Original Research Article

The Use of E-Learning Technologies as a Predictor of Students Academic Performance in Public Secondary Schools in Port Harcourt and Obio-Akpor Lga, Rivers State

Wagbara Chinyere Dorathy[1*], Adiela Uchechukwu Sambo[1]

[1]Department of Educational Management, Faculty of Education, University of Port Harcourt, Local Government, Abuja Campus, University of, 500272, Port Harcourt, Nigeria

*Corresponding author: Wagbara Chinyere Dorathy
Department of Educational Management, Faculty of Education, University of Port Harcourt, Local Government, Abuja Campus, University of, 500272, Port Harcourt, Nigeria

Abstract

This study examined the use of e-learning technologies as predictors of students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State. The study was guided by three objectives, three research questions and hypotheses. The population of the study comprised of 14,769 academic staff and SS2 stydents of all the 37 public senior secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State. The sample size for this study was 1477 respondents, representing 10% of the entire population. The sampling technique was a proportionate stratified random sampling. The instruments were questionnaire and teacher made test, used for the study to generate date. The instruments were validated and it reliability were tested using Kuder Richardson method, which yielded coefficients of 0.84 and 0.82 for The Use of E-learning Technologies Scale (TUETS) and Teacher Made Test Scale (TMTS) respectively. The research questions were answered with the use of simple regression, while the hypotheses were tested with t-test associated with simple regression at 0.05 level of significance. The findings revealed that the use of laptop and tablet computers predicts students' academic performance in public secondary schools in Rivers State to a low extent, while smartphone as e-learning technologies predicts students' academic performance in public secondary schools in Rivers State to a high extent. Based on the findings, it was recommended among others that the government who are the owners of public secondary schools should ensure that all schools have functional laptop computer laboratories, accessible to both teachers and students with trained personnel to help them acquire relevant ICT skills that will aid teaching and learning process for improved academic performance of students. Also, parents should explore all positive means to provide smartphones, constant strong Wi-Fi connection, browsing data, constant power supply for students with strict monitoring by the school PTA to guide, orientate and control students on how they can use the smartphones available to them to their own advantage, as all of these will enhance effective academic learning activities with minimal distraction.
Keywords: E-learning, Technologies, Students, Academic Performance.

INTRODUCTION

Learning as experienced by several developed nations across the globe has been made effective since the inception of e-learning technologies. What brings about effective learning is the insight and the powerful experiences gained by students. Learning has been made effective through dynamic and creative way of presenting information to students or learners. Effective learning is the culmination of dynamic and creative experiences for learners' improvement in their knowledge. Effective learning is based on the use of innovative teaching strategies presented in this 21st Century era such as electronic technologies. The monumental growth in the use of technology has definitely changed the learning process and environment. Learners' performance has changed regarding how they access and use information and their expectation regarding feedback.

The world is travelling on the fast lane of technological advancement in all spheres of life including education. The changes in education due to

Citation: Wagbara Chinyere Dorathy & Adiela Uchechukwu Sambo (2023). The Use of E-Learning Technologies as A Predictor of Students Academic Performance in Public Secondary Schools in Port Harcourt and Obio-Akpor Lga, Rivers State. *J Adv Educ Philos, 7*(8): 254-261.

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advancement in technology is so rapid that a professional can become completely outdated in his field of learning, if they do not key in with the technology that makes education (teaching and learning) readily available in their field. Electronic educational technology, mostly called e-learning, has become more important in the last decade considering the increasing number of students in secondary schools. E-learning systems provide benefits for students as wells as teachers by offering more flexibility about place, time and pace just as being experienced during the Corona Virus era. These platforms often offer more ways for interactions and motivation than traditional learning settings. E-learning which stands for 'electronic learning' has gained widespread acceptance in most institutions all over the globe. This is due to the numerous benefits it offers to schools and students who take part in it. E-learning is a technology which supports teaching and learning via an electronic gadget or device and the web technology. It bridges the gap between a teacher and a student in two different geographical locations. E-learning applications facilitate online access to learning content and which improves the performance of the learner (Wani, 2018). Thus, its application in the teaching/learning schools in Nigeria can be better imagined.

E-learning technologies may be referred to man-made devices created to aid learning for better performance of the learner or students. It is a 21 century initiative with the aim to solve seemingly difficult task in a split of seconds. It was also created to reduce workload and time wastage in the performance of tasks in organizations. Most countries of the world have moved on with life activities using electronic gadgets. Iloanusi (2017) opined that e-learning stands for electronic learning, which simply means learning mediated by electronic technology. In education, e-learning technologies have proven to be helpful to students' academic performance. It is referred to as a modern way of knowledge transmission through electronic devices within the learners' reach. As identified by Iloanusi (2017), e-learning could also be seen as the use of network technology to design, deliver, select, administer and extend learning.

However, Iloanusi (2017) noted that e-learning technologies have not come to substitute the physical classroom learning in schools rather to enhance effective learning in order to improve students' academic performance and that of the teaching in the area of effective teaching. The delivery of e-learning to distant or online students would depend on the quality of the virtual environment for learning. E-learning is an extended form of classroom teaching where learning, either online or offline facilitated by the use of computer, telecommunication devices, networks, and storage capacity (Tunmibi *et al*., 2015). It is a system of learning carried out through the use of electronic media with a combination of electronic technologies or gadgets and

internet, such as desktop or laptop computer, smartphone and tablet computer.

Computers are electronic gadget used in offices, schools, churches and some other places. It is a programmed electronic gadeget that performs mathematical calculations and logical operations, especially one that can process, store and retrieve large amount of data very quickly; now especially, a small one for personal or home use employed for manipulating text or graphics, accessing the internet or playing games or media. Adebisi (2013) opined that a computer is an electronic gadget, operating under the control of instructions stored in its own memory. These instructions tell the machine what to do. The computer is capable of accepting data (input), processing data arithmetically and logically, producing output from the processing, and storing the results for future use. Most computers that sit on a desk or the lap are called Personal Computers (PCs). People use computers in many ways; tracking of inventories with bar codes and scanners, check the credit status of customers, and transfer funds electronically. A laptop is a portable computer that is small enough and light enough to be used on one's lap, but large enough to have an integrated keyboard.

In addition, the smartphone is another important e-learning technology that has helped to propel effective learning and students' academic performance. The use of smartphone is gradually becoming a compelling learning tool used to enhance teaching and learning in distance education. Its usage ensures flexible learning delivery, makes it possible for learners to access online learning platforms, access course resources and interact digitally. A smartphone is a mobile phone that can perform many tasks and computations like a personal computer. It is slowly replacing the old cell-phone, as it is equipped with a powerful operating system (multi-tasking) along with a myriad of useful applications (Apps) and high speed data communication capability. A smartphone is a powerful handheld computer with an intrinsic connection mobile network (Davies; Rouse; Anshari & Alas, as cited in Muhammad *et al*., 2017). It is a wireless mobile device small enough and portable, which allow learners from any location to interact with other learners from anywhere and at any time to share information and expertise, complete a task, or work collaboratively on a project.

Another device or technology that has aided learning and students performance in school is the tablet computer. The word tablet is used to refer to slab, flat stone or wood (Oxford Advanced Learner's Dictionary, 2008), however, in the context of this study, tablet is a shortened name for portable computer. Cicevic *et al*., (2016) defined tablet as a miniaturized personal computer in slate form. It is a wireless computer with a display that enables the user to interact with it by clicking appropriately with a stylus or by touching appropriately on the screen to write, draw or command action

(Technopedia, 2021). Frohberg *et al.*, (2019) stated that contemporary tablets are built with internet and Wi-Fi capabilities, and capable of installing web-browsers, Microsoft Office, social media applications and wide variety of business and educational software, etc. Technopedia (2021) remarked that some tablets are built with fold keyboards, while some others, including Apple and Motorola brands are only with touch screen input system. Given that tablets are mostly designed with touch screen and integrated interfaces for digital keyboards, their input method is fundamentally different from laptop and desktop computer system, and this make them more portable so that school managers, including students can slot them on one side of their briefcases while on the go (Santamarta *et al.*, 2015). With its intelligent ability, tablet can be used to draw-out a plan for efficient operational effectiveness in the conduction of schooling and learning activities for improved students' performance.

Preliminary investigation showed that there are remarkable benefits of e-learning technologies. The significant progression in technology has brought about tremendous benefits in human life especially in the area of teaching and learning. It is against this background that this paper sought to examine the extent the application of e-learning technologies predict students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State.

Statement of the Problem
Secondary schools in Rivers State were on total lockdown during the heat of the COVID-19 and when normalcy was restored to some extent, it was discovered that general academic activities had suffered a lag and students were at the receiving end of this lag. For instance, some schools which have had to shut down within this period did not have the facilities that could aid distance learning and school administrative functions. All of these made principals to appear as though they have lost grip of the school system. School principals are expected to coordinate certain school operations remotely in line with social distance rules. Consequently, current situation suggests that many secondary schools do not have relevant e-learning technologies. Even those that have one or two of these technologies lack technical skill required to manipulate the facilities to aid effective learning. This adversely affects the usage for learning in schools. The use of e-learning technologies can go a long way in addressing so many challenges of learning especially in this era of technology and where distance learning is the order of the day. Therefore, the question here is, can the use of e-learning technologies improve students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State. This is the problem the study sought to address.

Aim and Objectives of the Study
The aim of this study was to examine the extent the use of e-learning technologies predict students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State. Specifically, the objectives sought to;
1. Determine the extent the use of laptop computer predicts students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State.
2. Ascertain the extent the use of smartphone predicts students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State.
3. Find out the extent the use of tablet computer predicts students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State.

Research Questions
The following research questions guided the study.
1. To what extent does the use of laptop computer predict students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State?
2. To what extent does the use of smartphone predict students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State?
3. To what extent does the use of tablet predict students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State?

Hypotheses
The following null hypotheses were tested at 0.05 alpha level of significance.
1. Use of laptop computer does not significantly predict students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State.
2. Use of smartphone does not significantly predict students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State.
3. Use of tablet computer does not significantly predict effective learning in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State.

METHODOLOGY
This study adopted a correlational survey design to ascertain if the use of e-learning technologies predict students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State. The population of this study was made up of all the 2,042 academic staff and 12,727 SS2 students of 37 public senior secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State, totaling 14,769. (Source: Planning, Research and Statistics

Department, Rivers State, 2022). The sample size of 1,477 respondents, representing 10% of the entire population was used for the study. The sampling technique was a proportionate stratified random sampling. This ensured that all members of the population are given equal opportunity of being selected. Questionnaire and Teacher Made Test were used as the instrument to generate date. The test was designed to measure students' academic performance. The instrument are two, with two sections (A and B). Section A elicited demographic information from the respondents, while section B elicited information on The Use of E-learning Technologies Scale (TUETS) and Teacher Made Test Scale (TMTS). Kuder Richardson reliability method was used to test the reliability of the instruments. The reliability coefficients of The Use of E-learning Technologies Scale and Students' Academic Performance Scale are 0.84 and 0.82. For the data that were analyzed, simple regression was used to answer research question one to three, while t-test associated with simple regression was used to test hypotheses at 0.05 level of significance.

RESULTS AND ANALYSIS

Research Question One: To what extent does the use of laptop computer predict students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State?

Table 1: Simple regression on the extent the use of laptop computer predict students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State

Model	R	R Square	Adjusted R Square	Extent of Prediction	Decision
1	.611a	.412	.403	41%	Low Extent

Decision Rule: 100%- 75% =Very High Extent, 74% - 50% = High Extent, 49%-25% = Low Extent and 0% - 24% = Very Low Extent (Source: Elendu, 2010)

Table 1 revealed that the regression (r) and regression square (r^2) coefficients are .611 and .412 respectively. The extent of prediction (coefficient of determinism) is 41.2% (.412 ×100). The result indicated that the use of laptop computer predicts students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State to a low extent by 41%. The remaining 59% is not accounted by the use of laptop computer.

Research Question 2: To what extent does the use of smartphone predict students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State?

Table 2: Simple regression on the extent the use of smartphone predict students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State

Model	R	R Square	Adjusted R Square	Extent of Prediction	Decision
1	.711ᵃ	.554	.545	55%	High Extent

Decision rule: 100%- 75% = Very High Extent, 74% - 50% = High Extent, 49%-25% = Low Extent and 0% - 24% = Very Low Extent. (Source: Elendu, 2010).

Table 2 revealed that the regression (r) and regression square (r^2) coefficients are .711 and .554 respectively. The extent of prediction (coefficient of determinism) is 55% (.554 ×100). The result showed that the use of smartphone predicts students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State to high extent by 55%. The remaining 45% is not accounted by the use of smartphone.

Research Question Three: To what extent does the use of tablet predict students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State?

Table 3: Simple regression on the extent the use of tablet predict students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State

Model	R	r Square	Adjusted r Square	Extent of Prediction	Decision
1	.523a	.364	.363	36%	Low Extent

Decision rule: 100%- 75% =Very High Extent, 74% - 50% = High Extent, 49%-25% = Low Extent and 0% - 24% = Very Low Extent

Table 3 revealed that the regression (r) and regression square (r^2) coefficients are .523 and .364 respectively. The extent of prediction (coefficient of determinism) is 36.4% (.364 ×100). The result showed that the use of tablet predicts students' academic performance in public secondary schools in Port

Harcourt and Obio-Akpor LGA of Rivers State to a low extent by 36%. The remaining 64% is not accounted by the use of tablet.

Test of Hypotheses

Hypothesis 1: Use of laptop computer does not significantly predict students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State.

Table 4: T-test associated with simple regression on the extent use of laptop computer does not significantly predict students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State

Model		Unstandardized Coefficients		Standardized Coefficients	t	p-value	Alpha level	Decision
		B	Std. Error	Beta				
1	(Constant)	5.857	1.641		3.570	.000		
	Laptop	.807	.047	.614	17.201	.000	0.05	Hypothesis is rejected

a. Dependent Variable: Academic Performance

Table 4 showed that the standard beta coefficient is .614 with t-test associated with simple regression value of 17.201. The hypothesis is rejected because the probability value of 0.00 is less than the alpha level of 0.05. Therefore, use of laptop significantly predict students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State.

Hypothesis 2: Use of smartphone does not significantly predict students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State.

Table 5: t-test associated with simple regression on the extent use of smartphone significantly predict predict students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State

Model		Unstandardized Coefficients		Standardized Coefficients	t	p-value	Alpha level	Decision
		B	Std. Error	Beta				
1	(Constant)	9.974	1.790		5.572	.000		
	Smartphone	.669	.050	.520	13.445	.000	0.05	Hypothesis is rejected

a. Dependent Variable: Academic Performance

Table 5 showed that the standard beta coefficient is .520 with t-test associated with simple regression value of 13.445. The hypothesis is rejected because the probability value of 0.00 is less than the alpha level of 0.05. Therefore, use of smartphone significantly predicts students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State.

Hypothesis 3: Use of tablet does not significantly predict students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State.

Table 6: t-test associated with simple regression on the extent use of tablet does not significantly predict effective learning in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State

Model		Unstandardized Coefficients		Standardized Coefficients	t	p-value	Alpha level	Decision
		B	Std. Error	Beta				
1	(Constant)	3.368	1.537		2.192	.029		
	Tablet	.872	.044	.671	20.000	.000	0.05	Hypothesis is rejected

a. Dependent Variable: Academic Performance

Table 6 showed that the standard beta coefficient is .671 with t-test associated with simple regression value of 20.000. The hypothesis is rejected because the probability value of 0.00 is less than the alpha level of 0.05. Therefore, use of tablet significantly predicts students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State.

DISCUSSION OF FINDINGS
Use of Laptop and Students' Academic Performance

The first finding of this study revealed that the use of laptop predicts students' academic performance in

public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State to a low extent by 41%. This evidence provided a logical explanation for the reason of why many public secondary schools in Rivers State don't have access to laptop computers in their ICT classrooms to enable e-learning. In other words, the use of laptops contribute little or nothing to students' academic performance in public secondary schools in Rivers State. This finding contradict Iqbal and Bhatti (2015) who in their study reported that there is a significant relationship between laptop computers and academic performance of students. According to the scholars laptop computers have helped learning become interesting as learners tend to do things themselves without looking up to the teachers to be the one to do everything. It helps students share, store and retrieve information, and this only when barriers to its utilization are eliminated.

Also, findings from the study showed that when these barriers are addressed, effective learning takes place and students tend to achieve more in their studies. In view of this, Rockman (2018) in supportive statement contributed that the use of laptop computers can also change what students learn by providing exposure to some new ideas and experiences that otherwise would be inaccessible. These rare opportunities are particularly useful in developing the higher-order skills of critical thinking, analysis, and inquiry that are necessary for success in the 21st century educational system. Also in support, Gikas and Grant (2018) in his study asserted that there is a significant relationship between laptops and effective learning process within and outside the classroom. Therefore, the use of laptop significantly predicts students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State.

Use of Smartphone and Students' Academic Performance
The second finding of the study showed that the use of smartphone predicts students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State to a high extent by 55%. Smartphone is seen as a very important instrument that can be used to improve learning activities especially when it is made available and utilized in a positive direction. Consequently, it is not surprising to the researcher to see that this is evidence in the finding of this study. This finding corroborates Ismail *et al.*, (2018) who observed that some smartphone have cutting-edge features, including high performance capability functions such as sensory functions, GPS functionalities, digital compass and acceleration functions that can help effective learning process and as well savvy school administrators to carry out high-tech tasks beneficial to school. Also, Provazza (2019) remarked that educators and students also use their smartphones to improve their teaching and learning process respectively. Tagoe (2017) concurred that

effective distance learning has always grown on the wings of technological gadgets like the smartphone.

In addition, Kibona and Mgaya (2015) observed that smartphones has made it possible for school principals to coordinate the schools activities (teaching and learning) remotely using internet- enabled smartphones. Similarly, Ketheeswaran and Mukunthan (2016) investigated the usage of the smartphones for learning purposes by students who pursue 'Diploma in Commonwealth Youth Development Programmes' in the Colombo and Batticaloa Centres of the Open University of Sri Lanka K. The study revealed that the usage of smartphones related with distance education helps to increase students learning, social interactions, collaborative learning, and socialization of students. It was postulated in the same study that "in the coming decade smartphones will be a main learning tool in the distance learning system" (2016:1). Tuncay (2016) concurred when he postulated in the study that focused on smartphones as tools for distance education, opined that there is a significant relation between smartphone and students performance in their academic works. Thus, the use of smartphone significantly predicts students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State.

Use of Tablet and Students' Academic Performance
The third finding of the study revealed that the use of tablet predicts students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State to a low extent by 45%. This substantiation provided a commonsensical account for the reasons of some level of downturn in students performance in both internal and external examinations of public senior secondary school in the state. Though it predicted students performance in secondary school to a low extent yet it is very critical in the actualization of effective learning. In view of this, Norries *et al.*, (2021) who opined that tablet computers to a high extent predict effective learning for improved academic performance. Also, Moran *et al.*, (2020) asserted that tablet offers school teachers and students the opportunities to search for information in order to make learning interactive and interesting. They scholar buttressed that e-learning tools and applications are now very versatile and tablets are rightly position to assist students and teachers to organize effective teaching and learning process in the classroom and remotely to improve academic performance.

In addition, Gomez-Garcia *et al.*, (2020) reported that teachers used tablets to communicate and engage students who also had smart devices, adding that their interactions helped to inform students and improve learning within the classrooms and remotely. Hence, school teachers can use their tablets to search for information without going to the physical library to borrow books or to read to extract information to improve their knowledge for effective teaching and learning experience with the students. In view of this,

Mohtar *et al.*, (2018) concurred that there is a significant relationship between tablet computers and learning activities of students, especially for students who do not participate in day-to-day conventional classroom activities. Hence, the use of tablet significantly predicts students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State.

CONCLUSION

Based on findings of the study, it was deduced that the use of laptop and tablet computers as e-learning technologies to a low extent predicts students' academic performance in public secondary schools in Port Harcourt and Obio-Akpor LGA of Rivers State. While, smartphone as e-learning technologies predicts students' academic performance in public secondary schools in Rivers State to a high extent.

RECOMMENDATIONS

Base on the findings and conclusion of this study, the following are hereby recommended.

1. The government who are the owners of public secondary schools should ensure that all schools have functional laptop computer laboratories, accessible to both teachers and students with trained personnel to help them acquire relevant ICT skills that will aid teaching and learning process for improved academic performance of students.

2. Parents should explore all positive means to provide smartphones, constant strong Wi-Fi connection, browsing data, constant power supply for students with strict monitoring by the school PTA to guide, orientate and control students on how they can use the smartphones available to them to their own advantage, as all of these will enhance effective academic learning activities with minimal distraction.

3. The principal as part of his administrative practice should solicit the support of parents, private industries and other Non-Governmental Organisations (NGOs) within the school host communities to provide tablet computers with internet access for students.

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