

## **EFFECT OF GUIDED E-LEARNING ON STUDENTS' ACADEMIC ACHIEVEMENT IN BAYELSA STATE**

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### **Abstract**

*The study investigated the effect of guided e-learning (Computer Aided Learning) on JSS 1 students' academic achievement in Basic Science in Bayelsa State. Two research questions and two null hypotheses guided the study. The study adopted quasi-experimental design, using non-equivalent control group design. The population of the study was 11,204 students, and 151 JSS 1 students from two purposively selected public junior secondary schools were used as the sample of the study. Two researcher-made instruments- Basic Science Test (BST) and Basic Science Survey Achievement Test (BSSAT) were used as the instruments for data collection. Reliability coefficients of BST and BSSAT were estimated to be .79 and .82 respectively, using Pearson Product Moment Correlation (PPMC) in SPSS statistics. Data obtained from the two groups (Experimental and Control groups) at pre-test, post-test were analyzed statistically, using Mean to answer the research questions, and analysis of covariance (ANCOVA) to test the hypotheses. The findings of the study showed that, academic achievement of students in the Experimental group was significantly greater than that of the Control at post-test. That, gender does not significantly influence guided e-learning at posttest. Therefore, it was recommended that, parents should consciously guide their children in the use of e-learning facilities by making only educational electronic programmes accessible to their wards and that, teachers should educate students on how to positively use digital technologies for acquisition of knowledge and fostering of their overall development.*

**Key words:** Guided e-learning, Students' academic achievement, Basic Science, Bayelsa State.

## **Introduction**

Technological advancement has brought innovations and stimulated global competitiveness in virtually all Sectors of human endeavour including Education. From the beginning, education has been a veritable tool for national and human resource development. Interestingly, digital technologies have secured useful roles in the education process. For instance, the use of innovative digital tools and technologies during teaching and learning in recent time has to a large extent changed the traditional educational process of impacting knowledge (McLaughlin, 2018). This revolutionary method of impacting knowledge is broadly referred to as digital education. Digital education, also referred to as electronic learning (e-learning) has been greatly embraced by educators, and especially students in the tertiary institutions (Gohil, 2018).

In most developing countries like Nigeria, there is a paradigm shift from use of the traditional instructional delivery systems in Universities to novelties in educational delivery systems like interactive and reflective model (Tamarkhi and Mehta, 2011), Web- Based Instruction (WBI), Online Learning (OL), Mobile Learning (ML), Computer Based Training (IBT) etc. Other types of digital technologies used as educational tools include; Computer Based Instruction (CBI), Computer Aided Instruction (CAI) and Digital Educational Collaboration (Safiyeh, 2015).

The aforementioned novel educational delivery systems are forms of Technology Enhanced Learning or e-learning. Explicitly, e-learning is the process of extending or delivering instructional resources sharing opportunities to locations away from the classrooms or building by using video, audio, computer, multimedia communications or a combination of these. E-learning comprises all forms of electronically supported learning and teaching (Wani, 2013). Electronic learning has become an invaluable support for learners around the world. Until the advent of digital technology, relevant materials were not easily accessed by students and researchers. Students with economic constraints, geographical boundaries or physical disabilities had limited opportunities in the academic province. Digital education has turned the tide such that students and educators can acquire and deliver relevant information through such technologies like the electronic formats which include electronic media such as the internet, DVD, CD-ROM, video tape, cell phones (Ofojebe, Olibie & Chukwuma, 2015).

Murcha (2011) identifying reasons why e-learning is essential for students' learning highlighted the following: students need to be engaged with what they are doing to improve learning outcomes and technology engages them to do so; it enables students to become thinkers, learners and risk takers

in a sheltered environment; students learn to be accountable themselves, and not to rely on teachers. He noted that e-learning teaches digital literacy, and that users can learn valuable employable skills in a digital world and good digital citizenship. That, they acquire cyber safety knowledge. Through e-learning, group or peer interaction and social relationship are increased.

In Bayelsa State, close observations by the researchers show that the utilization of e-learning by students in junior secondary schools clearly seems to be at its infancy stage. This is partly as a result of some peculiar challenges akin those Nwana (2012) identified as besetting instructions in Nigeria. Such challenges include absence of computer laboratories in public schools, digital library, teleconference devices, fax and wireless applications. Only few central model schools have information and communication Technology (ICT) centers in the State. The students however, have cell phones and access to computers and internet devices, but lack digital education in using the devices to aid their learning process. This prompted the need for the study to be carried out in Bayelsa State to ascertain the influence of e-learning on students' academic engagement as reflected in their academic achievements if they guided in the use of such electronic devices.

As teachers, the researchers equally observed that children in the area of study among others, are usually found to show great interest in watching different cartoon and entertainment programmes on digital screens. According to Ofojebe, Olibie & Chukwuma (2015), students in secondary schools are continually reducing the hours of academic engagement by exploring adversely the internet world. The manner at which children expend their time and resources on independent exploration of the electronic and social media have become an issue of serious concern to parents, educators and classroom teachers. The immediate consequences of this act among others, is decline in the time children engage in academic activities and hence their academic achievement level is dropping.

Academic achievement indicates the extent to which a learner (pupil/student) achieves in a predetermined short or long term behavioral objectives. Arora (2016) opined that academic achievement generally refers to the level of success attained in some academic work. If children independently spend much time with digital screens and they are gradually manifesting unwanted behavior outcomes in their academics and personality disposition, it means that use of e-learning facilities by children is rather producing unwanted results. It has been further argued that, the long time children are using digital technology is impacting negatively on their mental/psychological, social and physical well being (Kardefelt-Winther,

2017). The trend of this fate is not pleasing to parents, and has obviously generated concern for educators and the education system.

Paradoxically, the affinity children have for digital media screens remains inconvertible. Children learn from what they see and hear, hence the observed negative implications affecting their academic engagement, and consequently their academic achievements as well as their wholesome development. Therefore, the problem of the study is: how could children's academic engagement and wholesome development be improved through the use of digital technology? This problem which explicitly depicts an existing unsatisfactory state of affair stemming from the educational and psychological implications associated with the independent or unguided exploration of digital technologies by the Nigerian child is what this study seeks to provide possible remedy. The significance of the study lies in the fact that the findings of the study will be beneficial to children, parents, classroom teachers, educators, curriculum developers and the government.

### **Purpose of the Study**

The objectives of the study were to determine the:

1. effect of guided e-learning on students' academic achievement in Basic Science;
2. effect of gender on guided e-learning on students' academic achievement in Basic Science.

### **Research Questions**

These research questions guided the Study.

1. What is the effect of guided e-learning as measured by students' mean scores in Basic Science at pre-test and post-test?
2. What is the effect of gender on guided e-learning as measured by students' mean score in Basic Science at pre-test and post-test?

### **Hypotheses**

The following null hypotheses tested at .05 level of significance guided the study.

1. There is no significant difference between the mean achievement scores of the students exposed to a period of guided e-learning and those of the control in Basic Science at pre-test and post-test.
2. Significant difference does not exist between the mean achievement scores of male and female students exposed to a period of guided e-learning in Basic Science at pre-test and post-test.

## **Methodology**

The study adopted non-equivalent control group quasi-experimental design. Two intact groups were assigned to treatment conditions, and pre-tested at the start of the study to ascertain the equivalence of the study groups. The groups were post-tested after treatment to establish the effect of the treatment administered. The design is approximate because the study sought to determine the effect of the treatment on the subjects (Nworgu, 2015). The study was carried out in public Junior Secondary Schools (JSS) in Bayelsa State. The population of the study was 11, 204 students. A sample of 151 JSS1 students comprising of 85 students (46 female and 39 male) from Community Secondary School Famgbe with Information and Communication Technology (ICT) centre, and 66 JSS1 students from Community Secondary School Yanaka without ICT center. The sample schools were purposively selected for the study because the schools were located at upland areas in Bayelsa State. Two researcher -made instruments titled Basic Science Test (BST) and Basic Science Survey Achievement (BSSAT) were used for data collection. The question items for both BST and BSSAT were developed from topics in the treatment plan (Appendix A)

The instrument BST (Appendix C) was made up of 30 multiple choice objective questions with letter options labeled a,b,c and d. The students were made to circle the correct option. Each correct option to a test item was assigned a numerical weight of 2 marks to give a maximum of 60 marks. The BST was used to obtain data at pre-test and post-test in order to obtain information on the effect of treatment on the subject. The BSSAT (Appendix D) was made up 50 objective questions weighted 2 marks to give a maximum of 100 marks. The BST and BSSAT were subjected to internal and BST has a reliability coefficient of .79 whereas BSSAT has a reliability coefficient of .82. Selected four topics in the JSS1 third term 2018/2019 academic session Basic Science scheme of work. Besides using the traditional teaching formats, participants in the experimental group were guided on how to use computers to access information in relation to topics taught by the researchers. This revelation helped in elongating time participants allotted to their private study. At the end of six weeks study duration, data collected at pre-test, post-test from the study group were analyzed statically. Mean and standard deviation in SPSS statistics were used to answer the research questions, while analysis of covariance (ANCOVA) in SPSS statistics (Appendix B) was used to test the hypotheses. Use of ANCOVA fixed the error that could have arisen due to non-equivalent of the study groups. The control group was allowed to remain in their conventional state attending to normal classes for the period designed for the study.

## Results

**Research Question 1:** What are the mean scores of students exposed to a period of e-learning and control in Basic Science at pre-test and post-test?

**Table 1:** Mean and standard deviation of pre-test and post-test scores of students exposed to a period of e-learning and control in Basic Science.

GROUP	PRE-TEST		POST-TEST		MEAN GAIN	
	N	MEAN	SD	MEAN		SD
Experimental	85	8.71	2.70	41.31	7.97	32.60
Control	66	9.81	2.42	29.73	5.85	19.92
Mean difference		1.1		11.58		12.68

In Table 1, mean and standard deviation in SPSS statistics reveal that at pre-test only a marginal mean difference of 1.1 was found between the experimental group and control. The post-test mean score of students exposed to a period of e-learning was 41.31 with standard deviation of 7.97, while the control group has a mean score and standard deviation of 29.73 and 5.85 respectively. The mean difference at post-test was 11.58. This indicates that, the mean score of the experimental group was greater than the control at post-test.

## Hypothesis 1

H<sub>01</sub>. There is no significant difference between the mean achievement scores of students exposed to a period of guided e-learning and control in Basic Science at pre-test and post-test.

**Table 2:** ANCOVA tests of between subjects on pre-test and post-test mean achievement scores of students exposed to a period of guided e-learning and control in Basic Science.

Dependent Variable: Post-test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	10041.637 <sup>a</sup>	2	5020.818	78.053	.000	.513
Intercept	43559.049	1	43559.049	677.162	.000	.821
Pretest	56.316	1	56.316	.875	.351	.006
Students	9963.170	1	9963.170	154.886	.000	.511
Error	9520.231	148	64.326			
Total	712221.000	151				
Corrected Total	19561.868	150				

a. R Squared = .513 (Adjusted R Squared = .507)

Table 2 shows that  $p = .000$ . Since the calculated probability .000 is less than .05 the null hypothesis is rejected and the alternative hypothesis is accepted. Thus, a significant difference exists between the mean achievement scores of students exposed to a period of guided e-learning and control in Basic Science at post-test.

**Research Question 2:** What is the effect of gender on the use of guided e-learning on students' mean scores in Basic Science at pre-test and post-test?

**Table 3:** Mean and standard deviation of pre-test and post-test of female and male students exposed to e-learning in Basic Science.

GENDER	N	PRETEST		POST TEST		MEAN GAIN
		MEAN	SD	MEAN	SD	
Female	46	8.78	2.78	42.30	8.35	33.52
Male	39	9.18	2.63	40.12	7.44	30.94
Main difference		.40		2.18		2.59

From Table 3, at pretest the mean score of female students is 8.78, while that of male students is 9.18, with a mean difference of .40. Also, at posttest, the mean score of female students exposed to a period of guided e-learning is 46.60, while that of male students is 40.12, with a marginal mean difference of 2.18. scores in basic science.

**Hypothesis 2**

$H_{02}$ : Significant difference does not exist between the mean achievement scores of female and male students exposed to a period of guided e-learning in Basic Science at pre-test and post-test.

**Table 4:** ANCOVA tests of between subject effects on pretest and post-test mean achievement scores of female and male students exposed to a period of guided e-learning in Basic Science.

Dependent Variable: Post-test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	14.628 <sup>a</sup>	2	7.314	.087	.917	.002
Intercept	37480.353	1	37480.353	444.554	.000	.844
Pretest	14.568	1	14.568	.173	.679	.002
Experimental Gp Gender	.001	1	.001	.000	.997	.000
Error	6913.419	82	84.310			
Total	483704.000	85				
Corrected Total	6928.047	84				

a. R Squared = .002 (Adjusted R Squared = -.022)

Table 4 indicates that the calculated probability .997 is greater than the criterion p value of .05. Therefore the null hypothesis was not rejected. This means that there is no significant difference in the mean achievement scores of female and male students exposed to a period of guided e-learning at post-test in Basic Science.

### **Discussion**

The findings of the study revealed that at pretest an inconsequential marginal mean difference was found for the experimental group and control, whereas at post-test the mean score of the experimental group was higher. This means that exposure of students to e-learning had positive influence their mean scores. Also, the finding showed that significant difference exists between the mean achievement score of the experimental group and control at post-test. The follow-up test equally indicates that the treatment effect on the students was sustainable. This implies that exposure of students to a period of guided e-learning significantly influence their academic achievement in Basic Science. The finding does not support the corresponding stated null hypothesis. Rather, the finding shows that, guided use of digital technologies increase students' time of academic engagement which leads to increase in their academic achievements. This study is in agreement with Flanagan (2008) who found out that guided use of technology increases students engagement and interest in mathematics leading to higher achievement. Also, in agreement with the finding of the study, is the work of Anderson and Subrahmanyam (2007) who found that use of educational computer programme can lead to gains in academically relevant content and other cognitive skills.

The study equally revealed that gender does not influence use of guided-learning as measured by students' mean score. The mean scores of both male and female students showed a marginal difference both at pretest and posttest. In addition, the study noted that significance difference does not exist in the mean achievement scores of male and female students exposed to guided e-learning in Basic Science at follow-up. This means that male and female students can both benefit when they are guided in using electronic media screen to learn. The stated null hypothesis is in consonance with the findings of this study. This finding implies that e-learning improves the academic engagement of students which can lead to the high academic achievements of both male and female students.. This finding is in agreement with Suri and Sharma (2013) whose study showed that no relationship exists between gender and attitude toward computer and e-learning tools. Also, in consonance with the finding of this study is the work of Arena-Gaitan, Ramire-Corea and Randan-cataluta (2010). They found that students' behavior

of acceptance of e-learning technology do not manifest statistically significant difference between women and men.

### **Conclusion and Recommendations**

Students who were exposed to the use of internet services using computers under the guidance of the researchers had higher mean score than the control at post test. Also the academic achievements of students who were guided to access information/materials in the learnt topic areas using computers were significantly higher than the control group at follow-up. Therefore, exposure of students to guided usage of media screen devices like cell phones and computers can elongate their time of academic engagement and hence their academic achievements.

More so, gender does not negatively affect use e-learning devices by students to learn under proper guidance. Therefore, both male and female students can be conditioned in the use of e-learning devices to foster their academic achievements and wholesome development.

Based on the findings of the study, it was recommended that parents should guide their children in the use of digital technologies. Teachers should educate students on how to positively use digital technologies to acquire knowledge and also to foster their overall development.

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**APPENDIX A**

Question items for the Basic Science Test (BST) and Basic Science Survey Achievement Test (BSSAT) were developed from the 5 topics in the Treatment Plan.

**TREATMENT PLAN**

**DURATION: 6 WEEKS**

WEEK S	Topic	Behavioural Objectives: By the end of the lesson students should be able to:	Evaluation Students Activities
Wk 1	Living Things	- identify activities of living things -identify organs of movement	List five activities of living things
Wk 2	Non-living things	-sort out metals and non-metals -distinguish between metals and non-metals -state uses of non-living things	-Mention five non-living things and their uses
Wk 3	Gravitation & weightlessness	-explain the meaning of gravitation and weightlessness -explain effects of gravitation	-What is gravitational force?
Wk4	Energy	-explain meaning of energy -state sources of energy -give examples of transformation of energy	-Mention 3 types of energy -Give one use of energy
Wk5	Forces	-define force and give its SI unit -mention types of forces -explain friction, its advantages and disadvantages	-Define force -Mention types of forces -What is friction
Wk6		Revision and post test	

**EXPERIMENTAL GROUP (TREATMENT)**

WEEKS	Topic	Students to use the following to access information	Students' guided e- learning activities. Students to use internet to access the following
Wk 1	Living Things	<a href="https://www.google.com">https://www.google.com</a> <a href="https://www.ask.com">https://www.ask.com</a>	- activities of living things - organs of movement of living things
Wk 2	Non-living things	<a href="https://www.google.com">https://www.google.com</a> <a href="https://www.ask.com">https://www.ask.com</a>	- metals and non-metals -difference between metals and non-metals - uses of non-living things
Wk 3	Gravitation & weightlessness	<a href="https://www.google.com">https://www.google.com</a> <a href="https://www.ask.com">https://www.ask.com</a>	-meaning of gravitation and weightlessness effects of gravitation
Wk4	Energy	<a href="https://www.google.com">https://www.google.com</a> <a href="https://www.ask.com">https://www.ask.com</a>	- meaning of energy - sources of energy - examples of transformation of energy
Wk5	Forces	<a href="https://www.google.com">https://www.google.com</a> <a href="https://www.ask.com">https://www.ask.com</a>	-force and give its SI unit -types of forces - friction, its advantages and disadvantages
Wk6			Revision and post test

**APPENDIX B****DATA ANALYSIS FOR TEST OF HYPOTHESES**

Table 2

Hypothesis 1

**Univariate Analysis of Variance**

[DataSet3] C:\Users\Dr. Million\Documents\Pretest Post-test Data.sav

**Tests of Between-Subjects Effects**

Dependent Variable: Post-test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	10041.637 <sup>a</sup>	2	5020.818	78.053	.000	.513
Intercept	43559.049	1	43559.049	677.162	.000	.821
Pretest	56.316	1	56.316	.875	.351	.006
Students	9963.170	1	9963.170	154.886	.000	.511
Error	9520.231	148	64.326			
Total	712221.000	151				
Corrected Total	19561.868	150				

a. R Squared = .513 (Adjusted R Squared = .507)

Table 4

Hypothesis 2

**Univariate Analysis of Variance**

C:\Users\Dr. Million\Documents\Experimental Group Data Gender Influence on e-learning.sav

**Tests of Between-Subjects Effects**

Dependent Variable: Post-test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	14.628 <sup>a</sup>	2	7.314	.087	.917	.002
Intercept	37480.353	1	37480.353	444.554	.000	.844
Pretest	14.568	1	14.568	.173	.679	.002
Experimental Gp Gender	.001	1	.001	.000	.997	.000
Error	6913.419	82	84.310			
Total	483704.000	85				
Corrected Total	6928.047	84				

a. R Squared = .002 (Adjusted R Squared = -.022)

## APPENDIX C

### INSTRUMENT: BASIC SCIENCE TEST (BST)

INSTRUMENT: You are to circle the correct option from the alternatives.  
Answer all the questions.

1. The S.I unit of force was named after \_\_\_\_  
a. Sir Bobby Chariton b. Sir Isaac newton,  
c. Nelson Mandela, d, Goodluck Jonathan
2. \_\_\_\_ is a force which increases velocity of an object a. Drag b. Torgue, c. Thrust, d. Movement
3. \_\_\_\_ is the S.I unit of Energy?  
a. Calories, b. Horsepower  
c. Seconds d. Joules
4. When an object is at rest: we say the object carries \_\_\_\_\_ energy a. potential  
b. kinetic c. mechanical d. solar
5. The gas generated from digestion of animal waste is \_\_\_\_\_ a. biogas b. meogas c. no gas d. none of the above
6. \_\_\_\_\_ can be compressed in cylinders and used for cooking a. Butane b. Methane c. Octane  
d. Pentane
7. Hydroelectric energy uses \_\_\_\_\_ to drive a dynamo which produces electricity a. tides b. biomass c. turbine d. all of the above
8. Vector quality has both \_\_\_\_\_ and direction a. magnitude b. quantity  
c. force d. weight
9. All these are examples of non-magnetic substances except... a. copper b. blood c. brass d. iron
10. "R" in friction means \_\_\_\_\_ a. normal reaction b. options c. reaction d. reduction
11. \_\_\_\_\_ force pulls objects away from the Centre. a. Petal b. Centripetal c. Fugal d. Centrifugal
12. \_\_\_\_\_ is a negatively charged body a. Friction b. Cation  
c. Anion d. Noion
13. \_\_\_\_\_ friction occurs when a body constantly move over one another a. Dynamic b. Natic c. a and b d. None
14. Sliding friction is also called a. static b. Dynamic c. A and B d. None
15. \_\_\_\_\_ is a state of being well? A. Morals b. Ethics c. Habits  
d. Personal Health
16. Organs of movement for birds are .. a. arm b. wings c. fin d. limb
17. Activities of living things include these except ...a. growth  
b. movement c. excretion  
d. melting
18. Animals that eat flesh are.. a. omnivores b. carnivores c. herbivore d. none of the above

19. Which of the following is not a living thing? a. Grass b. Grasshopper c. Iron d. Snail
20. Aluminum is an example of... a. metal b. non-metal c. lead d. plastic
21. Gravitational force is a force of... a. friction b. repulsion c. attraction d. separation
22. Gravitational pull on an object is represented by an object's ... . a. size b. volumes c. weight d. material
23. Energy is the ability to a. move b. do work c. fly d. push
24. The following are forms of energy except.... a. sound b. heat c. light d. Wave
25. Which of the following is not a source of energy? A. Coal b. wood c. Smoke d. Petroleum
26. which of the is a form of energy? a. Water b. Sun c. Radio d. Wind
27. Which of the following is not a type of force? A. Magnetic b. Contact c. Reversible d. Gravitational
28. Friction makes \_\_\_\_\_ possible a. movement b. flying c. swimming d. radiation
29. Electrical energy can be converted to \_\_\_\_\_ energy a. heat b. solar c. potential d. none of the above
30. Kinetic energy is energy of \_\_\_\_\_ of a body a. vibration b. motion c. convection d. disintegration