
1	Lack of technology for distance learning/e-learning	3.31	.797	Agreed
2	Lack of support from the government/ school administration	3.18	.796	Agreed
3	Lack of funds to purchase e-learning instructional technologies	3.16	.786	Agreed
4	Government inability to train and retrain teachers on how to use e-learning instructional media	3.08	.731	Agreed
5	High cost of buying ICT gadget	3.09	.878	Agreed
6	Negative comments about E-learning among teachers	2.13	.851	Disagreed
7	Lack of technology/software required for home access	3.09	.724	Agreed
8	Low incentive for teachers	3.12	.813	Agreed
9	Lack of trained teachers with skills in ICT	2.35	.927	Disagreed
10	Unavailability of Wi-Fi in schools	3.28	.700	Agreed
11	Lack of computer/digital laboratory in schools	3.25	.851	Agreed
	Grand mean	**3.00**		

Table 1 revealed that biology teachers agreed with item 1,2,3,4,5,7,8,10 and 11 as the challenges inhibiting the deployment of e-learning in Biology teaching in Delta state. However, they disagreed with item 6 and 9 which are negative comments about E-learning among teachers and lack of trained teachers with skills in ICT. The grand mean score of 3.00 shows that the teachers agreed that the lack of technology for distance learning/e-learning, lack of support from the government/ school administration, lack of funds to purchase e-learning instructional technologies, government inability to train and retrain teachers on how to use e-learning instructional media, high cost of buying ICT gadget, lack of technology/software required for home access, low incentive for

teachers, unavailability of Wi-Fi in schools and lack of computer/digital laboratory in schools are the main limitations inhibiting the deployment of e-learning in biology teaching in Delta state.

Table 2: Mean and SD of teachers' challenges deploying e-learning in Biology teaching

	Items:	Mean	SD	Decision
12	Poor internet network connectivity	3.01	.945	Agreed
13	Poor/no power supply to schools	3.30	.841	Agreed
14	Poor skills and competence for using technologies	2.74	1.121	Agreed
15	Not enough time to prepare and use various e-learning instructional technologies	3.28	.859	Agreed
16	Inadequate e-learning instructional media	2.91	1.130	Agreed
17	High cost of data for access to the internet	3.48	.538	Agreed
18	Inaccessibility of audio/video material, PDF, PowerPoint…etc	2.96	.955	Agreed
19	Inadequate ICT (Information Communication Technology) and E-learning infrastructure	2.87	.943	Agreed
20	Lack of interaction between students and teachers	2.93	.897	Agreed
21	E-learning software's are too complicated in nature to use	3.40	.848	Agreed
22	Waste too much time due to internet fluctuation	3.15	.881	Agreed
23	Interruption in online classroom by family members	2.89	.838	Agreed
24	Use of mobile phone or other technologies during class	3.10	.803	Agreed
	Grand mean total	3.07		

Table 2 revealed that biology teachers agreed with all the items based on the 2.5 mean score bench mark for the study. Among the notable challenges are; high cost of data for access to the internet, poor/no power supply to schools, poor internet/ network connectivity, lack of interaction between students and teachers, waste too much time due to internet fluctuation and interruption in online classroom by family members among others.

Table 3: Mean and SD of the possible solutions to teacher's challenges deploying e-learning for biology teaching

	Item: possible solutions to the challenges faced by teachers while using e-learning	Mean	SD	Decision
25	Government should provide adequate ICT (Information Communication Technology) and E-learning infrastructure	3.21	.915	Agree
26	Employment of more skilled teachers	3.31	.735	Agree
27	Provision of standby generators for regular power supply	3.32	.625	Agree
28	E-learning software should be made available in schools	3.27	.683	Agree
29	Teachers and students should be expose to technology early enough	3.11	.772	Agree
30	Reduce work load for the teachers so that they have time to prepare and use media	3.28	.943	Agree
31	Funding of schools should be government top priority	3.22	.784	Agree
32	Give teachers incentives so that they can be motivated to work and use instructional media	2.86	.889	Agree
33	Training & retraining of teachers through seminars, workshops, and/or conferences on how to use, prepare and improvise instructional media	3.09	.981	Agree
34	Provision of digital libraries to schools	2.65	1.171	Agree
35	Connection of classrooms/Auditorium to the internet	3.26	.865	Agree
	Grand mean total	3.14		

Table 3 addresses the possible solutions to the challenges teachers encounter while teaching biology using e-learning in Delta state. The result shows teacher agreed with all the items as solution to their problem with deploying e-learning. The finding revealed further a grand mean score of 3.14 which based on the 2.5 mean bench mark decision rule for the study, the result reveal that the respondents/teachers agreed with all the items as possible solution to the challenges teachers face while using e-learning in secondary schools.

DISCUSSION

The result in table 1 shows the mean and standard deviation score of respondents in attempt to answer research question one. It reveals that the respondents agreed with 9 items and disagreed with two. Some of the notable limitations based on the finding are; lack of technology for distance learning/e-learning, unavailability of Wi-Fi in schools, high cost of buying ICT gadget, lack of support from the government/ school administration, lack of technology/software required for home access and lack of funds to purchase e-learning instructional technologies. Furthermore, the respondents disagreed with those negative comments about e-learning among teachers and lack of trained teachers with skills in ICT. The findings of the study corroborate with Ja'ashan, (2020) who found lack of technology for distance learning/e-learning, and high cost of buying ICT gadget as problems using ICT in classroom. Similarly, Ukala and Ugwu (2019), Gordon and Gabriel (2021) found lack of support from the government/ school administration, unavailability of Wi-Fi in schools as problem with ICT in school too.

In another study, Sabina (2012) disagreed with the findings of this study by reporting that school have enough computer in their computer laboratory in schools. The report explains further that teacher most teacher has computer phobia as such preventing them from accessing it. This contradictory finding could be attributed to difference in study's location and sample used. This implies that one cannot confidently generalize the problems affecting the use of ICT in school.

Finding in table 2 revealed the challenges teachers face while using e-learning for biology teaching to include but not limited to; inaccessibility of audio/video material, PDF, PowerPoint, poor skills and competence for using technologies, poor/no power supply to schools, poor internet network connectivity, high cost of data for access to the internet and interruption in online classroom by family members among others. The findings are in sync with the findings of Ja'ashan (2020) who also found poor power supply to schools, poor internet connectivity, and high cost of data for as the main challenges teachers and students face while using e-learning. In addition, Eze, et al., (2022) found poor school infrastructures, lack of skills and competence teacher and lack of computers in most rural schools as the challenges teacher face with the deployment of e-learning. In a contradictory finding, Sabina (2012) found laziness, phobia and lack of willingness among teachers as the major challenges preventing teacher from embracing ICT in classroom. With these kinds of findings, it is very difficult to state the real problem inhibiting the deployment of e-learning in biology classroom among teacher.

The finding in table 3 shows that all the respondents agreed that the solution to the limitations inhibiting the deployment of e-learning in biology in Delta State include but not limited to; provision of standby generators for regular power supply, employment of more skilled teachers, provision of adequate ICT and E-learning infrastructure, connection of classrooms to the internet, e-learning software should be made available in schools and training & retraining of teachers through seminars, workshops, and/or conferences on how to use, prepare for and use e-learning and making funding of school a priority among others. The findings of this study agree with the findings of Eze, et al., (2022), Ukala and Ugwu (2019) and Sabina (2012) who also carried out studies on the challenges and prospects of using e-learning. Most studies agreed with the finding of this study. This implies that both teacher and researcher are aware of the solutions to the challenges affecting them regarding ICT in school, but lack of political will from the government and the school authorities stand as a hindrance to implementing them.

CONCLUSION

The study investigated the limitations inhibiting the deployment of e-learning for biology teaching in secondary schools in Delta state. The findings revealed a number of limitations and possible solutions. Based on the findings, if government could live up to expectations all these would be a thing of the past in a short time and school will deploy ICT in classroom with confidence.

RECOMMENDATIONS

The researchers recommend the following:

1. government, especially Delta state government should embark on a massive computer literacy training program particularly for biology teachers and learners at all levels. This should be done through in-service training of teachers, workshops, seminars, and conferences.
2. Classrooms in secondary schools should be connected to the internet in order to enhance web-based instruction.
3. A standby generators and/or solar system should be installed in schools to tackle the problem of epileptic or poor power supply in order to support the use of electronic equipment for e-learning.
4. Teachers' salary should reflect the reality of today to enable them buy gadgets such as personal laptop, smart phone for effective e-learning

REFERENCES

1. Adepoju, T.M. (2021). Adoption of E-Learning as a Panacea to the Effects of Covid-19 on the Teaching and Learning of Science in Nigerian Secondary Schools. International Journal of Research and Innovation in Social Science (IJRISS) *5*(6). 115-119

2. Basher, S.A. (2017). The impact of Google classroom application on the teaching efficiency of pre-teachers. Retrieved from https://ww.researchgate.net/publication

3. Eze, S. C., Chinedu-Eze, V. C., & Bello, A. O. (2018). The utilization of e-learning facilities in the educational delivery system of Nigeria: a study of M-University. *International Journal of Educational Technology in Higher Education*, 15, 34.

4. Gordon, B. & Gabriel, J. (2021). Benefits, Challenges and Prospects of Integrating E-Learning into Nigerian Tertiary Institutions: A mini review. *International Journal of Education and Development using Information and Communication Technology (IJEDICT),17(3) 6-18*

5. Henukh, A., Rosdianto, H., & Oikawa,S. (2020). Implementation of Google classroom as multimedia learning. *Journal of Physics education, 5*(1), 38-44

6. Ja'ashan, M.M.N. (2020). The Challenges and Prospects of Using E-learning among EFL Students in Bisha University. *Arab World English Journal*, *11*(1) 124-137.

7. Leung, M. & Sharma, Y. (2020, February 21). Online classes try to fill education gap during epidemic. University World News. Retrieved from https://www.universityworldnews. com/post.

8. Mafa, K.R. (2018). Capabilities of Google classroom as a teaching and learning tool in higher education. *International Journal of Science, Technology and Engineering, 5*(5), 30-34

9. Misan-Ruppee, R.O., Obro, S. and Akpochafo, W.P. (2023), "Innovative instructional approach: the effect of information and communication technology-assisted instruction on civic education students' performance", *Arab Gulf Journal of Scientific Research*, 42(2), 744-756 https://doi.org/10.1108/AGJSR-02-2023-0047

10. 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). Retrieved from https://media.africaportal.org/documents/COVID19-ImpendingSituation-Threatens-to-Deepen-Nigerias-Education-.pdf

11. Obro, S. & Atubi, O. F. (2021). Social Impact and Coping Strategies of Covid-19 Pandemic: Insights from Social Studies Undergraduates Students. *Journal of Research in Humanities and Social Science, 9*(7), 61-68

12. Obro, S. (2021). The Internet and Quality Social Studies Education for Sustainable Development in Post-Covid-19: a Review. *Jurnal Penelitian dan Pengkajian Ilmu Pendidikan: e-Saintika, 5*(1), 15-26.

13. Obro, S. & Enayemo, O. G. (2022). Lecture method recoil: Effect of formatıve assessment and simulation activities on the learning outcomes of social studies students. *Journal for Educators, Teachers and Trainers*, 13(2). 174 –182.

14. Ogbole, J. (2019). *Uses and gratifications of radio educational programmes by senior secondary school students in Northeast geo-political region, Nigeria* (Unpublished Ph. D Thesis), Benue State University, Makurdi

15. Olowo, B.F. (2021). E-Learning Platform: A Sustainable Approach for Students' Learning during and after Coronavirus Pandemic in Oyo State Secondary Schools, Oyo State, Nigeria. *European Journal of Interactive Multimedia and Education, 2*(1), e02103. https://doi.org/10.30935/ejimed/9361

16. Omiko, A. (2016). *Using computer instruction* (Unpublished Lecture Note). Department of Science Education, Ebonyi State University, Abakaliki.

17. Omiko, A. (2018). Effect of Children's Radio/Television Programmes on Basic Science and Technology Education. *International Journal of Science Research and Education, 5*(3). 6254-626.

18. Omobolaji, A.O., Charles A.., Aderonke, A.O., Adeoba, T.F., Okezie C.G., & Udenwagu, N.E. (2019). The prospects of adopting e-learning in the Nigerian education system: a case study of Covenant University. *3rd International Conference on Science and Sustainable Development (ICSSD) Conf.* series: Journal of physics

19. Onovo, J.S. & Okorie, M.N. (2017). Adoption of E-Learning as Instructional Media in Secondary Schools: Challenges and Prospects. *Journal of Education and Practice 8*(35), 90-95

20. 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

21. Rabbi, M.M., Zakaria, A., & Tonmoy, M.M. (2018). Teaching listening skill through Google classroom: A study at tertiary level in Bangladesh.

22. Rilwan-Muhammad, A., & Mamman A.S. (2015). Cloud Computing Based e-Learning: Opportunities and Challenges for Tertiary Institutions in Nigeria. *International Journal of E-Education, e-Business, e-Management and e-Learning*, *5*(3), 144–152.

23. Sabina, N. (2012). Challenges in the application of e-learning by secondary school teachers in Anambra state, Nigeria. *African Journal of Teacher Education (AJOTE).* 2(*1*), 1-9

24. Ukala, G., & Ugwu, T.U. (2019). Teachers' Challenges in Integrating Information and Communication Technology (ICT) in Teaching and Learning of Biology in Secondary Schools. *Journal of CUDIMAC (J-CUDIMAC), 7*(1), 25-31.

25. UNESCO (2020). COVID-19 Educational Disruption and Response. Retrieved from https://en.unesco.org/covid/education response

26. Zhong, R. (2020). The coronavirus exposes education's digital divide. The New York Times.