



Impact Evaluation of E-Learning on Senior Secondary Students during Covid-19 Pandemic in Ogun State

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Abstract

No doubt, the COVID-19 pandemic had significant negative influence on educational sector particularly secondary education. Proactive intervention with the use of e-learning technologies was put in place by schools particularly in Ogun State to bridge the learning gap created by the pandemic. However, while there is evidence of e-learning technologies introduction in secondary education in Ogun state, little is known on the impact of these e-learning technologies in bridging the pedagogical gap created by the pandemic in Ogun State secondary schools, thus necessitate the need for this study. This study therefore evaluates the impact of e-learning on senior secondary school students in Ogun State. This study adopts the descriptive survey research design embedded with CIPP evaluation model. Four (4) research questions and two hypotheses were raised. The population for this study comprised of all public and private secondary schools in Ogun State, while 1 Senatorial district, 2 local governments, 5 public and 5 private secondary schools and 150 SS2 students constitute the study sample. E-learning Impact Evaluation Assessment Scale (ELIEAS) ($r = 0.77$) was the instrument used in data collection. Descriptive statistics was adopted to answer the 4 research questions raised, while t-test was used to test the two stated hypotheses at 0.05 alpha level of significance. Results reveals high students' proficiency level with e-learning technologies and high level of utilization of e-learning technologies for knowledge-based inquiry by students in Ogun East Senatorial district. Results also affirms that inadequate power supply, internet network problem, financial implications associated with procurement of laptop or smartphones, poor institution provision for e-learning facilities and students' mishap during e-learning class are challenges experienced by students in the use of e-learning technologies. Results showed high level of student's perception of e-learning effectiveness in bridging the gap in education created by COVID-19 in Ogun State. Findings of the study however established significant difference in e-learning technological proficiency ($t = 3.22$; $df = 148$, $p = 0.002 < 0.05$) and level of utilization ($t = -2.03$; $df = 148$, $p = 0.044 < 0.05$) among students based on their school type. Based on the findings of the study, it was concluded that e-learning technologies had significant positive impact bridging the educational gap created by the COVID-19 pandemic in Ogun State. On the bases of these findings, the study recommends that governments should invest heavily in e-learning technologies in schools particularly public secondary schools so as to prevent future interruption of learning by possible pandemic, while stakeholders, PTA and NGOs are encouraged to complement the efforts of government in equipping schools with e-learning technologies.

Keywords: E-learning Technologies, COVID-19 pandemic, E-learning Impact, Secondary Schools

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INTRODUCTION

E-learning or online learning has received much attention in recent years globally, with an estimated 5-7 million students now are enrolling

in at least one online course each year (Allen, I. Elaine, & Jeff Seaman 2015). The introduction of multimedia technologies and the internet in learning in many universities has been observed as a means of improving accessibility and quality of delivery and learning among the students and teachers. Zameni and Kardan 2011 believe that with the widespread use of the internet, knowledge has become more effectively reachable by the mass students, educators and researchers. E-learning or online learning has received much attention in recent years globally, with an estimated 5-7 million students now are enrolling in at least one online course each year (Allen, I. Elaine, & Jeff Seaman 2015).

The introduction of multimedia technologies and the internet in learning in many universities has been observed as a means of improving accessibility and quality of delivery and learning among the students and teachers. Zameni and Kardan 2011 believe that with the widespread use of the internet, knowledge has become more effectively reachable by the mass students, educators and researchers. Many terms had been used to describe learning that delivered online or via the internet, ranging from distance education, computerized electronic learning, online learning, internet learning, and many others. Numerous studies concluded that there were significant differences in learning outcomes between E-learning and traditional learning (Mason, Robin, & Weller 2000). However, regardless of which one is beneficial still some people support the idea of traditional learning, while others believe in the E-learning system. To study the impact of E-learning on academic performance, it will be better to be presented with a brief discussion of E-learning concept. Different terminologies had been used to define E-learning. E-learning is a type or system of learning which is utilizing electronic technologies to access educational curriculum outside traditional classrooms.

E-learning as “A method of teaching and learning that fully or partially signifies the educational model used, based on the use of electronic media and devices as tools for enhancing availability of training, communication and interaction that helps in accepting novel ways of comprehending and establishing learning”. Simply, E-learning courses are specifically delivered via the internet to somewhere other than the classroom for enhancing or supporting learning. That means E-learning is the use of network technologies to

create, foster, deliver and facilitate learning, anytime and anywhere for empowering the individual learner so that the teacher/trainer/tutor is no longer the gatekeeper of knowledge, while the role of teachers is likely viewed as facilitators of knowledge process (Oye, Mazleena & Iahad 2010). E-learning as a unifying term used to describe the fields of online learning, web-based training and technology delivered instructions (Khan, 2015). Khan pointed that E-learning has been described in various ways as learning that is using a number of different technologies and methods for delivery e.g. Computer based training (CBT), Internet-based training (IBT), Web-based instruction (WBI), Advanced distributed learning (ADL), Distributed learning (DL) Distance learning or Mobile learning, etc.

Despite these notable attributes of utilization of e-learning in teaching and learning, its impact on student's achievements remains difficult to measure and open to debate as there are few conclusive statements (Rosenblit & Gros, 2011). Others further argue that there is a contradiction on the conclusion on the impacts of e-learning systems on student's achievement (Trancore, 2005). It is also argued that data to support the perceived impact from e-learning technologies are limited and evidence of effectiveness, motivation, usefulness, innovativeness and performance impact are elusive (Pandolfini, 2016). In developing countries, there is paucity of information about the relationship between e-learning technologies and student's achievement (Rosenblit *et al.*, 2011). There is thus a need to carry out more research, notably to develop useful indicators and methodologies that need to be used in measuring the impact of e-learning in teaching and learning in developing countries including Nigeria in order to guide policy formulation. This is important because developing countries including Nigeria are still at a very basic stage of e-learning technology adoption. Nigeria needs to tap into experiences of universities in developed countries that have long experience of using e-learning so as to formulate innovative corrective measures. In 2019, there is pandemic called Coronavirus that really shake the whole world disrupted and shutdown all activities especially to Nigeria educational system (Primary, Secondary and Tertiary Education).

However, it is pertinent to state that the COVID-19 outbreak has opened up the importance of technology tools such as virtual/online education, e-learning and distance

learning globally. However, just a handful of the world's education that is taught online. According to Olatunji (2020), in the United States of America, about 15% of the total students are enrolled for online learning and distance learning. The pandemic has resulted in a more severe consequence on schools that do not possess the technological online learning platform. The COVID-19 pandemic ravaging the world have taken its effects on many sectors of the economy especially in Nigeria. This effect is also evident in the Nigeria educational sector as the academic session was halted by the Federal Ministry of Education in order to curtail the spread of this virus in educational institutions (Olatunji, 2020). Although, this decision came as a shock to many {1, strongly disagree} students toward academic related activities such as absenteeism to lectures, poor attitude toward assignment and overall poor performance of students in Nigeria tertiary institutions' (Olorunsola 2020). Furthermore, the lockdown caused by COVID-19 pandemic have affected students' morale toward engaging in academics related activities (Ogunode, 2020). Studies have also revealed that while some students reported that during lockdown, they enjoyed online classes, most reported lack of motivation and adverse attitudes towards online learning as barriers to their academic success (Quacquarelli, 2020). During COVID-19 lockdown, quarantine at home, the closing of educational institutions and adverse family environments were identified as major reasons for students feeling detached from their academics (Killan, 2020). In Nigeria, only few tertiary institutions which are mostly privately owned organised online classes for their students. Despite the relative success rate recorded during the process, it was still marred with variety of challenges and one remain curious if the online class have any effect on students' academic related activities especially as the lockdown is eased on tertiary institutions in the country.

Brooks et al. (2020) submitted that since lockdown, a lot of students have been confined for months with little or no physical human engagements. The only difference this has from being locked up in a prison cell is that, you have the keys to your door. Human beings are social beings, and we were made to thrive in a social gathering. As the pandemic continues, many students have developed both mental and physical fatigue since there are lesser activities to expend their mental and physical energies on. While for some, the little morning walk to and

from the workplace is an opportunity to exercise and keep the body in a good shape, but with this involuntary confinement, it might be an unwanted opportunity for many to add physical weights. Students who are lonely are more susceptible to illness.

Brooks et al. (2020) further noted that the immune system of people who have the feelings of loneliness fights virus differently, as such they are prone to falling sick easily. The more people become idle, the higher they become prone to perpetuating evil with their unoccupied time. For some, this time will become the perfect time to engage and visit immoralities or addictions like inappropriate sexual conduct, smoking and gambling. In a bid to prevent the feeling of loneliness and becoming potential victims of depression, they will seek activities that will make them feel busy, productive and working (Wang et al. 2020).

From the foregoing, it is evident that the impact of COVID-19 on education of students in Nigeria are massive, however, some scholars noted that the COVID-19 provides avenue for students to explore technology towards learning and the use of technology has significantly help students bridge the gap of continuous learning in spite of the pandemic, others have contrary opinion. The foregoing is a gap identified in this study that this study intends to fill. Base on the above submission, this study becomes imperative and thus evaluates the impact of e-learning on senior secondary students during COVID-19 pandemic in Ogun State.

STATEMENT TO THE PROBLEM

All schools in Nigeria were shut down because of COVID-19 pandemic that really shake the all whole. The coronavirus is a deadly virus that disrupted teaching and learning in all schools including secondary education. From this scenario, a set of measures have taken to decrease or mitigate the effect of the COVID-19 virus in the population especially in secondary schools. The traditional classrooms were disconnected, there is no interaction between teachers and students and off course schools can be closed but learning cannot be closed. In order to continuing educating students the e-learning is the best option. E-learning are specifically delivered via the internet to somewhere other than the classroom for enhancing or supporting learning. E-learning is the use of network technologies to create, foster, deliver and facilitate learning, anytime and anywhere for

empowering the individual learner. The use of technology would bridge the educational gap created by the pandemic particularly on secondary education in Nigeria, little is known on the extent of e-learning impact in bridging the educational gap created by the pandemic particularly on tertiary education in Nigeria particularly in Ogun state, thus necessitates the need for this study. This study therefore evaluates the impact of e-learning on senior secondary students during COVID-19 pandemic in Ogun State.

Objective of the study

The main purpose of the study is to evaluate the impact of e-learning on Senior Secondary Students during COVID-19 Pandemic in Ogun State, Nigeria. Specifically, the study ascertain;

1. Students' level of knowledge of e-learning technologies for knowledge base inquiring during COVID-19 in Ogun state
2. Level of students' utilization of e-learning for knowledge base inquiry during COVID-19 in Ogun State.
3. Determine challenges experienced by students in the use of e-learning technologies during COVID-19 pandemic in Ogun State.
4. perception of students on the effectiveness of e-learning technologies in bridging knowledge base gap created by COVID-19 pandemic in Ogun State?
5. Examine difference in students' level of proficiency in e-learning technologies based on their school type.
6. determine difference in students' level of utilization of e-learning technologies based on their school type.

Research Questions

The following research questions are relevant for this study.

1. To what extent are student knowledgeable in the use of e-learning technologies for knowledge base inquiry during COVID-19 pandemic in Ogun state?
2. What is the level of utilization of e-learning for knowledge base inquiry by students during COVID-19 in Ogun State?
3. What are the challenges facing by students in the use of e-learning technologies during COVID-19 pandemic in Ogun State?
4. How effective is e-learning technologies in bridging knowledge base gap created by COVID-19 pandemic in Ogun State?

Research Hypotheses

The following null hypotheses were raised and was tested:

- HO₁:** There is no significant difference in students' level of proficiency in e-learning technologies based on their school type.
- HO₂:** There is no significant difference in students' level of utilization of e-learning technologies based on their school type

Significance of the study

This study is significant, as the findings of this study would enlighten the stakeholders in secondary education, which is government, school administrators, teachers and educational planners, as it would identify the potential devastating consequences of COVID-19 pandemic on secondary education in Nigeria particularly in Ogun State. To the government, it will avail them to put in place programmes and policies geared towards bridging the educational deficiencies created by the pandemic and thus lure them to financially funds secondary schools particularly in areas of technological integration in Nigeria. The school administrators would also benefit immensely from this study, as findings of the study would expose them into pertinent challenges experienced by secondary students in the use of e-learning technologies, thus lure them to be proactive in devising strategies geared towards enhancing quality delivery of secondary education to students in spite of the pandemic effects. It would also be of immense benefit to the students as it would educate them on the need to developed positive ICT proficiency in their learning and finally, the study will equally serve as literatures for future researcher on this topic or similar studies.

METHODOLOGY

This study adopted a descriptive survey research design to examine students' views and experiences regarding the use of e-learning technologies. The choice of this design was informed by its suitability for collecting data on respondents' opinions, perceptions, and practices through structured instruments, without manipulating any variables. It enabled the researcher to obtain a comprehensive understanding of the phenomenon under investigation as it exists in its natural setting.

Table 1. Evaluation Framework based on CIPP.

Components	Variable Indicators	Data source	Instrument for Data Collection	Research Question to Address
Context	(i). E-learning Effectiveness	(i). Senior Secondary Students	ELIEAS	RQ.4
Input	i. Extent of knowledge of e-learning technologies	Senior Secondary Students		RQ.1
	ii. Level of utilization of e-learning technologies			RQ.2
Process	(I) Constraint to effective learning utilization	(i) Senior Secondary Students		RQ.3
Product	-----	-----	-----	-----

Evaluation Model

An evaluation model is a pathway or paradigm in pictorial form that defines the parameters of an evaluation and helps the researcher explain the interrelationship of the major elements along the evaluation process. However, for this study, CIPP evaluation model will be adopted. The CIPP model is a [Programme evaluation](#) model developed by Daniel Stufflebeam and colleagues in the year 1966. CIPP is an acronym for Context, Input, Process and Product.

CIPP is an evaluation model that requires the evaluation of context, input, process and product in judging a programme's value. CIPP is a decision-focused approach to evaluation and emphasizes the systematic provision of information for [programme management](#) and operation. The CIPP model is considered appropriate for this study because of the relationship among its four components which facilitates detailed answer to the questions.

1. **Context Evaluation:** This provides for justifying a particular type of programme. One is interested in knowing what had been in existence and unmet needs of the beneficiaries as regard the programme to be evaluated
2. **Input:** This talks about what is put into the programme like looking at funds, structures and infrastructures that are needful in the evaluation of the programme.
3. **Process:** Like in educational evaluation, process here is concerned about the various methods by teachers in delivery of classroom instructions.

4. **Product:** This is the final outcomes of the evaluation programme. This includes identifying congruencies and discrepancies between the intended objectives and actual attainment. Provide for objectives have not been met.

The population of the study comprised all public and private Senior Secondary School students in Ogun State, Nigeria.

A multi-stage sampling procedure was employed to select the sample for the study. Ogun State is divided into three senatorial districts, from which Ogun East was randomly selected. Within Ogun East, which consists of nine Local Government Areas (LGAs) and 118 senior secondary schools, two LGAs were randomly chosen. Subsequently, a purposive sampling technique was used to select ten (10) schools, five public and five private based on evidence of e-learning adoption during the COVID-19 pandemic. From each selected school, fifteen (15) Senior Secondary II (SS II) students were sampled, resulting in a total sample size of 150 students.

Data for the study were collected using a self-developed instrument titled E-learning Impact Evaluation Assessment Scale (ELIEAS). The instrument consisted of two sections. Section A captured respondents' demographic information, while Section B was divided into four parts corresponding to the research questions. Specifically, Part A assessed students' knowledge of e-learning technologies; Part B examined the extent of utilization of e-learning during the COVID-19 pandemic; Part C identified challenges encountered in the use of e-learning; and Part D evaluated students'

perceptions of the effectiveness of e-learning in bridging the educational gap created during the pandemic. All items were structured in clear and simple language to ensure ease of understanding by respondents.

To ensure the validity of the instrument, both face and content validation procedures were undertaken. The initial draft was reviewed by experts in test construction and educational measurement, who examined the items for clarity, relevance, and alignment with the research objectives. Their feedback informed necessary revisions and refinement of the instrument.

The reliability of the instrument was established through a pilot study involving 30 students outside the main sample but with similar characteristics. The data obtained were analyzed using Cronbach's Alpha, which yielded a reliability coefficient of 0.77, indicating acceptable internal consistency.

For data collection, the researcher administered the instrument directly to the respondents in their respective schools. Participants were adequately briefed on the purpose of the study and guided on how to complete the questionnaire. The completed instruments were retrieved immediately to ensure a high response rate and data security. The entire data collection process was completed within a period of two weeks.

Data were analyzed using descriptive and inferential statistics. Frequency counts, percentages, and mean/median ratings were used to answer the research questions, while the **t-test** statistical technique was employed to test the stated hypotheses at the 0.05 level of significance.

RESULTS AND DISCUSSION

Results

A total number of 150 questionnaires was administered to SS2 students selected across 10 secondary schools (5 public and 5 private) in 2 selected Local governments areas in Ogun East Senatorial District, and all the questionnaires administered were adequately filled and returned by the respondents. By implications 100% of the questionnaires were returned and was used for the data analysis. Also, the four stated research questions and two null hypotheses were analyzed using descriptive statistics of frequency counts, mean/median rating, percentages and t-test and the results is presented below:

Analysis of Research Questions

Research Question One: To what extent are student knowledgeable in the use of e-learning technologies for knowledge base inquiry during COVID-19 pandemic in Ogun state?

Table 2. Frequency counts, percentages, median, standard deviation showing extent of e-learning technology knowledge among students.

Scale: 1 – Novice 2 – Beginner 3 - Intermediate 4 - Advance

S/N	Item	1	2	2	3	Median	S.D.
1	Utilize web browsers such as internet explorer, Google chrome to access search engines	2 (1.3)	6 (4.0)	114 (76.0)	28 (18.7)	3.00	.89
2	Search and download learning materials to with Google or Wikipedia	2 (1.3)	2 (1.3)	41 (27.3)	105 (70.0)	4.00	.58
3	Zoom for virtual learning	3 (2.0)	1 (0.7)	93 (62.0)	53 (35.3)	3.00	.59
4	Microsoft team	1 (0.7)	2 (1.3)	65 (43.3)	82 (54.7)	4.00	.56
5	YouTube, Facebook live stream	3 (2.0)	2 (1.3)	80 (53.3)	65 (43.3)	3.00	.62
6	Surfing Educational website for learning	1 (0.7)	4 (2.7)	66 (44.0)	79 (52.7)	4.00	.59
7	CBT platform for educational assessments	1 (0.7)	4 (2.7)	83 (55.3)	62 (41.3)	3.00	.57
8	Google meet for virtual learning	1 (0.7)	3 (2.0)	62 (41.3)	84 (56.0)	4.00	.58
9	WhatsApp for e-learning	2 (1.3)	1 (0.7)	89 (59.3)	58 (38.7)	3.00	.57

10	Microsoft office suite for e-learning	1 (0.7)	3 (2.0)	62 (41.3)	84 (56.0)	4.00	.58
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*Figures in parentheses indicate percentage
Decision Rule: A median score below 2.50 indicates not knowledgeable, while a median score above 2.50, indicate highly knowledgeable

Given the results presented on table 5.1, the grand median of all the Ten (10) items measuring extent of student knowledgeable in the use of e-learning technologies for knowledge base inquiry during COVID-19 pandemic in senior secondary schools was $(35.0/10 = 3.5)$, it implies that the sampled students are highly knowledgeable with the use of e-learning technologies. Looking further at the frequency counts and percentages in table 5.1 above, it could be seen clearly that the students on average are knowledgeable in all the ten (10) e-learning technologies examined in this study.

Disintegrating the items one by one, 94.7% of the students are knowledgeable in the use of web browsers such as internet explorer, Google chrome to access search engines. In the same trend, 97.3% of the respondents are highly knowledgeable in the use of Search engine such as google or Wikipedia to download learning materials. Also, 98.3% of the respondents can effectively utilized Zoom for virtual or online learning; 98% are highly knowledgeable in the

use of Microsoft team; 96.6% can effectively utilized YouTube or Facebook for live educational lecture streaming. Similarly, Surfing Educational website for learning, use of CBT platform for educational assessments, use of Google meet for virtual learning, WhatsApp for e-learning and Microsoft office suite for e-learning with 96.7%, 96.6%, 97.3%, 98% and 97.3% respectively are other e-learning

Research Question Two: What is the level of utilization of e-learning for knowledge base inquiry by students during COVID-19 in Ogun State?

Table 3. Frequency counts, percentages, median, standard deviation showing students level of utilization of e-learning technology

Scale: 1 – Not Utilized, 2 – Low Extent, 3 –Moderate, 4–High Extent

S/N	Item	1	2	2	3	Median	S.D
1	Utilize web browsers such as internet explorer, google chrome to access search engines	11 (7.3)	4 (2.7)	107 (71.3)	28 (18.7)	3.00	.71
2	Search and download learning materials to with google or Wikipedia	7 (4.7)	13 (8.7)	29 (19.3)	101 (67.3)	4.00	.84
3	Zoom for virtual learning	9 (6.0)	8 (5.3)	77 (51.3)	56 (37.3)	3.00	.79
4	Microsoft team	7 (4.7)	8 (5.3)	57 (38.0)	78 (52.0)	4.00	.79
5	YouTube, Facebook live stream	9 (4.0)	10 (6.7)	53 (35.3)	81 (54.0)	3.00	.80
6	Surfing Educational website for learning	6 (4.0)	10 (6.7)	53 (35.3)	81 (54.0)	4.00	.78
7	CBT platform for educational assessments	11 (7.3)	9 (6.0)	72 (48.0)	58 (38.7)	3.00	.84
8	Google meet for virtual learning	7 (4.7)	8 (5.3)	61 (40.7)	74 (49.3)	3.00	.79
9	WhatsApp for e-learning	12 (8.0)	8 (5.3)	75 (50.0)	55 (36.7)	3.00	.85
10	Microsoft office suite for e-learning	5 (3.3)	11 (7.3)	65 (43.3)	69 (46.0)	3.00	.75

*Figures in parentheses indicate percentage
Decision Rule: A median score below 2.50 indicates low extent, while a median score above 2.50, indicate high extent.

supply Internet network challenges is a major constraint to effective e-learning usage.

In the same trend, 98.7% of the students agrees that internet network challenge is a constraint to effective e-learning usage. Financial implications associated with

Table 4. Frequency counts, percentages, mean, standard deviation showing challenges facing by students in the use of e-learning technologies.

S/N	Item	SD	D	A	SA	Mean	S.D.
1	Inadequate power supply affect e-learning during COVID-19 Pandemic	1 (0.7)	-	125 (83.3)	24 (16.0)	3.15	.41
2	Internet network challenges is a major constraint to effective e-learning usage	1 (0.7)	1 (0.7)	36 (24.0)	112 (74.7)	3.73	.50
3	Financial implications associated with procurement of laptop or smartphones is another challenge that hinder my adoption of e-learning during pandemic	1 (0.7)	-	113 (75.3)	36 (24.0)	3.23	.47
4	Poor institution provision for e-learning facilities is another challenge for e-learning adoption during COVID-19 pandemic	2 (1.3)	1 (0.7)	55 (36.7)	92 (61.3)	3.58	.58
5	Students' mishap during e-learning class, also poses great challenges to my involvement in e-learning	1 (0.7)	1 (0.7)	91 (60.7)	57 (38.0)	3.36	.53

*Figures in parentheses indicate percentage
Decision Rule: A mean score of 2.50 and below indicates disagreement, while a mean score above 2.50 indicates agreement to items stated above.

procurement of laptop or smartphones, poor institution provision for e-learning facilities and students' mishap during e-learning class with 99.3%, 98% and 98.7%) agreement respectively are other challenges experienced by students in the use of e-learning technologies during COVID-19 pandemic in Ogun State.

*Figures in parentheses indicate percentage
Decision Rule: A mean score of 2.50 and below indicates less effective, while a mean score above 2.50 indicates highly effective.

Research Question Three: What are the challenges facing students in the use of e-learning technologies during COVID-19 pandemic in Ogun State?

Given the results presented on table 4.3, the grand mean of all the five (5) items assessing challenges facing students in the use of e-learning technologies during COVID-19 was $(17.05/5 = 3.41)$, thus implies that the students agree to all the five items stated as challenges facing students in the use of e-learning technologies during COVID-19. The frequency count and percentages reveal that 99.3% of the students agrees that inadequate power

Given the results presented on table 5.4, the grand mean of all the ten (10) items measuring effectiveness of e-learning technologies in bridging knowledge base gap created by COVID-19 pandemic in Ogun State was $(32.35/10 = 3.24)$, thus implies high level of effectiveness of e-learning technologies in bridging knowledge base gap created by COVID-19 pandemic in Ogun State. Looking further at the frequency counts and percentages, it is evident that over 70% of the students attest to high learning of e-learning technologies in bridging learning deficiency gap created by the COVID-19 pandemic (see table 5).

Given the results ($t = 3.22$; $df = 148$, $p (0.002 < 0.05)$) on Table 4.5 above, there is a statistically significant difference in e-learning technological proficiency of students based on their school type. Looking further at the means score, it is evident that students from private school with mean score of 34.95 which is slightly greater than that of students from public school with mean score of 33.67, it implies that private school students are slightly more proficient in the use of e-learning technologies than students from public secondary schools. The null hypothesis is hereby rejected.

Given the results ($t = -2.03$; $df = 148$, $p (0.044 < 0.05)$) on Table 4.6 above, there is a statistically significant difference in public and private school students usage of e-learning technologies during COVID-19 pandemic and was found to be in favour of public secondary school students since their mean score of 33.63 was slightly greater than that of students in private school with mean score of 31.61. The null hypothesis is hereby rejected.

5.2 Discussion of findings

The results of research question one reveals that students to a high extent are proficient in the use of e-learning technologies

research question two shows high level of utilization of e-learning technologies for knowledge-based enquiry among students during COVID-19 pandemic. The findings of research question one and two is consistent with the work of Tossy (2012) who in his study shows that students tend to grasp the act of using technologies to learn when they are expose to it for educational gains.

The results of research three reveals that inadequate power supply, internet network problem, financial implications associated with procurement of laptop or smartphones, poor institution provision for e-learning facilities and students' mishap during e-learning class are challenges experienced by students in the use of e-learning technologies during COVID_19 pandemic in Ogun State. The findings of research question three above corroborates the findings of Owusu-Fordjour et. al. (2019) who in their study established that e-learning pose a challenge to the majority of the students because of the limited access to the internet and lack of the technical know-how of these technological devices by most Ghanaian students.

The results of research question four however shows that majority of the students attest to high level of e-learning technologies

Research Question four: How effective is e-learning technologies in bridging knowledge base gap created by COVID-19 pandemic in Ogun State?

Table 5. Frequency counts, percentages, mean, standard deviation showing students perception on e-learning effectiveness during COVID-19

S/N	Item	SD	D	A	SA	Mean	S.D.
1	I think E-learning enhances my learning experience as well as communication skills during COVID-19 Pandemic.	5 (3.3)	17 (11.3)	21 (14.0)	107 (71.3)	3.53	.83
2	Using technology during pandemic is very easy.	11 (7.3)	12 (8.0)	100 (66.7)	27 (18.0)	2.95	.74
3	I believe that E-learning gives me the opportunity to acquire new knowledge.	15 (10.0)	8 (5.3)	27 (18.0)	100 (66.7)	3.41	.98
4	E-learning is not efficient as a traditional learning method	12 (8.0)	10 (6.7)	71 (47.3)	57 (38.0)	3.15	.87
5	E-learning increases the quality of learning because it integrates all forms of media	5 (3.3)	18 (12.0)	40 (26.7)	87 (58.0)	3.39	.83
6	Computer facilities during e-learning encourage me to learn and pass very well.	14 (9.3)	8 (5.3)	86 (57.3)	42 (28.0)	3.04	.84
7	E-learning is stress free as students can learn anywhere and anytime	8 (5.3)	15 (10.0)	43 (28.7)	84 (56.0)	3.35	.87
8	The is room to learn and re-learn since learning can be download for future use	12 (8.0)	10 (6.7)	73 (48.7)	55 (36.7)	3.14	.86
9	Adopting ICT and E-learning allows for increased student satisfaction	11 (7.3)	12 (8.0)	52 (34.7)	75 (50.0)	3.27	.90
10	Overall, I e-learning has help bridge the educational gap created by the pandemic, thus it is alternative means for quality students learning	16 (10.7)	7 (4.7)	70 (46.7)	57 (38.0)	3.12	.92

during COVID-19 pandemic. The results of effectiveness in bridging the gap created by

COVID-19 pandemic in Ogun East Senatorial District of Ogun state. The findings of research question four is consistent with the work of Cotton (2007) concluded, among others, that the use of technology as a supplement to conventional instruction produces higher achievement than the use of conventional instruction alone, research is inconclusive regarding the comparative effectiveness of conventional instruction alone and technology alone, and that computer-based education produce higher achievement than conventional instruction alone. In addition, students learn instructional contents faster with e-learning than with traditional instruction, they retain what they have learned better with technology than with conventional instruction alone, and technology activities appear to be at least as cost effective as and sometimes more cost-effective than other instructional methods, such as teacher-directed instruction and tutoring.

Results of hypotheses one and two however established statistically significant difference in students' proficiency level and level of utilization based on their school type. For proficiency level, the findings shows that students from private school had higher level of e-learning proficiency than their public-school counterpart, while for level of utilization, students from public secondary had higher a slightly higher level of utilization of e-learning technologies than their private school counterpart.

Test of Hypotheses

HO₁: There is no significant difference in students' level of proficiency in e-learning technologies based on their school type. This hypothesis was tested with T-test and the result is presented in table 6 below.

Table 6. T-test analysis indicating difference in students' knowledge of e-learning technologies based on their school type.

Variable		N	$\bar{X}$	S.D.	DF	T	Sig. level	Decision
E-learning Technologies Proficiency	Private school	75	34.95	.96	148	3.22	.002	Significant
	Public School	75	33.67	3.31				

HO₂: There is no significant difference in students' level of utilization of e-learning technologies based on their school type. This hypothesis was tested with T-test and the result is presented in table 4.6 below.

Table 7. T-test analysis indicating difference in students' knowledge of e-learning technologies based on their school type.

Variable		N	$\bar{X}$	S.D.	DF	T	Sig. level	Decision
E-learning Technologies level of utilization	Private school	75	31.61	7.63	148	-2.03	.044	Significant
	Public School	75	33.63	3.91				

CONCLUSION

Based on the findings of this study, it was concluded that e-learning technologies adoption during COVID-19 pandemic not only bridge the educational gap created by the COVID-19 pandemic but also had a positive influence on students learning experience and exposure to the use of technologies in complementing their learning. The findings reveal further that there exists slight disparity in proficiency of students and level of utilization of e-e-learning technologies between public and private secondary school students.

IMPLICATIONS OF FINDINGS

Based on the results of the data analysis obtained in this research; the following implications were established;

1. Inadequate power supply, internet network problem, financial implications associated with procurement of laptop or smartphones, poor institution provision for e-learning facilities and students' mishap during e-learning class are pertinent e-learning technological adoption challenges
2. Students from private secondary school had better knowledge of e-learning technologies than their public secondary school counterpart.

RECOMMENDATIONS

Based on the findings of this research, the following recommendations are proffered:

1. Governments at all level should intensify efforts to invest heavily in e-learning technologies in schools particularly public secondary schools so as to prevent future interruption of learning by possible pandemic.
2. Government should intensify effort at recruiting competent ICT personal, equipped schools with modern e-learning technologies so as to foster effective utilization of e-learning in schools.
3. Stakeholders, parents/PTA and NGOs should also complement the efforts of government in equipping schools and their students with e-learning technologies.
4. Lastly, government should put in place regular in-service training to teachers particularly ICT training to foster

effective teachers' utilization of e-learning during classroom instruction.

Suggestions for further Research

Due to finance and time constraints, this survey was restricted to very small area, which consists of 10 secondary schools (5 public and 5 private) in 2 Local Government Area Ogun East Senatorial District of Ogun State As a result, the researcher is suggesting that future researchers should carry out this same research to cover large geographical area at least two senatorial districts with larger samples. More so, intending researchers on this topic should adopt this study as relevant literature.

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