



Effect of E-Learning Teaching Approach on Academic Performance in Biology Concepts Among Senior Secondary School Students in Lere LGA of Kaduna State

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Abstract

This study determined the effect of E-Learning Teaching Approach on academic Performance in Biology Concept among senior secondary School II Students in Lere LGA of Kaduna State, Nigeria. The study adopted quasi experimental research design which involve pretest and posttest. Experimental group were exposed to E-Learning Approach and Control group were exposed to lecture method. The sample size was (164) SSII Students out of (380) SSII Students in two Public senior Secondary School in Lere Local Government Area of Kaduna state. The study was guided by two objectives, two research questions and two null Hypotheses. A Biology Performance Test (BPT) item with a reliability coefficient of (0.76) was used. Mean and Standard Deviation were used to answer the research questions, while the hypotheses were tested at (0.05) level of significance using independent Sample T-test . The results from the analysis revealed that students exposed to E-Learning performed better than those taught with lecture method. There is a significant difference between the mean performance scores of the students taught Biology Concept with E-Learning and those taught with lecture method. There was also significant difference between Male and Female Students academic Performance in favour of female students. The research conclude that Students learn biology concepts better when taught using E learning SS II level. Secondly that E-Learning approach has positive effect on the academic performance of SS II Students when taught biology concept than using lecture method. The paper recommended, that teachers should be exposed to the use of E-Learning approach in teaching and learning by training and re-training, attending seminars, conferences and workshops on ICT programmes so as to keep them abreast of the innovation in teaching and learning.

Keywords: e-learning approach, lecture method, biology concept.

Introduction

Biology is an applied field of study that is diversified in nature and capable of providing job opportunities for those who studied it. Ejilibe, (2012). Ogonnaya (2014) defines biology as a science subject that is much concerned with the study of the living components of the environment. It is a practical course and hence requires the use of practical approach to teach its contents so as to produce students that would acquire necessary knowledge, skills and competencies needed to meet the scientific and technological demand of the society. The objectives of teaching biology at secondary school level as stated by National Policy on Education FME (2004) involve ability of the learners' to development of an awareness of the environment, to have meaningful and relevant knowledge in biology necessary for successful living in a scientific and technological world and to make room for technological advancement Kareem (2015). It's useful in technological development of the nation as well as to mankind. Teaching and learning is an important process for development of man and affects society when both the teachers and

students actively participate in the process. Well planned and properly directed education is a key to success and progress of a nation.

Information and communication technologies (ICT) provide new opportunities for education and training, as they enhance learning and teaching, and facilitate collaborations, innovation and creativity for individuals and organizations (Ala-Mutka, Punie & Redecker, 2008).

E-learning is an aspect of technology. It deals with the use of all types of technology, including electronic technologies in learning and education. This means using a computer to deliver part, or all of a course whether it is in School, part of your business training or a full distance learning course. It entails the use of electronic educational technology in learning and teaching. E-learning denotes the use of ICT by teachers and learners. Schmidt 2005 holds that e-learning consists of conventional training, such as courses, ad-hoc training, selected learning objects, formalization through document collections and community formation which can be achieved via social software. Wild, Griggs and Downing, (2002) describe E-learning as the delivery of training and education via networked interactivity and distribution technologies. Sambrook, (2003) said that e-learning is a learning and communication exercises across computers and networks or for that matter any other electronic sources. According to Olaniyi (2006), e-learning is all about learning that occurs at the computer. Horton (2005) defined e-learning as the use of internet and digital technologies to create experiences that educate our fellow human beings.

Khan (2005) and Umar, Muawuiya and Yahuza, (2019). pointed that E-learning has been described in various ways as learning 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, online learning (OL), mobile learning (or m-learning) or remote learning and learning management systems (LMS).

In E-learning system, students are able to interact anytime from wherever with different instructional material (text, sound, pictures, video and so on) through Internet. According to Al-Ammari and Hamad, (2008). Learners can communicate with teachers and classmates both individually and as a group discussion with the use of message boards, instant message exchanges and video conferencing. E-learning has become a new epitome and new underlying principles in library services as well as educational sector with a mission to serve as a development platform for present-day society based on knowledge. Moreover E-learning system can be analyzed as an inventive approach for delivering, learner-centered, interactive, and facilitated learning environment to anyplace, anyone, anytime by utilizing the features and resources of different digital technologies along with other types of learning materials suited for an open, distributed, and flexible learning environment (Ibid, 2008).

Several researchers suggest that E-learning will be an important part of education for the next generation too. The use of E-learning in teaching is becoming increasingly vital owing to the global network of the twenty first century teaching and learning. In line with this, Abdulmalek (2013) opined that the use of modern technology such as ICT, CAI etc. offers many means of improving teaching and learning.

The field of computer and communication technologies have offered tremendous opportunities for learning by electronic means (Abimbade, 2002 and Rozina, 2002). The world of technology grown through the achievement of technology and has also stretched educational boundaries and created new ones. One of these new and rapidly expanding boundaries is e-learning is offering tremendous advantage to education sector. Abimbade,(2002) and Holley,(2002) found that students who participate in online/ E-Learning achieve better grades than students who studied with traditional approach. The impact of science and technology on education cannot be over-emphasized. The advent of information and technology especially the product aspect has influenced both the content as well as methods of teaching. Most of the developed countries have exploited the potentials of ICT (Information Communication Technology) to transform their educational landscape at the tertiary, secondary and even primary school levels particularly the instructional process Wekesa, (2003). Generally, ICT holds out the opportunity to revolutionize pedagogical methods, expand access to quality education, and improve the management of education systems (World Bank, 2002). Current trend in science teaching is to integrate technology into the classroom in a variety of ways (Yusuf & Afolabi, 2010). These include, the ability to shift learning to more hands-on and visual imagery interaction that is often lacking in traditional teacher based classroom, It natures confidence, initiative and enhances cognition, psychomotor and effective behaviour. It provides immediate feedback and it is self- paced (Wekesa, Wekesa & Amadalo 2013).

The fast changes in science and technology in recent times have affected education systems. Seyhan (2015) students of today need to be able to adapt to a rapidly changing technological world (Şaşan, 2002). As a result of these fast changes, the education systems need to be modified. The education systems can activate the students to learn ways to reach knowledge, to develop solutions for problems yet unknown and to enhance the skills of decision-making (İnce Aka, Güven & Aydoğdu, 2010). Students should be given opportunity to discover, invent and get caught up in the rapid expansion in science and technology. Biology has made great impact in the development of nations and its importance warrants the need to expose biology students to innovative methods like E-Learning approach. As result of this review, E- learning is growing very fast and become popular and that is why many; higher educational institutions are adopting to virtual learning system. Keshavarz et al. (2013) concluded that e-learning has a positive impact on academic achievements of students. Mahmoodi et al. (2015) found that the use of e-learning in physiology teaching-learning process improves students learning and creativity. Zare, Sarikhani, Salari, & Mansouri. (2015), also found that learning and recollection of students who were educated to multimedia methods, is more than learning and recollection of students who were educated in the traditional methods. Umar, Muawuiya and Yahuza,(2019), worked on effect of e-learning teaching approach on academic performance in geometrical concepts among senior secondary school students in zaria and found out that students exposed to E-Learning were superior in performance than those taught with lecture method.

Review of studies conducted in the field of e-learning application and its impact on learning and creativity suggests that the use of this teaching method in the teaching-learning process can lead to the effectiveness of training.

Emergence of new theories of teaching and learning has made the education to shift from being teacher-oriented to being student-oriented. Moreover, development and

evolution of new communication devices has enabled modern man to use modern methods of teaching and learning and get free from time and space barriers and keep on learning in any time and place according to his needs and demands (Hosseini, Seyed-Saeed, Nasram, Smailpour, & Ashoori, 2015). E-learning has become a new paradigm and philosophy in education with a mission to serve as a development platform for present-day society based on knowledge. It is evident that the concept of e-learning is considered to be very attractive as a new learning model whose effect will be a positive one to the development of education in developing countries.

Gender issues have become the talk of today's educational forum. Although the literacy rate is more among boys than girls are, it is quite interesting to observe that girls are securing better rank than boys in almost all academic and other competitive examinations. (Karthigeyan and Nirmala, 2012). The performance of every individual is not equal, there is a lot of variability and dispersion. The differences cannot be attributed to a single factor only, but the outcome of a number of factors such as intelligence, study habits, self-concept, creativity, aptitude, interests, socio economic factors, etc. Along with these, gender of the child is also an influencing factor on academic performance. The role of gender in science achievement test has resulted to studies over time by scholars. Usman (2008) found that boys performed well in any rigorous work while girls settle more for less rigorous work. Bichi (2009) believed that girls performed better than boys in problem solving types of activities. Hoffman (2002) observed that girls on an average perform as well as, if not better than boys, in many scientific subjects, also that girls have the same level of competence in science as boys.

Statement of the Problem

The teaching of Biology in Nigerian secondary schools has been with the use of traditional method of instruction. The subject especially at SSCE level has consistently remained poor. This may imply that students are not learning from the use of this method of teaching. The application of teaching and learning methods that promotes deep and active learning and creativity in learners is the emphasis of the educational system of the present age. To achieve this objective, the traditional teaching methods (lectures, etc.) do not have the required effectiveness, but implementation of e-learning in teaching-learning process could be a way to realize this goal (Zare et al., 2014). E-learning is one of the most important learning environments in the information era. Therefore, efforts and experiences related to this type of learning is given due attention around the world. E-learning can benefit self-regulation through the use of self-directed e-learning. Therefore the problem of this study is how to provide evidence on the effect of e-learning approach on students' academic performance in biology concept. Therefore, the problem of this study is how to provide evidence on the effectiveness or otherwise of the use of E-Learning Approach on students' performance in Biological concepts.

Objectives of the Study

This study aimed at ascertaining the effect of E-Learning strategy on academic performance in Biology among Secondary School Students in Lere Local Government Area. The objectives of this study therefore are to:

1. Examine the effect of E-learning approach on the academic performance of students taught Biology concepts

2. Investigate the effect of E-learning strategy on the academic performance between male and female students taught Biology concept.

Research Questions

The study seeks to answer the following research questions:-

1. What is the difference in the mean academic performance scores of students taught biology concept using E-learning approach and those taught using lecture method?
2. What is the difference in the mean academic performance scores between male and female students taught Biology using E-learning strategy only?

Research Hypotheses

The following null hypotheses were tested in the course of this study at $p \leq 0.05$ levels of significance.

HO₁: There is no significant difference on the mean academic performance scores of students taught Biology concept using E-learning approach and those taught with lecture method.

HO₂. There is no significant difference on the mean academic performance scores of male and female students taught Biology using E-learning approach.

Methodology

This study adopted quasi-experimental design involving pretest and posttest. .Intact classes were used. The population of the study compressed of all SSII students. Two Pubic senior secondary schools in Lere local government area, Kaduna state, Nigeria. The sample for the experimental group was (80) students of which (30) are male and (50) are females. A simple random sampling technique was used to select the sample for the study. Two school were sampled. The experimental group (80) students and control group (84) students. Experimental group was exposed to E-learning strategy while Control group was exposed to lecture method. The instrument used in the study was Biology Performance Test (BPT) which was both face and content validated. The validation was done by two chief lecturers from science Education Department ABU Zaria, Kaduna State. The reliability coefficient was (0.76) using PPMC, this was considered reliable enough to be used for the data collection. Their regular biology teacher from the two schools were used as research assistant in the teaching (treatment) process of the students. These research assistants were briefed before commencement of the study on how to use the treatment package (E-learning). Lesson plan was prepared for the study on the topic selected (Ecology) for the period of six weeks, one hour per period. Before the treatment a pretest was administered to both experimental group and control group to establish background knowledge. After which the same instrument were re-administered to students as a post-test, to test their academic performance.

Results

The results of the study were presented according to the research questions and hypotheses.

Research Question 1: What is the difference in the mean academic performance scores of students taught Biology concept using E-learning approach and those taught using lecture method?

The academic performance scores of students taught biology using E-learning approach and those taught the same concepts using lecture method was analyzed descriptively using mean and the mean difference as presented in Table 1.

Table 1: Mean and Standard Deviation of academic Performance Scores for students in the Experimental and Control Group

Variable	Grouping	N	Mean	Std. Dev.	Mean Difference
Academic Performance	Experimental	80	15.75	1.32	2.51
	Control	84	13.24	2.60	

Results from Table 1 shows that the computed academic performance mean scores of the students in the experimental and control group are 15.57 and 13.24 respectively with a mean difference of 2.51 in favor of students in the experimental group. This means that the students taught using E-learning approach performed better than their counterparts who were taught same concept using the lecture method. In order to test if the difference is significant, hypothesis one was tested using independent samples t-test statistic.

Research Question 2: What is the effect of E-learning approach on male and female SS II biology students' academic performance scores?

In order to test for the effectiveness of E-learning approach among male and female SS II biology students' academic performance scores. The posttest scores of students in the experimental group were analyzed descriptively using mean and the mean difference as presented in Table 2.

Table 2: Mean Performance Posttest Scores of Male and Female Students Exposed to E-learning approach

Variable	Grouping	N	Mean	SD	Mean Difference
E-Learning Approach	Male	30	12.47	2.29	1.23
	Female	50	13.70	2.68	

Results from Table 2 shows that the computed performance mean scores of the male and female students are 12.47 and 13.70 respectively with a mean difference of 1.23 in favor of female students. This means that the female students performed better than their male counterparts. In order to test if the difference is significant, hypothesis three was tested using independent samples t-test statistic.

**Null Hypotheses Testing**

Null Hypothesis 1: There is no significant difference in the mean academic performance scores of students taught biology concept using E-learning approach and those taught using lecture method.

Table 3: t-test Analysis for Difference in Academic Performance Scores of students in the Experimental and Control Groups

Variable	Groups	N	Mean	SD	Df	t-cal	p-value	Remark
Academic Performance	Experimental	80	15.75	1.32	162	7.87	0.00	Sig.
	Control	84	13.24	2.59				

t-crit. = 2.00, Significant $p < 0.05$

Results of the independent samples t-test statistic in Table 3 revealed that the difference in performance scores between the experimental group ($N = 80$, $M = 15.75$, $SD = 1.32$) and the control group ($N = 84$, $M = 13.24$, $SD = 2.59$) were statistically significant. The calculated t-value is 7.87 and p-value is 0.00. The p-value of 0.00 is less than alpha value of 0.05. Based on this evidence, the null hypothesis which states that there is no significant difference in the mean academic performance scores of students taught biology concept using E-learning approach and those taught using lecture method is therefore, rejected. This implies that a differences exist between the performance of students in the experimental and control group. This is an indication that the difference in performance is as a result of the treatment (teaching with E-learning approach) as students in the experimental group performed better than those in the control group who were taught using the lecture method.

Null Hypothesis 2: There is no significant difference between the academic performance scores of male and female SS II biology students taught biology concept using E-learning approach

Table 4: t-test Analysis for Difference in Academic Performance of Male and Female SS II Biology students

Variable	Groups	N	Mean	SD	Df	t-cal	p-value	Remark
Academic Performance	Male	30	12.47	2.29	78	2.10	0.04	Sig.
	Female	50	13.70	2.68				

t-crit.(df=78) = 2.00, Significant $p \leq 0.05$

Results of the independent samples t-test statistic in Table 4 revealed that the difference in academic performance between the male ($N = 30$, $M = 12.47$, $SD = 2.29$) and the Females ($N = 50$, $M = 13.70$, $SD = 2.68$) were statistically significant. The calculated t-value is 2.10

and p-value is 0.04. The p-value of 0.04 is less than alpha value of 0.05. Based on this evidence, the null hypothesis which states that there is no significant difference between the academic performance scores of male and female SS II biology students, is therefore rejected. This implies that there is a difference in the performance of male and female SS II biology students which in turn implies that teaching using E-learning approach is not gender friendly as it favours the female more than the males.

Discussion of Findings

The result presented in the Table 4.1 showed that there is significant difference in the academic performance of students taught using E-Learning approach and those taught using lecture method. The finding of this study is in line with the findings of Zare, Sarikhani and Mansouri (2016) and that of Umar, Muawuiya and Yahuza, (2019) that formerly stated that e-learning has a positive effect on the academic performance of students because the approach is student centered. The result also indicates that E-Learning approach is not gender friendly, since there is significant difference between male and female students exposed to E-Learning approach in favour of female students. The finding of this study is in line with the findings of Bichi (2009) who opined that girls performed better than boys in problem solving types of activities.

Conclusions

Students learn biology concepts better when taught using E learning SS II level. The E-Learning approach has positive effect on the academic performance of SS II Students when taught biology concept than using lecture method. This may be due to the activities involved. E-learning encourages Learners to communicate with teachers and classmates both individually and as a group discussion with the use of message boards, instant message exchanges and video conferencing. According to the findings of this study female students taught biology concept using E-learning approach perform better than their male counterpart indicating that the instructional strategy is not gender friendly at SS II level. In conclusion on the findings of this study, using E-Learning approach in biology concept has the ability of enhancing academic performance of SSII students positively.

Recommendations

Based on the findings of the study, the researcher therefore recommends that:

1. Teachers should be exposed to the use of E-Learning approach in teaching and learning by training and re-training.
2. Teacher of Biology should be sponsored by the state ministry of education to attend seminars, conferences and workshops on ICT programmes so as to keep them abreast of the innovation in teaching and learning which will also help in boosting the quality of education in the country.

References

Abdulmalek, A. (2013). E-Learning in Yemen Reality and Ambition Retrieved February 2, 2019 from <http://www.alomborah.net/article.php>.



- Abimbale, A. (2002). Perspective of Technology Integration and Effectiveness of Computer Assisted Instruction in Primary Mathematics Classroom. *Unique Research Chronicle* 4(2), 88-109.
- Al-Ammari, j. And Hamad, S. (2009), “Factors Influencing The Adoption Of E-Learning At UOB”, University Of Bahrain
- Ala-Mutka, K., Punie, Y. & Redecker, C. (2008). ICT for Learning, Innovation and Creativity. European Commission (Institute for Prospective Technological Studies), Available at: <http://ftp.jrc.es/EURdoc/JRC48707.TN.pdf>
- Bichi, S.S (2009). Resources For Science, Technology and Mathematics in Nigeria In 21st Century. *Journal of Educational Research* 3 (1)163-173.
- Ejilibe, O.C (2012) Entrepreneurship in Biology Education as a Means for Employment. *Knowledge Review* 26,3.
- Hoffmann, L. (2002). Promoting Girls Interest and Achievement in Physics Classes for Beginners. *Learning and Instruction*, 12, 447-465.
- Holley, D. (2002). Which room is the Virtual Seminar in Please? *Education and Training*, 44(3), 112-121
- Hosseini, T., Seyed-Saeed, Sh., Nasram, Esmailpour, M. & Ashoori, J. (2015). A comparative study of Web-Based Education and Cognitive and Meta Cognitive Strategies on Educational Progress and Self-Efficacy of Nursing Students of Islamic Azad University, Pishva, *Media Elec. Learning Magazine*, 6 (2), 17-27.
- Ince Aka, E., Güven, E. & Aydoğdu, M. (2010). Effect Of Problem Solving Method On Science Process Skills And Academic Achievement. *Journal of Turkish Science Education*, 7(4), 13–25.
- Kareem, A.A (2015) Effects Of Computer Assisted Instruction On Students’ Academic Achievement And Attitude In Biology In Osun State, Nigeria. *Journal Of Emerging Trends In Educational Research And Policy Studies (JETERAPS)* 6(1):69-73
- Karthigeyan, K. & Nirmala, K. (2012). Academic Achievement in English: An Analysis through Gender Lens, *MIER Journal of Educational Studies, Trends & Practices*, 2, (2)144-157.
- Keshavarz, M., Rahimi, M. & Esmaili, Z. (2013). The Effect of E-Learning on Educational Progress of Students' Medical Science of Isfahan University. *Torbat Heydarieh Uni. of Medical Science periodical*, 1(2), 13-22
- Ogonnaya, U.P. (2011). Fostering the Understanding of Biological Science Concepts at the Senior Secondary School level using Collateral learning strategy. *Journal of Science Teachers Association of Nigeria*. 52nd No 242-248.
- Olaniyi, S. S. (2002). E-Learning Technology: The Nigeria Experience. A paper presented at the Shape the Change Congress Munich Germany, The International Bureau of Education of UNESCO. <https://www.unesco.org.links.htm>.



- Sambrook, S. (2003), "E-learning in Small Organizations." *Education + Training*, Vol.45,
- Şaşan, H.H. (2002). Constructivist Learning. *Journal of Lifelong Education*, 74(75), 49–52.
- Schank, R.C., (2002), "Designing World Class E-Learning", 1st ed., McGraw Hill, USA
- Seyhan, H.G. (2015). The Effects Of Problem Solving Applications On The Development Of Science Process Skills, Logical Thinking Skills And Perception On Problem Solving Ability In The Science Laboratory. *Asia-Pacific Forum on Science Learning and Teaching*, 16(2), 8-27.
- Umar, Muawuiya and Yahuza(2019) Effect Of E-Learning Teaching Approach On Academic Performance In Geometrical Concepts Among Senior Secondary School Students In Zaria LGA Of Kaduna State, Being A Paper Presented At The School Of Science Conference Held At Federal College of ducation Zaria
- Usman, I.A. (2008). Using a Selected Method of Teaching in Enhancing Slow Learner's Academic performance Among Junior Secondary School Integrated Science Students.
- WAEC, (2017). WAEC Result Statistics and Chief Examiner Reports retrieved from Google Search 28th July, 2016.
- Wekesa, D.W., Wekesa E.W. & Amadalo, M.M. (2013). A Computer Mediated Simulation Module for Teaching Cell Division in Secondary School Biology. *International Journal of Educational Research and Development*. 2(5), 114-130.
- Wekesa, E.W. (2003). "Effects of a Computer-Based Instruction Module on Student's Achievement, Perception of the Classroom Environment and Attitude Towards School Biology in Nakuru District, Kenya, "Unpublished Master Thesis, Egerton University, Njoro, Kenya.
- World Bank (2002). *World Science Report on Information and Communication Technology*. Washington D.C.
- Yusuf, M.D and Afolabi , A.O(2010). Effects of Computer Assisted Instruction on Secondary School Students' Performance In Biology TOJET: The Turkish Online Journal Of Educational Technology, 9(1).
- Zare, M., Sarikhani, R., Salari, M., & Mansouri, (2016) The Impact Of E-Learning On University Students' Academic Achievement And Creativity. *Journal of Technical Education and Training*.8(1).
- Zare.M., Sarikhani, R., Sarikhani, E. & Babazadeh, M. (2015). The Effects of Multimedia Education on learning and Retention in a Physiology Course. *Media Electronic Learning Magazine*, 6(1), 32-38.