BLENDED LEARNING APPROACH IN TEACHING ECOLOGY CONCEPTS AMONG NCE BIOLOGY STUDENTS IN KADUNA STATE

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Abstract
The study investigated the of NCE Biology in Kaduna-State Nigeria. Two hypotheses were formulated and tested at 0.05 level of significance. The study adopted pretest posttest quasi experimental and control group design. The population for the study consisted a total of 1357 NCE Year one students admitted in the academic session of 2020/2021 from the two colleges of education in the state. Simple random sampling technique was used to select a of 185. It consists of 185 students in both. The subjects were divided into experimental and control groups. The experimental group was taught using blended learning approach (physical and radio lesson) while the control group was taught ecology concept using physical only. Two instruments were used in the study for data collection: Ecology Achievement Test (EAT) and Instructional Package in radio broadcast. The instruments were developed by the researcher. The reliability of EAT was done using test retest and Pearson product moment correlation to determine the co-efficient value of 0.75. Pretest was administered after which treatment was done for six weeks, then groups were administered Posttest. Data were analyzed using mean, standard deviation and t-test. The blended learning approach was found to significantly improve students' achievement. It was recommended that the management of Colleges of Education should encourage the use of blended learning approach for NCE Biology students.
Keywords: *Blended Learning, Teaching, Radio lesson, Ecology Concepts, Biology Students.*

Introduction

Education was one of the first casualties of the 2014-2016 Ebola outbreak in West Africa, which hit Sierra Leone, Liberia and Guinea the hardest (World

Bank, 2015). In Nigeria COVID-19 pandemic presents unique challenges in the educational system (Obiakor & Adeniran, 2020), where the country made her unprecedented decision to close schools and universities to curtail the spread of the deadly virus, while social distancing was ensured as a more effective preventive strategy for COVID-19 (Nlebem, 2020). In response to this education emergency, the federal and state governments, as well as the private sector are implementing various learning interventions using technological platforms, internet-based tools and traditional media to mitigate the impact of the closure of schools. Some schools shifted from in-person to distance education to facilitate students' education while for many, web video conferencing (WVC) technologies and online education were new and challenging**.** Now that schools throughout the country have re-opened for educational activity, there is need to devise ways to improving quality teaching and learning in this pandemic era especially in quality teaching and learning of Biology.

The teaching and learning environment are embracing a number of innovations and some of the innovative pedagogical approach has been embraced rapidly though. It is given through Blended Learning. Blended learning can be defined as the use of traditional classroom teaching methods together with the use of online learning for the same students studying the same content in the same course. Improvement of learning potentials of students is led by the fusion of face-to-face lecture with technology (Megahed and Ghomeim, 2022).

Recently, research literature has indicated that blended approaches to learning might provide an optional environment for enhancing student engagement and success. The idea of blending different learning experiences has been in existence since human started thinking about teaching. The on-going infused web-based technologies into the learning and teaching process has highlighted the potential of blended learning. The productivity and efficiency have created opportunities for online collaboration tools in all aspects of business and education. However, it enables students to complete projects, activities or tasks easier and faster with their peers, teachers and content (Bralic & Divjak, 2018). In view of this, schools and colleges are tackling choices about how to continue teaching and learning while keeping their staff and learners safe. Numerous institutions have chosen to drop all in-person classes, including laboratories and other learning meetings, and have ordered that staff move their courses online for better implementation of the curriculum. It is in view

of this that this paper proffered the blended learning approach in teaching ecology concepts among NCE biology students to carter for this setback.

Blended learning is a scenario where in-person education is mixed with online opportunities, and the online materials are presented with the traditional classroom atmosphere Ikwuka and Adigwe, (2021). It is not seen as surpassing the traditional teaching methods. In other words, the physical presence of the teacher and the student is necessary. The concept of blended learning has been around for a long time, but its terminology was not firmly established until around the beginning of the 21st century. Many countries today in 21st Century are seeking to develop their education systems through the use of these technologies and methods of modern learning (such as blended learning in the field of education) in order to keep pace with technological developments and to achieve satisfactory results, as education is considered a real investment for any country and its people. Blended learning allows learners to visualize, listen, feel, and interact with the learning material. It moves them from theory into practice. They can gain deeper understanding for all the abstractions they get through. They can learn according to their pace, which creates the opportunity for more individualized education. Good achievers can expand their learning and learn things that are not within the school syllabus.

Biology is a natural science that deals with the living world: How the world is structured, how it functions and what these functions are, how it develops, how living things came into existence, and how they react to one another and with their environment including its vast natural resources (Jacob, 2022). The ability of computers to present information visually is especially important for the biology course especially in tertiary institution among NCE students. Well-developed pictures, three-dimensional models, animations and interactive environments allow easy understanding of the learning objectives. The programme had a substantial impact on large number of urban and rural students studying in tertiary institutions. It can be used effectively to meet the expanding educational need in developing countries without a loss in quality of education. Christman and Badgett (2018) has done a lot to the society, by informing and educating the populace on what they need to know and understand. The broadcast radio helps education through educational broadcasting.

In the 1930s, radio became a popular education technology when the UK Open University first made use of it. The Open University showed that radio had a

greater value for weak students who benefit from radio as a supplementary teaching and learning tool Mitsiola, Spiliopoulos, Kotsaki, Nicolaou and Podara (2019). The choice of technology tools in education had seen a widening of options, yet radio remains a popular medium in the tertiary education system. In the post-independence Nigerian government understood that education was the key to a better future for Nigerians, so they strategically used the mass media (radio) in educating its citizen. These systems of instructional design use many types of teaching and learning experiences and vary in design and implementation across teachers, programmes and schools. Blended Learning effectiveness has quite number of underlying factors that pose challenges. One of the greatest challenges is about how users can successfully use the technology and ensuring participants' commitments given the individual learning characteristics and encounters with technology Tejedor Cervi, Perez-Escoda, Tusa, Parola (2021).

Several studies have shown that blended learning has been used as a tool to reach large audiences. Fazal and Bryant (2019) revealed the effect of blended learning on the achievements of students in middle school. The study sample consisted of 56 teachers who used blended learning in teaching mathematics. The results indicated that blended learning had no significance difference between the groups in terms of academic achievement, the students in the blended group are more successful in transferring their knowledge to their projects than the ones in the face-to-face group. Senturk (2021) investigated the effect of the blended learning and face-to-face learning on students' academic achievements and transfer of learning. The participants were undergraduate pre-service teachers; who were assigned randomly to the experimental and control groups. While the experimental group had both online and classroom sessions, the control group had only face-to-face classroom sessions. Although there was no significance difference between the groups in terms of academic achievement, the students in the blended group were more successful in transferring their knowledge to their projects than the ones in the face-to-face group. The results showed that the blended learning approach had a positive effect on the transfer of learning.

In this study a modification of the online known as radio lesson broadcast was used. There are also blended programmes, in which students study some courses in face-to-face classrooms and other courses were delivered fully through the radio. However, in an effective blended learning experience, the content and activities of both in-person and online learning are integrated with one another and work toward the same learning outcomes with the same

content. The various learning experiences were synthesized, complemented each other and were planned or orchestrated to run in parallel. The importance of using the Internet and computers is gradually increasing in as a course in Colleges of Education (Samaila, 2015). Therefore, the current study examined the effect of blended learning approach in teaching ecology concepts to NCE Students in Kaduna.

The quest for quality education during the post covid 19 pandemic and wider access to education in so many countries led to the adoption of different programs and strategies. The improvements in Information and Communication Technology (ICT) over the years have often been exploited and this has made blended learning approach (radio and physical contact) an educational medium equivalent to a formal school. Most media houses seem not to also produce educative programmes modeled after the classroom curriculum. Hence, the people seem not to see express education in most of these media programmes so, these invites making good use of the technology in preparing students, teachers, curriculum development and the diversity of teaching methods, in an attempt to develop the educational process and to provide better learning in colleges of education especially in some difficult concepts such as Evolution, Botany, Ecology etc. However, in view of this the researcher intends to examined the effect of blended learning approach in teaching ecology concepts among NCE Students in Kaduna state

The objectives guiding the research are to:

1. determine the effect of Blended learning approach (physical and radio) on achievement of students taught Ecology concepts.
2. ascertain the gender difference among students taught ecology concepts with blended learning approach.

The following research questions were formulated for the study:

1. What is the difference in the mean achievement scores of students taught ecology concepts with blended learning approach (physical and radio) and those taught with physical contact only?
2. Is there any gender difference in mean achievement scores of male and female students taught ecology concept with blended learning approach (physical and radio)?

Based on the above research questions the following null hypotheses was formulated to guide the study:

HO1: There is no significant difference between mean achievement scores of students taught ecology concepts with blended learning approach and those taught with physical contact only.

HO2: There is no significant gender difference in mean achievement scores of male and female students taught ecology concepts with blended learning approach

Method

The study adopted the pretest posttest quasi-experimental control group design. Two groups were involved, the experimental and the control. The population of the study consisted of all NCE year 1students admitted between the session 2020/2021 in the two colleges of education in Kaduna state. A total of 1357 students made up the population for the study and were from the two colleges of education (COE) the FCE Zaria and COE. Simple random sampling technique was used to select 185 participants out of which 55 were females and 40 were males. FCE Zaria was randomly assigned as the experimental group while COE was used as the control group,95 students took part in the radio mode delivery while the control are 90 students were used for the lecture method.

Two (2) instruments were used for data collection recorded sound and test items (i) Ecology Achievement Test (EAT) made up of a 50 item multiple choice questions The topics covered by the instrument are: definition of ecological terms, adaptation of animals in different habitats and adaptation of plant in different habitats. Soil, types of soils and their characteristics. Each item scored one mark. The EAT was validated by two lecturers from College of Education and two science education experts from education, Ahmadu Bello University Zaria. The blended learning approach radio lessons were also validated by the Head of Media in FCEZ 93.7 FM. Reliability of EAT was done using test retest and Pearson Product Moment Correlation to determine the co-efficient value of 0.75.

Pre-test was administered to both groups before the treatment. This is to determine the equivalent on their academic ability and performance. Experimental group received treatment which was blended learning while control group was taught using lecture method using the same instrument. In

other to ensure that the instructional package was well designed. Learning approach was a 30-minute radio lesson broadcast on Tuesdays and repeated on Thursdays every week between 9.45am and 10.15 am. Blended learning approach was broadcast on FCE 93.7 FM Radio in Zaria and acknowledged to have clear reception of its signals. However, audio CDs were provided for the sampled six radio lessons with CD players as back up incase radio signals were not clear during the lessons. Facilitators were trained to master the operation of the CD player, insertion of CDs, batteries and the tuning of the radio in readiness for the programme. Other materials such as Radio School Teacher's Manual, flip charts, flash cards and relevant instructional materials were provided. Nonetheless, a pre-testing exercises during which the test items was administered to the respondents in order to get baseline data on the students' achievement before the introduction to blended learning approach. During radio lessons, two facilitators were expected to manage the class for effective participation of the students. One of the facilitators led during the lesson while the second assisted in the control of the class.

The broadcast of first episode of blended learning commenced on the first Tuesday of the first semester with a repeat on the following Thursday. The sampled episodes lasted for six weeks after which the post test was administered simultaneously to both the experimental and the control group. The control group was not exposed to the radio programmes. Results obtained from two groups were analysed using mean, standard deviation and t-test statistics

Results

Table 1: Mean and Standard Deviation for Post-Test Scores of Experimental and Control Group taught using Physical Contact and Blended Learning

Group	N	Mean	Std. Dev.	Mean diff.
Experimental Group	95	4.19	4.74	
				0.3
Control Group	90	3.89	3.28	

Table 1. shows that the difference in the mean performance scores of students taught ecology concepts with blended learning approach (radio and physical) and the control group using Physical contact only. The Experimental group

had mean score of 4.19 while control group had mean score of 3.89. The mean difference between the two groups was 0.3. This implies that, the experimental group performed slightly better than control group.

Table 2: Mean and Standard Deviation for Post-Test Scores of Male and Female Students in Experimental Group only

Gender	N	Mean	Std. Dev.	Mean diff.
Male	40	3.33	3.38	
				1.15
Female	55	4.48	4. 61	

Table 2. that the difference in mean achievement scores between experimental (male) and experimental (female) students taught using blended learning approach (radio and physical) . Therefore, experimental (male) obtained the mean score of 3.33 and standard deviation of 3.38 while the experimental (female) group obtained a mean score of 4.48 and a standard deviation of 4.61. This shows that mean difference between the mean difference is 1.15. This implies that female slightly achieved higher than the male counterpart.

Table 3: Summary of the t-test Analysis of Post-test Score of Students in the Experimental and Control Groups

Group	N	Mean	Std. Dev.	Mean diff.	Df	t-cal	P value	Remark
Experimental Group (blended learning approach)	95	3.33	3.38					
				1.15	184	10.17	0.00	Significant
Control Group (physical only)	90	4.48	4.61					

***Significant at p < 0 .05.**

Table 3 shows that analysis of significant difference between mean performance scores of students taught ecology concepts with blended learning approach (3.33) and those taught with physical contact only (4.48) performed better. The t-test analysis employed to test the hypotheses one, Table 3, p value obtained (0.00) is less than 0.05. This shows that there was significant difference between mean performance scores of subjects. The null hypothesis

of no significant difference was thus rejected. This means that there was significant difference in the academic achievement of the experimental group taught using blended learning approach compared to the control group taught using lecture method. The result showed that the blended learning approach was better at improving students' achievement in ecology concepts than the lecture method.

Table 4. Summary of t-test Analysis of Post-Test Scores of Male and Female students in Experimental Group Only

Gender	N	Mean	Std. Dev	Mean diff.	df	t-cal	P value	Remark
Male	40	4.19	4.74					
				0.30	93	0.07	0.47	Not Significant
Female	55	3.89	3.28					

From Table 4, t calculated = -0.07, df =184 and p = 0. 4717.since P> 0.05. It means that there was no significant difference between the two groups. Therefore, the null hypothesis which states that there is no significant difference in the mean performance scores of the male and the female students taught ecology concepts with blended learning approach is not rejected. This implies that the difference in the mean achievement scores of male and female students in blended learning approach was not statistically significant at 0.05 alpha level.

Discussion

The aim of this study was to determine the effects of the blended learning approach blended learning approach in teaching ecology concepts among NCE biology students in Kaduna state. The results of the study in Table 1, showed that the blended learning implemented in the experimental group (physical/radio) for six weeks had more positive effect on the student's ecology achievement test compared to the physical contact only implemented in the control group. There are several studies that have reported parallel results regarding the effect of blended learning on academic achievement. Studies have reported that the post-test scores of the experimental group students who were taught using blended learning process were higher than the scores of those taught with the physical lesson only (Senturk,2021). In this

study, a significant difference was found in favour of the experimental group over the physical lesson which was used for the control group. It can be stated that blended learning approach (physical/radio lesson) was more effective than the physical lesson. These findings support earlier reports by Fazal and Bryant (2019), Tejedor, Cervi, Perez-Escoda, Tusa, Parola (2021) and Senturk (2021) to them, when students are exposed to blended learning approach in teaching and learning processes it has the potentials to enhance their performance positively.

The findings in Table 2, showed that the blended learning approach between the experimental group of males and females indicated gender difference in learning ecology concept. The result showed that female achieved higher than male academic performance has to do with mental and intellectual ability and not gender. This result agrees with that of Christman and Badgett (2018) and Mitsiola, Spiliopoulos, Kotsaki, Nicolaou and Podara (2019) which revealed that in modern science curriculum which is gender friendly.

Conclusion

The results of the study have led to the conclusion that there was a significant difference in the mean achievement scores of experimental group taught ecology concepts using blended learning approach and the control group taught with physical contact only There is need for blended learning approach to be used in teaching which can also be used to supplement, clarify, vitalize, emphasize, instruct, and enhance learning in the process of transmitting knowledge, ideas, skills, and attitude. The ability of the lecturers' to make use of instructional radio improves students' academic achievement.

Recommendations

Based on these findings, it is recommended that:

1. Colleges of Education management should encourage the use of blended learning approach among NCE biology teachers for teaching ecology concepts and similar difficult concepts.
2. Biology students should endeavor to learn using the blended learning approach.
3. Curriculum designers should adopt Blended-learning approach to enhance student engagement and learning.

4. Instructors in the field of biology should optimize efforts towards full understanding of the blended learning approach for effective utilization as positive impact on learners' achievement has become glaring.

5. Other fields in science, apart from biology should also explore blended learning approach for effective content delivery and excellent learning outcomes.

References

Bralić, A., & Divjak, B. (2018). Integrating MOOCs in traditionally taught courses: achieving learning outcomes with blended learning. *International Journal of Educational Technology in Higher Education*, *15*, 1-16.

Christman, F. & Badgett, C. (2018). Online discussions, retention, gender and student achievement. *The School Community Journal, 10(2) 20 - 27*.

Fazal, M., & Bryant, M. (2019). Blended learning in middle school math: The question of effectiveness. *Journal of Online Learning Research*, *5*(1), 49-64.

Ikwuka, O.I.&Adigwe, J.E. (2021). Comparative Effects of PowerPoint and Video Instructional Packages on CRS Students' academic Achievement. *Higher Education of Social Science,20(1),46-52.*

Jacob, F. (2022). *The logic of life: A history of heredity* (Vol. 62). Princeton University Press.

Mitsiola, M., Spiliopoulos, P., Kotsakis, R., Nicolaou, C., & Podara, A. (2019). Technology-enhanced learning in audiovisual education: The case of radio journalism course design. *Education sciences*, *9*(1), 62.

Nlebem, A. (2020). FG orders closure of all schools in Nigeria as Coronavirus spreads. *Business Day. https://businessday.ng/coronavirus/article/fg-orders-closure-of-all-schools-in-nigeria*

Obiakor, T., & Adeniran, A. (2020). COVID-19: Risk-Control Measures Threaten to Deepen Of history definition and theories. In: Sisman-Ugur S, Eskisehir KG, editor. *Handbook of research on learning in the age transhumanism*. IGI Global:Turkey,p.252-73.

Samaila, R. (2015). School closure and management practices during coronavirus outbreaks including COVID-19: A rapid systematic review. The Lancet. *Child & Adolescent Health,* 4, 397–404.

Şentürk, C. (2021). Effects of the blended learning model on preservice teachers' academic achievements and twenty-first century skills. *Education and Information Technologies*, *26*(1), 35-48.

Suleiman, I. (2016). Effects of Blended Learning on Performance and Retention of Senior Secondary School Students in English Language in Kaduna State. Being research submitted to English Department, Ahmadu Bello University, Zaria.

Tejedor, S., Cervi, L., Pérez-Escoda, A., Tusa, F., & Parola, A. (2021). Higher education response in the time of coronavirus: perceptions of teachers and students, and open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(1), 43.

World Bank. (2020). How countries are using edtech (including online learning, radio, television, texting) to support access to remote learning during the COVID-19 pandemic. *https:// www.worldbank.org/en/ topic/edutech/brief/how-countries-are-using-edtech-to-support remotelearning-during-the-covid-19-pandemic.*