World Applied Sciences Journal 37 (9): 798-804, 2019
ISSN 1818-4952

DOI: 10.5829/idosi.wasj.2019.798.804

Effects of E-Learning on Tertiary Institution Students' Academic Achievement

[1]P.I. Eze and [2]Emmanuel Ogbaga

[1]Department of Educational Foundations, Faculty of Education,
Ebonyi State University, Abakaliki, Nigeria
[2]Department of Science Education, Faculty of Education,
Ebonyi State University, Abakaliki, Nigeria

Abstract: The study examined the effects of E-learning on student's academic achievement in Tertiary Institution. Three research questions and the three null hypotheses guided the study. The study was conducted in Enugu State of Nigeria. A total of One Thousand Seven Hundred and Thirty-nine students (1739) was the population of the study, out of 1739 students; One Hundred and Thirty students (130) was used as sample of the study. 57 students were used as treatment group while 73 students were used as control group. The instrument used for data collection was Educational Technology Achievement test. The reliability of the instrument was obtained using Kuder-Richardson (K-R20) and reliability index of 0.71 was obtained. Mean and Standard deviations were used to answer the research questions while Analysis of Covariance (ANCOVA) was used to test the null hypothesis at 0.05 level of significance. The study revealed that students taught CRS with E-learning (Treatment group) score higher than those taught CRS with conventional approach. The result also showed that Male Students score higher than their Female counter parts when taught CRS with E-learning. Finally the result revealed than E-leaning approach is superior to the conventional approach at the two level of gender, indicating a situation of interaction. Recommendations were made based on the findings of the study.

Key words: Instructional Content · Educational Technology · Simulation

INTRODUCTION

Learning as a process occupies significance role in one's life and is necessarily a focal point of teaching-learning process. It is natural in life. While learners (Students) are the centres of all academic activities. How they learn and achieve maximally the designed lesson content presented to them is of great important. On the basis of this analysis, one can believe that the extent of outcome of the instructional content presented to students by the teacher the implementer of the designed school curriculum is determined among other variables by the technique (Channel) through which it is being presented. Previously, around 1840-1960, teaching and learning processes were confided in the classroom. Within these periods, chalk and chalkboards were mostly used as instructional media. In this present rapid moving world and technological evolution, modern technologies with the potentials of racing with the space of time, technological progress and high demand of education are used as techniques for instructional delivery. Among the sophisticated technological innovative techniques to m eet the demand of time is e-learning.

In the learning or teaching any subject at any level of institutions, computers and E-learning instructional approach plays significant roles in enhancing academic achievement. One of the important approach used in the teaching sciences and art related courses is the computer Assisted instruction (CAI). Computer assisted instruction is a learning process in which students interact with and is guided by a computer through a course of study aimed at achieving certain instructional goals. It involves the use of computer to present drills, practical exercise and

Corresponding Author: Emmanuel Ogbaga, Department of Science Education, Faculty of Education,
Ebonyi State University, Abakaliki, Nigeria.

tutorial sequence to the students and perhaps to engage the students in a dialogue about the substance of instruction. Take for instance, if a teacher tends to teach the history of Jesus in the classroom, it will be easily done in that it will be easily get downloaded and it will be display in the screen of the computer. With this it is a practical teaching method that makes teaching and learning concrete and real. It is also worthy to note that this computer assisted instruction is part of e-learning.

Therefore, E-learning is an abbreviation of the term electronic learning according to Mangal and Mangal [1]. E-learning involves all forms of electronic supported learning and teaching. In the light of this, there is no common acceptable definition of e-learning as individual scholar defines it in his or her own way. This is in support with Dublin [2] and Oblinger and Hawkins [3] that there is no common definition of the term e-learning. According to Fry [4] e-learning is a technological based which encompasses the use of the internet and other important technologies to produce materials for learning, teach learners and also regulate courses in an organization. Mangal and Mangal [1] define e-learning as a learning carried out, supported and facilitate by the advanced multimedia facilities as well as internet and web technology delivered to the end users via computers, laptops and mobile ICT appliances. They further described e-learning as an electronically carried out learning facilitated and supported by the use of advanced learning technology particularly calling for the services of computers, networking and multimedia.

Provisionally, e-learning can be defined as teaching and learning through sophisticated electronic multimedia technologies and internet.

E-learning is an innovative technique used in providing learning experiences to the students' on-lines through the use of internet services and web technology of the computers. It has the potentials to provide immediate and lasting academic assistance to teachers and students irrespective of the programme, field of study, time, ability and distance. According to Layton [5] and Wallhaus [6] e-learning can give students much greater understanding over their own learning experience while giving e-teachers an opportunity to further meet the needs of individual students in a digital age. In this respect, e-learning is used in different perspectives in teaching-learning process such as on-line distance learning, hybrid learning and distributed learning. The teacher can embark on any of the identified channels through internet based learning; mobile ICT appliances or multimedia depending on the one that he/she fills more convenience, accessible and appropriate to the subject matter. On this note, according to Mangal and Mangal [1] e-learning situation may be seen to adopt any of the following modes: support e-learning, blended e-learning and complete e-learning modes. In teaching and learning situation, multimedia, internet and web services can be applied as assistant or support to traditional teaching and learning to enhance effective instructional outcome. In the area of blended e-learning mode, there is a combination of traditional mode of teaching and ICT appliances in the classroom setting to help students achieve from both practices of traditional and e-learning. That is, the delivery of instructional contents and explanations is shared between traditional learning mode and e-learning mode in the classroom situation. While the complete e-learning mode involve use of e-learning throughout in teaching and learning exercise. In this situation, the learner depends solely on designed e-learning courses which mostly are on-line. The course information, educational materials and lesson content are recorded and stored in CD and DVD, e-mails or any other ICT appliances like mobile phone, or web. As a result, there are no classrooms or schools needed as in the case of traditional established schools. Mangal and Mangal identified two distinctive communication style to be adopted in complete e-learning; they are "Asynchronous and synchronous" communication styles. Asynchronous is a complete e-learning communication styles where the course content, educational materials or information are delivered to the students through ICT appliances such as e-mails, web pages, web logs, social media plat discussion forum or recorded CD and DVD. In this situation there is no face-to-face or immediate on-line interaction between the teacher and students. This style does not allow immediate feedback; though feedback or response to questions might be made later. While in synchronous communication style of complete e-learning, the teacher and students or students and students interact or discuss lively on-line through the use of tools such as live audio-video conferencing and chat room. This style of complete e-learning creates room for immediate response to questions presented to the students by the teacher or the other way round. The study adopted blended and complete e-learning asynchronous communication style.

E-learning as innovative technique of teaching with some characteristics of presenting lesson content to the students to some extent as if in the real classroom situation serves as an opportunity/chance for anybody who is willing to further his/her education at one's pace from any location. As many Nigerian youth and

adults with particular reference to Enugu State, Nigeria at present are deprived the opportunity of tertiary education as a result of other challenges in addition to cost in terms of feeding, transportation, accommodation, school fees, racism indigenization, segregation, whether and other resources, e-learning seem to be the answer and solution to their education stagnation. This necessitated the study.

Problem of the Study: E-learning is a means through which teachers and students share and acquire information by the aid of internet and multimedia technologies. European Commission [7] describes e-learning as the use of new multimedia technologies and internet to increase learning quality by easing access to facilities and services as well as distant exchanges and collaboration. Abbad *et al*. [8] define e-learning as any learning that is enabled electronically. The existence of e-learning in education sector has reduced the problems of teaching students in far distance. It has also helped many to study while on the job. This being the case, E-learning satisfies learners desire and ambition of getting access to school, quality information and lesson content as a full time student any time, any place. In addition, e-learning takes care of scarcities of human and material resources such as academic (Teaching) staff, lab technicians, facilities and infrastructures. But to enjoy the benefits of e-learning, there must be available, quality and functional technological devices like computers, laptops, multimedia facilities, mobile learning tools, internet and web services. In addition to availability of material resources, enough knowledge and skills for the use of multimedia, internet and web technologies is required of the users. But, in most eases, the items are not there at all or they are in short quantity. This might be that school managements or government are not ready to invest on such capital intensive investment while most individual learners cannot afford to buy the required devices. It is assumed that if schools are equipped with e-learning needed resources (Human/materials) and learners with required knowledge and skills, a lot will benefit from the educational experiences offered by e-learning. The problem of the study is: what are the effects of e-learning on tertiary institution students' academic achievement.

Purpose of the Study: The general purpose of the study is to find out the effects of computer assisted instruction/ e-learning on students academic achievement. Specifically, the study sought to ascertain:

- The effects of the mean achievement score of students taught educational technology using e-learning and those taught with the conventional method.
- The effects of the mean achievement scores of male and female students taught educational technology with e-learning.
- The interaction effects of methods and gender on students mean achievement in educational technology.

Scope of the Study: The study centred on the effects of e-learning on students' achievement score of tertiary institution two hundred (200) level students in Enugu State, Nigeria constituted the population and sample.

The study determined students' achievement in e-learning based on educational technology curriculum. The topics covered are newer media and improvisation of instructional media in educational technology.

Research Questions: The following research questions guided the study:

- What is the mean achievement score of students taught educational technology using e-learning and those taught with the conventional method?
- What are the mean achievement scores of male and female students taught educational technology with e-learning?
- What is the interaction effect of methods and genders on students mean achievement score in educational technology with e-learning?

Hypotheses: The following hypotheses were tested.

- There is no significant difference in the mean achievement score of students taught educational technology using e-learning and those taught with the conventional method.
- There is no significant difference in the mean achievement scores of male and female students taught educational technology with e-learning.
- The interaction effect of methods and gender on students mean achievement score in educational technology is not statistically significant.

Methodology: The design of the study was a quasi experimental aimed at finding out the effects of e-learning on students' achievement in educational technology when exposed to complete e-learning mode and blended e-learning mode. It is a quasi experimental in the sense that intact classes were used. Non equivalent control group design was adopted.

Enugu State, Nigeria has all together at present six (6) Education Zones, namely: Enugu Education Zone, Nsukka Education Zone, Agbani Education zone, Awgu Education Zone, Obolo Education Zone and Udi education Zone. The study was carried in three (3) Education zones: Enugu Education Zone, Obollo Education zone and Agbani Education zone. Three (3) institutions one each from the three (3) zones were used for the study. The institutions were used for the study because they over education programme and are all state own institutions and are exposed to the same environment and treatment conditions.

The target population of the study comprised all two hundred (200) level education students of tertiary institutions in the three zones in Enugu State, Nigeria. There are altogether 1739 of 200 level students comprising 1062 from Federal college of education Technical and 677 from College of education.

A stratified random sampling technique was adopted in selecting the three tertiary institutions (One university: faculty of education; one college of Education and one college of education technical). This technique was used in relation to the programme the institutions offer. Simple random sampling technique was used in identifying and assigning the 200 level students in each tertiary institution to experimental (Complete e-learning mode) and control (blended e-learning mode) conditions.

Educational technology course unit of 200 level education students was prepared and developed to form lesson content text and CD/DVD materials. Educational technologists and computer scientist were asked to validate the instructional texts of lesson delivery, e-mail, CD/DVD. They were asked to rate the lesson text internet text, e-mail text and CD/DVD to indicate whether they are clear, unambiguous and covered the content. Their comments were used to produce the final version of the instructional content.

A (20) item of sub-objective and four (4) short essay questions test was constructed by the researcher to evaluate the students' achievement in instructional media.

For face and content validation, the draft instrument generated from the unit of study was presented to three experts: two from educational technology and one from measurement and evaluation of Enugu State University of Science and Technology. The comments and observations from these experts were used to modify the test items. Answer (Marking guide) to the questions were prepared by the researcher and validated by the experts in educational technology in relation to the course content.

Simple random sampling technique was used in identifying and assigning the 200 level students in each tertiary institution to experimental (Complete e-learning mode conditions.

Technology course units of 200 level was prepared and developed to from lesson content text materials educational technologists and computer scientist asked to validate the instructional texts, on CD. They were asked to rate the e-mail text, content to indicate whether they are clear and unambiguous. E-mail was their comments were used to produce the final version of the instruction content.

A ten (10) item of objectives and four 4 short essay questions tests were constructed by the researcher to evaluate the students' achievement and retention in instructional media.

For face and content validation, the draft instrument generated from the unit of study was presented to three experts. Two from education technology and one from measurement and evaluation; the comments and observations from the experts were used affecting necessary modifications on the test items. Answers to the questions were prepared by the researchers and validated by experts in educational technology in relation to the course content.

Scoring of the Instrument: One mark was assigned to each objective question and five 5 marks each to essay questions; total = 30 marks.

Pilot Study: A pilot study was carried out to test run the experimental procedure it helped the researcher to generate information for the main study. Item analysis and subsequent calculation of the reliability of the instrument were based on pilot study data. The length of time needed by the students to read the materials and complete the test was determined. Also determined was whether the e-mail texts information was clear and appropriate. The pilot study was carried out in Ebonyi State. In the state, three departments of 200 level education students was randomly selected and used.

Reliability of the Instrument: The reliability of the instrument after pilot study was determined using Kudar Richardson (KR) formula 20 for the sub-objective question items of the educational media achievement test (EMAT). The scores obtained were used to establish the internal consistency reliability coefficient of the instrument using the formula below:

K = K-R^{20}:

$$r_{xx} = \frac{n}{n-1}\left(\frac{\Sigma pq}{S^2}\right)$$

A value of 0.65 was obtained for the sub-objective section

where
n = Number of items in test
p = Proportion of people who answered item correctly
q = Proportion of people who answered item incorrectly
Σ = Summation sign indicating that pq is summed over all items
S^2 = Variance of the total test

The reliability of the essay section of the test was obtained through score's reliability. A value of 0.71 was realized.

Experimental Procedure: The researchers in an attempt to carry out the grouped the subjects into two: experimental and the control groups the first group that is the control group was given the pre-test after that the lesson content was delivered content was also given to them to read. Afterward, the text was collected back and the subjects given the post-test the same day.

The second group of the subjects (The experimental group) was given the pre-test CD containing the lesson content was given to them to study the lesson contents was also sent to their e-mail. After they had read it, the material was collected and the post-test was given to them.

One hour, thirty minutes (30 minutes) was given to each group for the experiment. The two groups were tested again two weeks after the instructional exercise to measure retention. The researchers made use of six (6) research assistants; 2 from each institution, they contributed much during the evaluation exercise and distribution, collection and marking of the instructional test (pre-test post-test) they are all teachers in institutional of higher learning. They were provided with marking guide.

Method of Data Analysis: Descriptive and inferential statistics were used in analysing the data collected from the study. Mean score and standard deviation were used in answering the three research questions, while 2-way analysis of covariance (ANCOVA) was used to test the hypotheses at 0.05 alpha level of significance with the pre-test scores as covariates.

Table 1: Achievement score of the students taught educational technology with E-learning approach and those taught with the conventional approach

Groups	N	Mean ($\bar{x}$)	Standard deviation
Treatment (E-learning)	57	58.24	13.99
Control group (conventional)	73	55.41	11.42

Table 2: Mean achievement score of male and females students who were taught with E-learning approach

Students	N	Mean ($\bar{x}$)	Standard deviation
Male	61	57.11	13.26
Female	69	56.24	12.15

RESULTS PRESENTATION

Research Question 1: What is the mean achievement score of the students taught educational technology with E-learning approach and those taught with the conventional approach were analyzed descriptively using mean and standard deviation. Summary of data is presented in Table 1.

Summary of result presented in table revealed that students taught educational technology with E-learning approach is superior to those taught educational technology with the conventional approach in enhancing students academic achievement in the tertiary institution. As shown in the table, the E-learning approach yielded a mean score of 58.24 with a standard deviation of 13.99 while the conventional approach had a mean score of 55.41 with a standard deviation of 11.42.

Research Question 2: What is the mean achievement scores of male and female students taught educational technology with E-learning approach?

The mean achievement score and standard deviation of male and female students who were taught with E-learning were computed as presented in Table 2:

Summary of result in Table 2 shows that male students taught educational technology with E-learning approach in the tertiary institution had a mean achievement score of 57.11 with a standard deviation of 13.26 while their female counter-part taught with the same E-learning approach had a mean achievement of 56.24 with a standard deviation of 12.15. As shown in the table, the difference in the mean achievement scores of male and female revealed that male students slightly perform better than their female counterparts.

Research Question 3: What is the interaction effect of methods and gender on students mean achievement with E-learning approach?

Table 3: Males and females in both the treatment and control group using educational technology achievement test

	Gender categories	
Methods	Male	Females
Treatment	57.27	59.06
Control	57.00	53.95

Table 4: Analysis of covariance for students overall achievement scores in educational technology by using E-learning and conventional approach.

Sources of variation	Sum of Square	Df Degree	Mean square	F	Sig of F.
Covariate (pre-test)	1.637	1	1.637	0.010	0.920
Main effect	296.839	2	148.420	0.922	0.401
Methods	273.474	1	273.174	1.698	0.195
Gender	191.208	1	24.179	0.150	0.699
2-way interest					
Method & gender	24.179	1	191.208	1.187	0.278
Explained	489.684	4	122.421	0.760	0.553
Residual	20131.739	125	161.054		
Total	20621.423	129	159.856		

Table 5: Analysis of co-variance of mean achievement scores of students who were taught educational technology with E-learning (treatment group only) is presented in the table below:

Sources of variation	Sum of Square	Df Degree	Mean square	F	Sig of F.
Covariate (pre-test)	54.042	1	54.042	0.268	0.607
Main effect (gender)	34.392	1	34.392	0.171	0.681
Explained	88.434	2	44.217	0.220	0.804
Residual	10876.128	54	201.410		
Total	10964.561	56	195.796		

Data obtained for the males and females in both the treatment and control group using educational technology achievement test were used to answer this research question. Summary of result is shown in Table 3:

As shown in Table 3, (E-learning) approach is superior to the conventional approach at the two levels of gender indicating a situation of no interaction.

Hypotheses

HO_1: There is no significant difference in the mean achievement scores of students taught with (E-learning) with simulation approach and those taught E-learning with conventional approach.

HO_3: The interaction effects of method and gender on students mean achievement score in E-learning is not significantly significant.

Data collected on the achievement of the students in both treatment and control groups were used to test hypotheses 1 and 3. These hypotheses were tested using analysis of co-variance (ANCOVA). The summary is presented in Table 4.

For hypothesis 1, summary of data analysis in Table 4, revealed that the alpha level (0.05) is less than the significant of F value (0.920). Based on the decision rule, the researcher upholds the null hypothesis and concludes that there was no significant difference in the mean achievement scores of student taught educational technology with E-learning and those taught with conventional approach.

For hypothesis 3, summary of data analysis presented in Table 4 revealed that the alpha level (0.05) is less than the significant of f value of (0.278). Based on the decision rule the researcher also upholds the null hypothesis and concludes that the interaction effects of methods and gender on students mean achievement in CRS using E-learning is not statistically significant.

HO2: There is no significant difference in the mean achievement score of male and female students taught educational technology with E-learning.

Data collected on the achievement of students (Males and females) in treatment group using the analysis of co-variance is presented in Table 5.

As shown in Table 5, the significance of F value is (0.607) at alpha level of 0.05. Because the alpha level is less than the significance of F value, the researcher upholds the null hypothesis and concludes that there was no significant difference in the mean achievement scores of male and female students taught educational technology with E-learning approach.

DISCUSSION OF FINDINGS

The discussions of finding of this study are presented along the line of the specific objectives of the study. To this end the following sub-headings were used to guide the discussions;

- The effects of the mean achievement score of students taught educational technology using e learning and those taught with the conventional method.
- The effects of the mean achievement scores of male and female students taught educational technology with e-learning approach.
- The interaction effects of methods and gender on students mean achievement in educational technology.

Effects on the Mean Achievement Score of Students Taught Educational Technology with E-Learning and Those Taught with Conventional Approach: The result revealed that students taught with E-learning approach are superior to the conventional approach in enhancing students' academic achievement in the tertiary institution. The result also revealed that there was no significant difference in the mean achievement scores of student taught educational technology with E-learning and those taught with conventional approach.

The Effects of the Mean Achievement Scores of Male and Female Students Taught Educational Technology with E-Learning Approach: The result revealed that the mean achievement scores of male and female students were slightly different because male students slightly perform better than their female counterparts. The result of the study also revealed that there was no significant difference in the mean achievement scores of male and female students taught educational technology with E-learning approach.

The Interaction Effects of Methods and Gender on Students Mean Achievement in Educational Technology: The result revealed that E-learning approach is superior to the conventional approach at the two levels of gender indicating a situation of no interaction. The result also revealed that that there was no significant interaction at the both gender level using E-learning and conventional approach.

Recommendations: Based on the findings of the study, the researcher made the following recommendations;

Teachers should adopt E-learning as a medium of instruction at all level of Nigerian educational system.

That government at all levels in Nigeria should equip all schools with all the E-learning facilities. This includes Computer laboratories, computer Libraries, computers and its facilities.

That government at all level should encourage and sponsor in service training for teachers on the application of E-learning.

CONCLUSION

The researchers conclude that educational technology at any institution of learning should be taught using e-learning so that the learners will know the current trends in academic systems.

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