



Facilities For The Implementation Of E-learning in Physics: Implication For A Paradigm Shift Towards The New Normal

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ABSTRACT

The study investigated the availability and level of utilization of facilities for the implementation of e-learning in the teaching of Physics. This was in a bid to assess preparedness for a paradigm shift to the new normal. Mixed method research design, specifically descriptive survey and exploratory analysis was adopted for the study. Using the purposive sampling technique, a total of 66 secondary school Physics teachers were selected in secondary schools in Port Harcourt and Obio-Akpor Local Government Areas of Rivers State. The research instrument were Checklist on Availability and Utilization of e-Learning Facilities (CAUe-LF) ($r = 0.76$) and Structured Interview Template on e-Learning (SITE-L). Frequency count, percentage and mean were used to analyze the data. The findings of the study revealed that e-learning facilities are not available for Physics teaching in secondary schools in Rivers State. It was also indicated a low extent of utilization of e-learning facilities for Physics teaching. The study therefore recommends that Governments at all levels and as well as school administrators should provide e-learning facilities in secondary schools for the teaching of Physics in this era of COVID-19.

Keywords: e-learning facilities, Availability, Utilization, Physics teaching, new normal.

INTRODUCTION

The world had been plagued with several outbreak of infectious diseases that have caused significant ravage on the existence of humans. Bin-Saeed et al. (2017) asserted that there are evidences of the Severe Acute Respiratory Syndrome (SARS-CoV) and Middle East Respiratory Syndrome (MERS-CoV) which occurred in 2002 and 2012 respectively in some European and Asian countries that infected more than 8000 persons which was traceable to the corona virus family. This family of virus are specifically characterized by symptoms of common cold to acute respiratory tract infection. The severity of the infection may be visible as pneumonia, acute respiratory syndrome, and even death. The novel Coronavirus was named by the International Committee on Taxonomy of Viruses (ICTV) as SARS-CoV-2 while the disease was called COVID-19 (Cui, Li & Shi, 2019). Coronaviruses are zoonotic, that is can be transmitted between animals and people. COVID-19 was first identified in China, Wuhan city in

2019 and its rapid spread to other parts of china and as well neighboring countries gradually causes an international health concern.

Based on these increasing health concerns and unpredictability in terms of the spread of the virus, the World Health Organization (WHO) on 30th of January, 2020 declared COVID-19 as a major international health emergency and a pandemic because of the increasing figures of about 167,515 cases reported globally, including 6,606 deaths as at 11th of March, 2020. Research studies on the transmission of COVID-19 by Yeo, Kaushal & Yeo (2020) reported that the virus is a communicable respiratory disease which can spread from person to person through the projection of infected droplet by means of coughing, sneezing and talking. Transmission of this virus can also occur when smaller droplet are suspended in the air for a long period of time. It can as well be transmitted when the human hand has made contact with a contaminated surface and subsequently used to touch the eyes, mouth or nose.

The report posted by UC Davis Health (2021) noted a newer strain of COVID-19 is causing concern as cases are rising in the United State of America, Asia and Africa. This strain called the “Delta Variant” which was originated in India began spreading more rapidly and making news around the middle of June, 2021. The deadly virus as of 26th June 2021 has infected more than 181.3 million people and killed over 3.9 million people globally. In Nigeria, the Nigeria Centre for Disease Control (NCDC) reported that as at October 24th, 2021 the total confirmed cases is 210,295 while the total death cases is 2856. Apart from total lockdown by the Federal Government of Nigeria before the emergence of the “Delta Variant”, other measures were stipulated in curtailing the spread of the virus as highlighted by the Nigeria Centre for Disease Control (NCDC) through the National Emergency Operations Centre (EOC) that was oversight of the Presidential Task Force on COVID-19 (PTF-COVID-19) which included;

- (i) regular washing of hands and the use of hand sanitizers
- (ii) avoid touching the eyes, nose and mouth with the hand
- (iii) avoid close contact with people, there maintain social distance.
- (iv) coughing and sneezing should be done using bent elbow and not the hand
- (v) regularly clean and disinfect surfaces that has been touched
- (vi) social gatherings and time spent in crowded places should be limited among others.

Before the emergence of the pandemic, many public secondary schools in Nigeria operated the face-to-face approach to teaching and learning due to poor technological infrastructure and perhaps resistant to adapt and adopt digital technology. The general perception of the concept of learning especially in secondary schools was illustrated through face-to-face contact between teachers and students in the classroom. During the total lockdown, there were amplified concerns and conscious actions in the education sector in restructuring and aligning towards the new normal as education agencies and most secondary school administrators sought for alternative approach for teaching and learning during these complex circumstances of the pandemic. In most developing countries, like Nigeria, application of e-learning was underutilized, however as a result of the current pandemic, there was a deliberate shift to rely on its applications fundamentally. E-learning became a lifeline for effective instructional interaction with distinctive rise in its application that were undertaken in various digital platforms. Holzapfel (2020) in the UNESCO’s flagship digital technologies in education event noted that the

“COVID-19 has accelerated e-learning transformation [in education] that was well underway and we’ve seen years’ worth of change in just a matter of weeks. On the other side, the acceleration of change also brings an opportunity to reimagine the future of education and chart a path that is inclusive for all students around the world”

E-learning is a valuable means of extending instructional activities facilitated by the integration of digital devices linked with the internet to surf, design, present, assess, evaluate and extend teaching and learning process. Zalat, Hamed and Bolbol (2021) described e-learning as a learning experience that utilizes electronic device such as laptops, computers, smart-phones connected to the internet in a synchronous or asynchronous learning conditions. Due to the significance of e-learning amidst the COVID-19 pandemic,

several studies were focused on this area of educational technology. For instance, Eduard and Lucian (2020) studied the level of preparedness for e-learning in Romania while Chaka (2020) focused on the application of online instruction, tools and resources during COVID-19. It is a totally technological driven process that takes cognizance of instructional flexibility, innovative approach and encourages mastery of content due to its reversibility or system of recovery. E-learning is essential in the support towards knowledge enhancement, avenue for knowledge management and opportunities for instructional dissemination through electronic platforms. Importance of e-learning applications in education as highlighted by Alodan (2021) are:

- (i) Easy access to electronic educational materials for teachers and learners.
- (ii) Increase in teachers' experience of preparing educational materials, thereby improving their effectiveness.
- (iii) Easy access to information sources for educational process.
- (iv) Increase in the level of creativity and understanding in learners.
- (v) Compensation for the shortage of educational personnel.
- (vi) Facilitation of organized and accessible communication with all parties in the educational process.

Schleicher (2020) noted that students' academic performance of those that employ online electronic approach surpass their counterpart that indulge in the face-to-face traditional instruction approach. Ololube (2006) maintained that greater proportion of educational objectives can be achieved when technology is integrated in the teaching and learning process.

Atsumbe, Emmanuel, Igwe, and Atsumbe (2012) reported that e-learning facilities directed towards teaching and learning is very poor. Okolocha and Nwadiani (2015) also revealed that most e-learning facilities essential for the application of e-learning for teaching in schools are not available. Abiodun-Oyebanji, Olatoye, Dairo, and Faremi, (2019) similarly found that e-learning facilities in most secondary schools in Ibadan, South West of Nigeria are not sufficient. Emesi & Yellowe (2018) lamented that the availability of e-learning facilities in Nigeria secondary schools is quite doubtful as the nation faces their inevitable use. Allison and Allison (2014) discovered that school lacks the e-learning facilities, thereby making it difficult for e-learning to take place in such school. Aboderin and Kumuyi (2013) found that e-learning facilities are not being used for curriculum implementation in secondary schools in Ondo State, Nigeria. The studies of Inije, Utoware and Kren-Ikidi (2013) and Okeke and Ihenacho (2017) also reported that e-learning technologies are not utilized for instruction in schools.

Physics is a basic science whose concepts cut across all other branches of science. The study of Physics in the secondary school provides the foundation, extends and enhances the understanding of other disciplines, such as the earth, agricultural, chemical, biological, and environmental sciences and astrophysics. The study of Physics provides insights into the understanding of nature and the relationship with the dynamics of the universe and principles regulating the production of technological tools for the provision of comfort for humans, therefore, academic performance of students in the study of Physics is paramount for all nations. Federal Republic of Nigeria (2014), in the National Policy in Education posited that principles, laws and theories enshrined in the secondary school Physics curriculum is needed for facing the challenges and dynamism of contemporary events in Science and Technology that are essential for sustainable development.

There is no gainsaying that e-learning is a contemporary learning approach in Nigeria that was been triggered by the emergence of the COVID-19 pandemic and has begun to gain popularity in the teaching enterprise as the demand for its application is increasingly required especially in science subject like Physics. Physics teachers are expected to be technological competent and possess the knowledge to employ e-learning in and out of their classroom. In an effort to contain the demands of e-learning transformation especially in the COVID-19 pandemic era for Physics teaching in secondary schools, availability of e-learning facilities poses a critical issue in determining the push toward sustainable development. The emergence of the COVID-19 pandemic brought a higher demand in the use of e-

learning facilities. Thus, there is a steady shift into a new normal of e-learning. Are the facilities needed for this paradigm shift into e-learning available in Nigerian Secondary Schools? What is the level of utilization of e-learning facilities in secondary school? This study therefore sought to investigate the availability and utilization of facilities for the implementation of e-learning in Physics in preparation for a paradigm shift to the new normal.

Aim and objectives of the study

The aim of the study is to investigate the availability and utilization of facilities for the implementation of e-learning in Physics in preparation for a paradigm shift to the new normal. Specifically, the objectives of the study are to:

1. Investigate the availability of e-learning facilities for Physics teaching in secondary schools in Rivers State.
2. Determine the extent e-learning facilities are utilized for Physics teaching in secondary schools in Rivers State.

Research Questions

1. Which e-learning facilities are available for Physics teaching in secondary schools in Rivers State?
2. To what extent are the e-learning facilities utilized for Physics teaching in secondary schools in Rivers State?

METHODOLOGY

The study investigated the availability and utilization of facilities for the implementation of e-learning in Physics in preparation for a paradigm shift to the new normal. Mixed method research design, specifically descriptive survey and exploratory analysis which provided qualitative and quantitative data was adopted for the study. According to Fischler (2021), mixed method research design is a procedure for collecting, analyzing, and “mixing” both quantitative and qualitative research and methods in a single study in order to understand a research problem with “more in-depth exploration” or clarification. All Physics teachers in secondary schools in Port Harcourt and Obio-Akpor Local Government Areas of Rivers State constituted the population of the study. Using purposive sampling method, a sample of 66 secondary school Physics teachers who have qualifications in education was selected for the study. The research instruments were Checklist on Availability and Utilization of e-Learning Facilities (CAUe-LF) and Structured Interview Template on e-learning (SITE-L). Checklist on Availability and Utilization of e-Learning Facilities (CAUe-LF) has three sections. Section A was used to elicit demographic information from the respondents, Section B was used to elicit information on the availability of facilities for the implementation of e-learning in Physics, while Section C was used to elicit information on the utilization of facilities for the implementation of e-learning in Physics.

Structured Interview Template on e-learning (SITE-L) contains questions requiring free oral response from the respondents, asked by the researcher. The responses complemented their responses to CAUe-LF. The interview session for each respondent which lasted for 30mins were recorded based on their permission. The recorded responses were then transcribed for coding after which thematic content analysis was employed to ascertain similar patterns across the data set. The instruments were validated by two experts in Science Education and two others in Educational Technology. Using test retest technique, copies of (CAUe-LF) were administered to 20 secondary school Physics teachers to obtain a reliability coefficient of $r = 0.76$ when the responses were subjected to Pearson Product Moment Correlation. Frequency count, percentage and mean were used to analyze the data.

On CAUe-LF, availability of facilities for the implementation of e-learning in Physics was rated Available or Not available. For availability, any facility with a percentage of less than 50% availability is considered to be ‘not available’ while any facility with a percentage that is equal to 50% and above availability is considered to be ‘available’. The level of utilization of facilities for the implementation of

e-learning in Physics was rated Very Low (VL), Low (L), High (H) and Very High (VH) for competencies with approximate mean values of 1, 2, 3, and 4 respectively.

RESULTS

Research Question 1: *Which e-learning facilities are available for Physics teaching in secondary schools in Rivers State?*

Table 1: Frequencies and percentages of the available e-learning facilities for Physics teaching

S/no	e-learning facilities	Available (%)	Not Available (%)	Decision
1	Desktop computers	12 (18.2%)	54 (81.8%)	NA
2	Laptops	26 (39.4%)	40 (60.6%)	NA
3	Video/video tapes	15 (22.7%)	51 (77.3%)	NA
4	Overhead projectors	6 (9.1%)	60 (90.9%)	NA
5	Electronic whiteboard	11 (16.7%)	55 (83.3%)	NA
6	Electronic graphic board	2 (3.0%)	64 (97.0%)	NA
7	Modems	4 (6.1%)	62 (93.9)	NA
8	e-learning software	18 (27.3%)	48 (72.7%)	NA
9	Printers	24 (36.4%)	42 (63.6%)	NA
10	Wi-Fi	2 (3.0%)	64 (97.0%)	NA
11	Podcast and live streaming	2 (3.0%)	64 (97.0%)	NA
12	Quiz builders	-	66 (100%)	NA
13	Virtual library	-	66 (100%)	NA
14	Mega phones	18 (27.3%)	48 (72.7%)	NA
15	Virtual classroom	2 (3.0%)	66 (97.0)	NA
16	Video teleconferencing	11 (16.7%)	55 (83.3%)	NA
17	Smart phones	47 (71.2%)	19 (28.8%)	A
18	Digital camera	39 (59.1%)	27 (40.9%)	A
19	e-book	9 (13.6%)	57 (86.4%)	NA
20	Diskettes	21 (31.8%)	45 (68.2%)	NA
21	i-touch	2 (3.0%)	64 (97.0%)	NA
22	Internet connectivity	37 (56.1%)	29 (43.9%)	A
23	Scanners	4 (6.1%)	62 (93.9%)	NA
24	Screen	6 (9.1%)	60 (90.9%)	NA
Aggregate mean		13 (20.1%)	53 (79.9%)	NA

Source: Researcher's fieldwork, 2021.

Table 1 showed that items 17, 18 and 22 with percentage values of 71.2%, 59.1 and 56.1%) respectively were the available e-learning facilities for the teaching of Physics in secondary schools. Based on the aggregate mean value of 13 and percentage of 20.1% for "Available" and aggregate mean value of 53 and percentage of 79.9% for "Not Available", the result indicates that e-learning facilities are not available for Physics teaching in secondary schools in Rivers State.

Research Question 2: *To what extent are the e-learning facilities utilized for Physics teaching in secondary schools in Rivers State?*

Table 2: Mean values of the extent of utilization of e-learning facilities for Physics teaching

S/no	e-learning facilities	Mean	Decision
1	Desktop computers	2.01	LE
2	Laptops	2.37	LE
3	Video/video tapes	1.72	LE
4	Overhead projectors	1.94	LE
5	Electronic whiteboard	2.11	LE
6	Electronic graphic board	1.64	LE
7	Modems	2.22	LE
8	e-learning software	1.70	LE
9	Printers	2.18	LE
10	Wi-Fi	1.94	LE
11	Podcast and live streaming	1.22	VLE
12	Quiz builders	-	VLE
13	Virtual library	-	VLE
14	Mega phones	2.09	LE
15	Virtual classroom	1.02	VLE
16	Video teleconferencing	2.17	LE
17	Smart phones	2.73	HE
18	Digital camera	2.51	HE
19	e-book	1.66	LE
20	Diskettes	2.13	LE
21	i-touch	1.50	LE
22	Internet connectivity	2.54	HE
23	Scanners	2.31	LE
24	Screen	2.02	LE
Aggregate mean		1.99	LE

Source: Researcher's fieldwork, 2021.

Table 2 showed the analysis of Physics teachers' responses on the extent utilization of e-learning facilities for Physics learning. The result indicated that the e-learning facilities used by Physics teachers for the teaching of Physics to a high extent are Smart Phones (Mean value = 2.73), Digital cameras (Mean value = 2.51) and Internet connectivity (Mean value = 2.54). The aggregate mean value shows 1.99 which indicates that the extent of utilization of e-learning facilities for Physics teaching is low.

DISCUSSION OF FINDINGS

The finding of this study showed that e-learning facilities are not available for Physics teaching in secondary schools in Rivers State. This finding agrees with Atsumbe et al. (2012), Okolocha and Nwadiani (2015), Abiodun-Oyebanji et al. (2019) who in their different studies found that e-learning facilities essential for the application of e-learning for teaching in schools were neither available nor sufficient. Most of the participants interviewed in this study echoed similar responses concerning the availability of e-learning facilities. According to them,

“we don't have those facilities that can enable us indulge in online teaching and learning. Presently in this school, there is no ICT lab, but it is essential that teaching in this time should exceed the classroom boundaries were e-learning facilities are readily available and can aid the development of learning packages that our students can consult in and out of the classroom”

Excerpts from an interview session with another participant explicitly noted that:

“I think the issue of education is not been taken seriously, the school don’t have all these facilities mentioned. Physics teachers can adopt e-learning if there is genuine effort by school authorities to look the way of technology integration in teaching by providing the required facilities”.

“although we have some facilities like computer, scanners, projector and screen, but there is no Wifi for internet connection which I think is very important for implanting e-learning”.

This study further revealed that the extent of utilization of e-learning facilities for Physics teaching is low. This finding agrees with Aboderin and Kumuyi (2013), Inije, Utoware and Kren-Ikidi (2013) and Okeke and Ihenacho (2017) who reported that e-learning technologies are not utilized for instruction in schools. Some interviewed participant also noted that:

“I don’t have the knowledge of using e-learning facilities to teach...but if there are facilities, certainly I will be enthusiastic to learn how to use them for Physics teaching especially in this era of COVID-19”.

“Developing Physics lesson packages manually is quite tedious, let alone integrating technology. The workload is cumbersome”.

“If the school administration should provide technical support in using e-learning facilities, teaching becomes simple. For now, I don’t use them”.

The low level of utilization of e-learning facilities discovered by this study is quite troubling considering the position of Ololube (2006) who maintained that greater proportion of educational objectives can be achieved when technology is integrated in the teaching and learning process.

CONCLUSION

e-learning is extremely becoming popular due to the unprecedented events in the world today such as the COVID-19 pandemic, this has open up the avenue for students to have access to learning materials and curriculum contents while in the classroom and outside of the class. E-learning is a powerful and versatile platform for improving the teaching and learning of Physics. In line with the objectives of secondary school Physics, application of this platform is a catalyst for adequate coverage of Physics content and a veritable vehicle for the preparation of Physics students for the future. Therefore, there is an exigent need for a paradigm shift towards the new normal.

RECOMMENDATIONS

In light of the findings of the study, the following recommendations were made:

1. Governments at all level and school administrator should provide e-learning facilities in secondary schools for the teaching of Physics in this era of COVID-19.
2. Physics teachers should endeavour to utilize e-learning facilities for teaching of Physics

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