

FACTORS AFFECTING E-LEARNING UTILIZATION IN BASIC SCIENCE IN SECONDARY SCHOOLS IN ENUGU STATE IN THE POST COVID-19 ERA

Aham Assumpta Chinyere & Onyi Ifeoma Eugenia*

Department of Science Education, University of Nigeria, Nsukka

Corresponding email: ifeoma.onyi@unn.edu.ng

Abstract

This study investigated the factors affecting e-learning utilization in Basic Science in a post covid-19 era in secondary schools in Enugu State. The study adopted a descriptive research design. Two research questions and two hypotheses guided the study. The instrument for data collection was the Factors affecting E-Learning Utilization in Basic Science Questionnaire (FEUBSQ). The population of the study was 6, 017 respondents. Multi-stage sampling technique was used to select 20 teachers and 220 students from the secondary schools in Enugu State. The Cronbach Alpha technique was used to ascertain the instrument's reliability, which yielded 0.89. Data collected were analyzed using mean, standard deviation, and t-test. The findings revealed that the factors affecting e-learning utilization include lack of funds, lack of competence, and inadequate infrastructure among others. It was recommended that e-learning platforms and internet facilities should be provided by the institutions and workshops for the training and retraining of teachers.

Keywords: Basic Science, E-learning, Post covid-19 era

Introduction

E-learning is one of the strategies that has been widely recognized to have improved the teaching and learning of Basic Science. The utilization of e-learning in Basic Science in the post covid-19 era is so important because it encourages the active participation of students in the teaching and learning process despite being physically far away from each other. The National Policy on Education (FME, 2013) emphasizes the need for proper teaching and learning of Basic Science by stimulating individual activity on the part of the students. With high achievement in Basic Science in mind; there is, therefore, a need to utilize e-learning that will promote creative and innovative activities among students in the teaching and learning of Basic Science (Haciogluo, 2020).

Basic Science is essential in the scientific and technological development of the nation as it helps to improve the lives of humans and encourages junior students to continue with science. The curriculum should be thought with an integrated approach that will unite the science subjects such as physics, chemistry, and biology which are bases for courses such as medicine, engineering, pharmacy, and others (Rahman, Chandra & Anwar, 2019). The Basic Science curriculum is filled with lots of activities and experiments which are meant to encourage the students to develop their knowledge and skills to meet the contemporary needs of society.

Despite the importance of Basic Science, a report from Basic Education Certificate Examination (BECE) indicated that the Junior Secondary School Certificate Examination (JSSCE) result (2015-2020) was poor. The poor achievement has been attributed to the abstract nature of the subject and the lack of use of innovative teaching methods. Tolowa and Adefila, (2020) and Nwaeze et al. (2016) further stated that the conventional method does not allow students to acquire the necessary skills that promote achievement in Basic Science. However, Ugwuanyi (2022) opined that one of the most effective ways of promoting students' achievement is by utilizing e-learning.

The essence of utilizing e-learning is to enhance students learning outcomes unfortunately this has been hindered by a lot of factors. The competence of teachers and lack of infrastructure were reported as factors that affected e-learning utilization in secondary schools (Ibrahim 2016; Onovo & Okorie, 2017). Teachers' experience and qualifications were factors that were found to be affecting e-learning utilization in teaching science in secondary schools (Oyelakan, Igbokwe & Olarundare, 2017). Lack of funds and lack of supervision affected the utilization of e-learning in tertiary institutions (Yusuf, Igwe & Eneh, 2020; Adarkwah, 2020; Olutola, Olatoye & Olatoye, 2021). Although e-learning facilities are there all the time, sometimes the internet is unstable. It has been noted that lack of access to devices and unreliable internet connectivity are the challenges affecting e-learning usage (Maphosa, 2020; Aneke, Aduaka & Eze, 2021; Sarpong, Dwomoh, Boakye & Ofosua-Adjei, 2022).

Factors that are considered in this investigation are lack of infrastructure and tools, lack of funds, lack of administrative and technical support, poor internet connectivity, erratic electricity supply, and lack of experience. The factors investigated in the study affect e-learning platform utilization in Basic Science to various degrees.

E-learning is an important tool adopted during covid -19 in secondary schools to continue the educational system. Obeta, Etukudoh, and Ejinaka (2020) defined e-learning as the use of computer-based technology for the transfer of knowledge without physical contact. Teachers can upload information that was not provided during face-to-face classes and students consequently send back information or the difficulties they encounter and receive feedback. Operationally e-learning can be viewed as the interaction of the instructor and the learner to impart knowledge using an electronic device. Teachers utilize e-learning platforms to share, collaborate and disseminate information to students through social support sites such as zoom, google classroom, WhatsApp, and others (Elumalai et al., 2020; Oguguo et al., 2020). Information is shared with the students and response is got from them through the same medium.

In the post covid-19 era, the teacher's interaction with the students is important in determining the learning context, selection of learning, and assessment which means that the teacher's pedagogy should be considered. Aniaku and Lateef (2021) posited that in the utilization of e-learning platforms there is sharing of information and knowledge between the teacher and the students that would enable the students to think, plan and develop knowledge for themselves This involves the planning of the lesson, practices adopted for learning and the assessment (Abudselidze, Radzivilora & Mohylevska, 2021; Adzovie & Jibril, 2022). To achieve the predetermined aims and objectives of Basic

Science, educational researchers are reviewing the teaching by having the factors affecting the utilization of e-learning in mind to improve the achievement of students.

From the foregoing, it has been established that e-learning is important at all levels of Nigerian education, particularly secondary education. There is scanty empirical research on the factors affecting the utilization of e-learning in science, especially in Basic Science. Hence, this study needs to find out the factors affecting e-learning utilization in Basic Science in junior secondary schools in Enugu State.

Statement of the Problem

Basic Science is very vital for national development. However, despite the importance of Basic Science, reports on Basic Education Certificate Examination (BECE) indicate poor achievement of students in the Junior Secondary School Certificate Examination (JSSCE). The poor achievement has been attributed, mainly to the abstract nature of the subject and the lack of use of innovative teaching methods. It is noted that one of the most effective ways of promoting students' achievement is by utilizing e-learning. Unfortunately, there is little or no knowledge on the extent of teachers' utilization of e-learning platforms and factors that could affect teachers' utilization of e-learning platforms in teaching Basic Science in secondary schools in Enugu State. Filling this knowledge gap is needed for effective interventions. Hence, the problem of this study is the factors affecting e-learning utilization in Basic Science in secondary schools in Enugu State.

Purpose of the Study

The general purpose of the study was to investigate the factors affecting e-learning utilization in Basic Science by teachers and students. Specifically, the study seeks to find out

1. the extent of teachers' and students' utilization of e-learning in Basic Science.
2. the factors affecting teachers' and students' utilization of e-learning in Basic Science.

Research Questions

The following research questions guided the study.

1. What are the mean ratings of teachers and students on the extent of e-learning utilization in Basic Science?
2. What are the mean ratings of teachers and students on the factors affecting e-learning utilization in Basic Science?

Hypotheses

The hypotheses that guided the study were tested at 0.05 level of significance

Ho₁: there is no significant difference between the mean ratings of teachers and students on the extent of e-learning utilization in Basic Science.

Ho₂: There is no significant difference between the mean ratings of teachers and students on the factors affecting e-learning utilization in Basic Science.

Methodology

The study adopted a descriptive survey design. The population of the study was made up of 5,887 junior secondary II Basic Science students and 130 teachers in the Enugu education zone in Enugu State. Multi-stage sampling technique was used to select 20 teachers and 220 students for the study based on the availability of e-learning resources. Two research questions and two hypotheses guided the study. The instrument for data collection was the Factors affecting E-learning Utilization in Basic Science Questionnaire (FEUBSQ). The instrument was validated by three experts two from the Basic Science unit and one from the Measurement and Evaluation unit all in the Department of Science Education, Faculty of Education, University of Nigeria, Nsukka. The questionnaire comprises two sections A and B. A consists of demographic information of the respondents while section B contains items on the extent of utilization and factors affecting the utilization of e-learning in Basic Science. Cronbach alpha method was used to determine the internal consistency which yielded 0.89. Data relating to research questions were analyzed using mean and standard deviation and t-test to test the hypotheses at 0.05 level of significance. The null hypothesis of no significant difference was not rejected if the p-value was greater than 0.05 level of significance but rejected if otherwise.

Research Question 1: What are the mean ratings of teachers and students on the extent of e-learning utilization in Basic Science?

Table1. Mean ratings of teachers and students on the extent of e-learning utilization in Basic Science

S/N	Items	Teachers N=20			Students N=220		
		Mean	SD	Decision	Mean	SD	Decision
1.	Transfer of knowledge to students orally or in written form	2.28	0.71	D	2.37	0.48	D
2.	Write a report on an experiment	2.41	0.36	D	2.23	0.40	D
3.	Utilization of google classroom	2.30	0.57	D	2.38	0.10	D
4.	Utilization of the zoom app	2.70	0.87	A	2.52	0.72	A
5.	Utilization of e-mail	2.60	0.74	A	2.58	0.76	A
6.	Utilization of YouTube video	1.97	0.16	D	2.15	0.03	D
7.	Participate in the e-learning discussion forum	2.58	0.60	D	2.51	0.59	D
8.	Use of PowerPoint	2.25	0.30	A	2.18	0.08	A
9.	Utilization of WhatsApp	2.84	0.83	A	2.54	0.68	A
10.	Utilization of virtual laboratory	2.43	0.42	D	2.31	0.31	D
	Aggregate mean and standard deviation	2.44	0.56	D	2.38	0.42	D

The data in table 1 revealed that the teachers and students disagree on all the items materials including transfer of knowledge for students having mean ratings of 2.28 and 2.37; writing a report of an experiment having mean ratings of 2.41 and 2.23;

utilization of google classroom having mean ratings of 2.30 and 2.38; followed by utilization of YuoTube having a mean rating of 1.97 and 2.15; PowerPoint having mean ratings of 2.25 and 2.18, and finally utilization of virtual laboratory having mean ratings of 2.43 and 2.31. The above results according to the respondent indicated a low level of utilization of e-learning in Basic Science. Also, the utilization of zoom app has mean ratings of 2.70 and 2.52; the utilization of email has mean ratings of 2.60 and 2.58; participation in e-learning discussion forum has to mean ratings of 2.58 and 2.51 and lastly utilization of WhatsApp has mean ratings of 2.84 and 2.54 revealed adequate usage of e-learning. However, the overall mean ratings of 2.44 and 2.38 is an indication that the e-learning platform was poorly utilized.

Hypothesis One: There is no significant difference between the mean ratings of teachers and students on the factors affecting e-learning utilization in Basic Science.

Table 2: t-test Analysis of the Difference in the Mean Ratings of Teachers and Students on E-learning Utilization in Basic Science

Group	N	Mean	SD	t	df	Sig (2-tailed)
Teachers	20	32.01	5.00	-0.98	238	0.33
Students	220	33.50	6.70			

Table 2 shows that the mean ratings of teachers on the extent of e-learning utilization ($M = 32.01, SD = 5.00$) are not significantly higher ($t = -0.98, df = 238, p = 0.33$) than students' ratings ($M = 33.50, SD = 6.70$). Hence, the null hypothesis which states that there is no significant difference in the mean ratings of teachers and students on the utilization of e-learning in Basic Science was not rejected.

Research Question 2: What are the mean ratings of teachers and students on the factors affecting e-learning platform utilization in Basic Science?

Table 3: Mean Ratings of Teachers and Students on the Factors Affecting E-Learning Utilization in Basic Science

S/N	Items	Teachers N=20		Decision	Students N=220		Decision
		Mean	SD		Mean	SD	
1	Poor electricity supply	3.31	0.70	Agreed	3.37	0.60	Agreed
2	Lack of competence	3.42	0.63	Agreed	3.41	0.63	Agreed
3	Lack of infrastructure	3.40	0.65	Agreed	3.39	0.61	Agreed
4	Lack of fund	3.44	0.67	Agreed	3.35	0.58	Agreed
5	Poor internet connectivity	3.23	0.72	Agreed	3.28	0.64	Agreed
6	Lack of technical support	3.20	0.61	Agreed	3.24	0.59	Agreed
7	Lack of administrative support	3.14	0.61	Agreed	3.08	0.43	Agreed

Aggregate mean and standard deviation	3.31	0.65	Agreed	3.30	0.58	Agreed
---------------------------------------	------	------	--------	------	------	--------

The result in table 3 with overall mean ratings of 3.32 and 2.65 indicated that the respondents agreed that all the items were factors affecting e-learning platform utilization in Basic Science. From the table, the major factors affecting e-learning utilization are: Lack of funds with mean ratings of 3.44 and 3.35 ranked 1st, lack of competence with mean ratings of 3.42 and 3.41 ranked 2nd and lack of infrastructure with a mean rating of 3.40, 3.39 ranked 3rd. Other factors that are not predominantly affecting e-learning utilization are poor electricity supply with mean ratings of 3.31 and 3.37; poor internet connectivity with mean ratings of 3.23 and 3.28; lack of technical support with mean ratings of 3.20 and 3.24 and lastly lack of administrative support with mean ratings of 3.14 and 3.08.

Hypothesis Two: There is no significant difference between the mean ratings of teachers and students on the factors affecting e-learning utilization in Basic Science.

Table 4: t-test Analysis of the Difference in the Mean Ratings of Teachers and Students on the factors that affect the utilization of e-learning in Basic Science

Group	N	Mean	SD	t	df	Sig (.2-tailed)
Teachers	20	24.13	3.04	0.43	238	0.67
Students	220	23.81	3.18			

Table 4 shows that the mean ratings of teachers on the factors that affect the utilization of e-learning platforms in Basic Science ($M = 24.13, SD = 3.04$) are not significantly higher ($t = 0.43, df = 238, p = 0.67$) than students' ratings ($M = 23.81, SD = 3.18$). Hence, the null hypothesis which states that there is no significant difference in the mean ratings of teachers and students on the factors that affect the utilization of e-learning in Basic Science was not rejected.

Discussion of Findings

The findings of this study revealed the extent of e-learning utilization in Basic Science. The findings in table I revealed that zoom tools, e-mail, PowerPoint, and WhatsApp were utilized while transfer of knowledge to students orally or in written forms, writing a report of an experiment, YouTube videos, participating in e-learning discussions and virtual laboratories were poorly utilized. Considering the result of the extent of e-learning utilization it could be observed that the e-learning platforms are not adequately incorporated into Basic Science instruction. This is in agreement with Maphosa (2021) who found out that the students of tertiary institutions had negative perception of e-learning usage. This is consistent with Aneke, Aduaka, and Eze who reported that migration to e-learning platforms has not made any impact on the performance of lecturers and students in tertiary institutions.

The findings in table 2 revealed the factors affecting the e-learning utilization include poor funding, lack of competence, inadequate infrastructure, poor internet connectivity, poor administrative and technical support, and erratic power supply. The test

of the hypothesis showed that there is no significant difference in the mean ratings of teachers and students on the factors affecting e-learning utilization in Basic Science. This implies that the factors affecting the e-learning utilization in Basic Science would not support students' engagement and as such hinders the achievement of the learning outcomes. This result is in line with that of Ibrahim (2016) who stated that both lecturers and students of Basic Science were affected by these factors. Other authors include Oyelakan, Igbokwe and Olarundare (2017), Yusuf, Igwe, and Eneh (2020); Olutola, Olatoye and Olatoye (2020) and Sarpong, Dwomoh, Boakye and Ofosua-Adjei (2022) who also found out that poor funding, poor infrastructure and lack of experience among others affect the e-learning utilization in tertiary institutions.

Conclusion

Teachers and students agreed that the factors pointed out above affected e-learning utilization in Basic Science. Therefore, there is an urgent need for stakeholders in education to eliminate these factors posing a serious problem to the utilization of e-learning in Basic Science to enable teachers to utilize e-learning and present their lessons innovatively and interactive.

Recommendations

Based on the findings of the study, the following recommendations were made thus:

1. Government should provide funds for adequate provision and maintenance of the e-learning facilities.
2. Professional bodies such as STAN should organize workshops, seminars and conferences to improve teachers' pedagogical knowledge and skills for instructional purposes.
3. Curriculum planners should integrate e-learning in the curriculum review to encourage students' active participation.
4. Basic Science teachers should employ e-learning to promote independent learning among students. This will enhance innovation and sustain learning outcomes in students.

References

- Abuselidze, G., Radzilova, I. & Mohylevska, O. (2021). Psychological-pedagogical problems and prospects of distance learning of students during the covid-19 pandemic. *E3S Web of Conferences*, 25, 1-10.
- Adarkwah, M. A. (2021). An outbreak of online learning in the covid-19 outbreak in sub-Saharan Africa: Prospects and challenges. *Global Journal of Computer Science and Technology: Information and Technology*, 21(2), 1-10.
- Adzovie, D. E. & Jibril, A. B. (2022). Assessment of the effect of a covid-19 pandemic on the prospects of e-learning in higher learning institutions. The mediating role of academic innovativeness and technological growth. *Content Education*, 9, 1-20.
- Aneke, M. N., Aduaka, O. S. & Eze, C. M. (2021). Effect of migration to the e-learning platforms on higher education in tertiary institutions in Nigeria in the covid-19

- pandemic era. *Sapientia Foundation Journal of Education, Sciences and Gender Studies (SFJESGS)*, 3(4), 289-305.
- Aniaku, O. L. & Lateef, J. I. (2020). Availability and utilization of Information Communication Technology (ICT) in secondary school biology teaching: Implication for national security. *Review of Education, Institute of Education Journal, University of Nigeria, Nsukka*, 33(1), 272-279.
- Elumalai, K. V., Sankar, J. P., Kalaichelvi, R., John, A. J., Menon, N., Alqahtani, M. S. & Abumelha, M. A. (2020). Factors affecting the quality of e-learning during the covid-19 pandemic from the perspective of higher education students. *Journal of Information Technology Education: Research*, 19, 731-753.
- Federal Ministry of Education (2013). *National Policy on Education*, Lagos.
- Hacioglu, Y. (2021). The effect of stem education on 21st-century skills: Pre-service science teachers' evaluations. *Journal of Science Technology, English, Mathematics, and Arts Education (STEMAEd)*, 2(4), 140-167.
- Ibrahim, J. D. (2016). Factors affecting Information and Communication Technology use in teaching and learning integrated science in colleges of education in Katsina State: A case of Federal college of education, Katsina. *57th Annual Conference Proceeding of Science Teachers Association of Nigeria (STAN)*, 354-362.
- Maphosa, V. (2021). Factors influencing students' perception towards e-learning adoption during a covid-19 pandemic: A developing country context. *European Journal of Interactive Multimedia and Education*, 2(2), 1-8.
- Nwaeze, E. U. C., Onuoha, R. C. & Ukogo, I. (2016). Innovative teaching methods in science education for junior secondary school basic science students. *Journal of Teacher Perspective*, 11(2), 1-10.
- Obeta, M. U., Etukudoh, N. S. & Ejinaka, R. O. (2020). A case of online teaching and learning during covid-19 in a medical lab, science lab, and training in Federal School of Medical lab science, Jos. *South-East Asian Journal of Medical Education*, 14(2), 108-116.
- Oguguo, B. C., Ajuonuma, J. O., Azubuike, R., Ene, C.U., Attah, F. O. & Oko, C. J. (2020). Influence of social media on students' achievement. *International Journal of Evaluation and Research in Education (IJERE)*, 9(4), 1000-10009.
- Olutola, A. T., Olatoye, R. A. & Olatoye, O. O. (2021). Assessing the impediments to e-learning utilization by the higher institution. *Journal of Education and Learning (Edulearn)*, 15(12), 297-302.
- 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.
- Oyelakan, O. S., Igbokwe, E. F. & Olarundare, A. S. (2017). Science teachers' utilization of innovative strategies for teaching senior school science in Ilorin, Nigeria. *Malaysian Online Journal of Educational Sciences*, 5(2), 49-65.
- Rahman, D. F., Chandra, D. T. & Anwar, S. (2019). Development of an integrated science teaching material-oriented ability to argue for Junior high school students. *Journal of Physics Conference Series*, 1157(2), 1-4.

- Sarpong, S. A., Dwomoh, G., Boakye, E. K. & Ofosua-Adjei, I. (2022). Online teaching and learning under covid-19 pandemic: Perception of university students in Ghana. *European Journal of Interactive Multimedia and Education*, 3(1), 1 -10.
- Toluwa, O. & Adefila, O. M. (2020). Effects of analogy-enhanced instructional strategy on learning outcomes of students in basic science practical skills in Ekiti state, Nigeria. *International Journal of Multidisciplinary Current Research (IJMCR)*, 2(4), 41-45.
- Ugwuanyi, C. S. (2022). Enhancing children's achievement in basic science using library electronic books: A case of repeated evaluation. *Library Philosophy and Practice (e-learning)* 6573.<https://digital>
- Yusuf, L., Igwe, N. J. & Eneh, E. C. (2020). Utilization of Information and Communication Technology (ICT) for students' support services in e-learning in tertiary institutions for sustainable national development. *Review of Education*, 32 (11), 311-318.
- Waec Bece Chief Examiners' Report (2015-2020).