JOURNAL OF INNOVATIONS IN SCIENCE EDUCATION (JISE)
Editor in-Chief
PROF. JOSEPHINE N. OKOLI

JOURNAL OF INNOVATIONS IN SCIENCE EDUCATION (JISE)

A PUBLICATION OF ASSOCIATION OF SCINCE EDUCATORS ANAMBRA STATE (ASEA)

Vol. 1
ISSN ONLINE:

Editor in-Chief
PROF. JOSEPHINE N. OKOLI

JOURNAL OF INNOVATIONS IN SCIENCE EDUCATION (JISE)
Vol. 1(1); 2025

A PUBLICATION OF ASSOCIATION OF SCIENCE EDUCATORS ANAMBRA (ASEA)

JOURNAL OF *INNOVATIONS IN SCIENCE EDUCATION (JISE)*
Vol. 1 (1); 2025

JOURNAL OF INNOVATIONS IN SCIENCE EDUCATION (JISE)
Vol. 1(1); 2025

Print ISSN: 3092-9180
Online ISSN:

Published in July, 2025.

Printed in Nigeria in the year 2025 by:
Love Isaac Consultancy Services
No 1 Etolue Street, Ifite Awka, Anambra State, Nigeria
+234-803-549-6787, +234-803-757-7391

JOURNAL OF INNOVATIONS IN SCIENCE EDUCATION (JISE)
Vol. 1(1); 2025

EDITORIAL BOARD

JOURNAL OF INNOVATIONS IN SCIENCE EDUCATION (JISE)
Vol. 1(1); 2025

EDITORIAL

Journal of Innovations in Science Education (JISE) is a Publication of Association of Science Educators Anambra (ASEA). It is publishable both online and offline. The publication is twice a year. It embraces only on science education and innovative ideas. JIES provide an avenue for dissemination of research findings, innovative ideas and practices between researchers, science educators and policy makers in the form of original research, book review, theoretical and conceptual papers which will serve as an important reference for the advancement of teaching, learning and research in the field of science education.

We are grateful to the contributors and hope that our readers will enjoy reading these contributions.

Prof. Josephine N. Okoli
Editor-in-Chief

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EFFECT OF BLENDED LEARNING IN POST COVID 19 ERA ON THE ACADEMIC ACHIEVEMENT OF BIOLOGY STUDENTS IN SECONDARY SCHOOLS IN RIVERS STATE.

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Abstract

This study was carried out to find the effect of Blended learning in post Covid 19 era on the academic achievement of Biology Secondary School Students in Ikwerre Local Government Area of Rivers State, Nigeria. The purpose of the study was to see how we can augment normal classroom lessons with some internet or online based learning environment to achieve the same goals. Three (3) research questions and one (1) hypotheses were raised, answered and tested at 0.05 level of significance using ANCOVA. A quasi-experimental design was carried out using pre-test post-test control groups to compare students' achievement. Population of the study comprised all SS2 students. A sample size of 170 students from two selected schools using purposive sampling technique. Among the two schools selected, one was used as the control group and the other the experimental group. The instruments Biology Performance Test (BFT) was validated. A reliability coefficient of r=0.95 was calculated using Pearson's Product Moment Correlation Formula for the BFT, Mean and standard deviation were used in answering the research questions while ANCOVA was used to test the hypotheses. The result shows that there is an increase in the achievement of students who were engaged in Blended learning, and that it helped students to have unlimited access to different educational contents, thereby enhancing their digital literacy, promote critical thinking and encourages constructivist learning. It was recommended that educators should blend their teaching of curriculum contents, using digital tools such as YouTube.

Keywords: Blended Learning, Post Covid-19 Era, Academic Achievement

Introduction

The educational system throughout the world is fast changing in response to socio-economic and technological demands. One of such changes is in the area of teaching methodology which until now has been teacher – centered. Teaching and learning processes have gone through series of changes over the years and have now been enriched with new methods and techniques which differ from the traditional chalk board approach to blended learning environment (Onasanya, Fakomogbon & Shehu, 2010) The essence of these changes is to improve students' performance; one of the major changes is in the application of computer in teaching. In today's online era, the concept of a classroom extends beyond a walled room with desks and chairs and into the realm of cyber space. Computer screens are replacing the blackboard and keypads are replacing chalk. To provide learners with the best experience, many educators are opting for a blended learning approach. (www.nap.edu, 2018)

In December 2019, the world health organization (WHO) was informed of a strange viral disease related to pneumonia in the city of Wuhan, in China. A strain of Corona Virus (SARS-COV 2) was identified by the medical authority in China and was named COVID 19. In January 2020, it was declared as Public Health Emergency of International Concern (PHEIC) by the WHO. Due to the increase in recorded cases of Covid 19 in other Countries, the WHO declared the virus a pandemic on the 11th of March, 2020. The COVID 19 pandemic created the greatest negative impact on all levels of educational systems in human history. The pandemic brought about drastic changes in many areas of human endeavours, including educational policies. Due to this development, total lockdown was declared for all the public places including schools and this created a great setback for learning activities. As a result of the global pandemic and the need to deliver learning remotely, many schools were forced to device other means of educating students especially those in Examination classes. One of the learning strategy adopted was the use of Blended Learning.

Blended learning, the teaching practice that combines teaching methods from both face-to-face and online learning, is an established, rapidly growing instructional model that is proving highly effective in helping schools address the challenges of student achievement, limited resources, and the expectations of 21st century learners. As more and more schools use this model, many different meanings have evolved. (OECD, 2020)

The concept of Blended Learning is not new, as the term was coined in the 1990s. As Ema rightfully points out, all learning can actually be called 'blended' as there is normally more than one medium involved in the learning process. She defines blended learning as 'the use of two or more styles of content or context delivery or discovery. Although blended learning is therefore an integrated part of the learning process, while technology is constantly expanding the possibilities of the use of blended learning, limiting views on the concept of blended learning hampering its expansion in higher education. (Ema,2018)

Blended learning is not a new approach but through the past four years of the global pandemic and the need to deliver learning remotely; blended learning has become a focus for future educational approaches. Blended learning combines in-class education with online learning sessions and can help strengthen 21st century skills (creativity, collaboration, critical thinking, and communication) (Pam, 2022)

Blended learning is implemented in a variety of ways, ranging from models in which curriculum is fully online with face-to-face interaction to models in which face-to-face classroom instruction is integrated with online components that extend learning beyond the classroom or school day. The rapid growth of blended learning has been a catalyst for additional instructional transformation, in this post COVID 19 era including:

- Evolving pedagogy in which teachers' roles include facilitation, student mentoring and differentiating instruction for individual learners,
- Increased flexibility and personalization of students' learning experiences, and
- Strategic uses of technology as districts tap the capabilities of the learning management systems to support a wider range of instructional programs.

Educators support online learning because of its unique abilities to provide students with enriched learning experiences, to extend learning beyond the school day, and to support more successful differentiated learning strategies that personalize students' educational experiences. Additionally, as educators gain more experience with the approaches to and benefits of blended learning, they have discovered that this instructional model helps them increase capacity without commensurate increases in budget or staff.

Blended learning is one option for altering and expanding that means to the needs of a 21st-century technology-based, network society. (Ema ,2018).

The major goal of Science Education is to develop scientifically literate individuals that are concerned with high competence for rational thoughts and actions. Science education objectives includes the following: the need to prepare students to observe and explore the environment, explain simple natural phenomena, develop scientific attitudes including curiosity, critical thinking and objectivity, apply the skills and knowledge gained through science to solve everyday problems in the environment, develop self-confidence and self-reliance through problem solving activities in science and many more. In Nigeria, science education is concern with the teaching and learning of scientific concepts, teaching strategies and also proffering solution to learner's problem in the subject area. (www.asaolusam.wordpress.com 2021).

Biology is one of the science subjects that senior secondary school students offer at all level in Nigerian secondary schools. Biology is very important in science and it's a requirement for further learning of a lots of science-related professional courses like medicine, agriculture, pharmacy, etc. In this present Nigeria, greater emphasis is laid on science and technological development, therefore students are being encouraged to take up science-related subjects, and most students prefer the subject Biology. Presently, knowledge acquired from Biology embedded in almost all the field of human endeavor, and plays fundamental role in educational advancement as well as obvious for technological advancement in today's world due to scientific investigations. However, it is a known fact that there is high rate of failure in Biology as a subject in most secondary schools in Nigeria, (www.societyofbiology.org 2010). Al-Mukhaini, Al-Qayoudhi and Al-Badi (2014) provided evidence of existing difficulty in the process of fitting the use of technology into the learning experiences of students resulting in a mismatch leading to poor academic performance and additional frustrations for learners. In fact, Sadaf and Ertmer (2016) shared the opinion on the fitting of a broad spectrum of Web 2.0 tools to teaching specific subjects in the contexts of teachers and pupils.

Studies also have shown that the use of instructional media such as YouTube have improved achievement and students' performance. (George, 2008 & Nwagbo 2006).

Statement of the Problem

The declaration of the COVID 19 as pandemic on the 11th of March, 2020 brought everything to a standstill. The COVID 19 pandemic created the greatest setback on all levels of educational systems in human history. The pandemic brought about drastic changes in many areas of human endeavours, including educational policies. Due to the lockdown declared for all the public places including schools that affected learning activities, many schools were forced to device other means of educating students especially those in Examination classes. One of the learning strategy adopted was the use of Blended Learning.

Biology as a subject has several abstract topics which may pose difficulty in presentation during instructions in the traditional classroom. In recent times, teachers are force to look for alternative ways of making abstract concepts come alive and real. Most teachers do not use visual aids as instructional materials. This possess a lot of barriers to teaching/learning process and affects the learning outcomes directly.

The teaching profession is full with countless opportunities to enhance the academic performance of students, while some educational contents will be easy for students to comprehend, other requires you to think productively to make sure that important learning aims and objectives are met. Both mobile and still visual instructional devices are important to enhance quality of instructions if effectively utilized in instructional delivery hence, the use of blended learning has an important role to play in students' performance in biology, therefore ICT provides a wide range of useful resources and tools which can be made available in schools to support the teaching and learning of biology.

Purpose of the Study

The purpose of this study was to find out effect of Blended Learning in the post Covid 19 era on student's performance in Biology, using the conventional classroom learning environment with the blended learning environment in secondary schools in Obio-Akpor Local Government Area of Rivers State.

Objectives of the Study

This study therefore was aimed at comparing blended learning and traditional classroom learning in the post COVID 19 era on students' achievement in Biology in secondary schools in Obio-Akpor Local Government of Rivers State. Specifically, the study sought to;

1. Determine the extent of students' achievement when taught with the traditional classroom learning environment in selected topics in Biology

2. Determine the extent of students' achievement when taught with blended learning environment in selected topics in Biology
3. Determine the extent to which students taught with the traditional classroom learning environment and those taught with blended learning differ in their achievement in selected topics in Biology

Research Questions

The following research questions were answered to obtain the findings of the study;

1. What is the extent of students' achievement when taught with the traditional classroom learning environment in selected topics in Biology?
2. What is the extent of students' achievement when taught with blended learning environment in selected topics in Biology?
3. How does the achievement of students' taught with blended learning differ with does students taught with the traditional classroom learning environment in selected topics in Biology?

Hypothesis

The null hypothesis was tested at 0.05 level of significance which was formulated to guide the study:

$H0_1$: There is no significant difference in the performance students taught with blended learning environment and those taught with traditional classroom learning environment in selected topics in Biology

Methodology

The study was a quasi-experimental design. A quasi-experiment is an empirical study used to estimate the causal impact of an intervention on its target population, which allows the researcher to control the treatment condition using criteria other than random assignment. *Wikipedia* (retrieved September, 2020)

The study is carried out using the pretest – posttest control group to compare students' achievement when using blended learning and traditional classroom learning environment to teach a selected topic in Biology. The population for this study consisted of all the Senior Secondary two (SSII) class offering Biology as a subject in all the secondary schools in Ikwerre L. G. A. of Rivers State estimated at 2,800. Sample size of one hundred and seventy (170) was used for this study. The research instruments used for this study was Biology Performance Test (BPT) and a face and content validity was done by two Lecturers of Science Education Department, and a reliability coefficient "r=0.95" was calculated using Pearson's Product Moment

Correlation formula. Mean and standard deviation were used to answer the research questions while Analysis of Covariance was used to test the hypotheses.

Results

Research Question 1: What is the extent of students' achievement when taught with the traditional classroom learning environment in selected topics in Biology?

Table 1: Mean and Standard deviation of students taught with traditional classroom teaching method.

Group	Teaching method	Tests	N	$\bar{x}$	SD	Mean Gain
Control Group	Traditional classroom method	Pre-test	85	10.04	2.45	9.7
		Post-test	85	19.74	6.04	

Table 1 shows that the pre-test mean value of the control class, those taught using the traditional classroom method was 10.04 and a standard deviation (SD) of 2.45 and the post-test mean value of the same class was 19.74 and a standard deviation of 6.04 respectively. The result of this analysis shows that there was an increase in the mean values, having a mean gain of 9.7. The result therefore shows that there was a significant increase in the mean score of the student's performance after being exposed to the pre-test.

Research Question 2: What is the extent of students' achievement when taught with blended learning environment in selected topics in Biology?

Table 2: Mean and Standard deviation of student's achievement when taught with blended learning teaching method

Group	Teaching method	Tests	N	$\overline{x}$	SD	Mean Gain
Experimental Group	Blended learning method	Pre-test	85	10.14	3.27	14.99
		Post-test	85	25.13	6.61	

In Table 2 shows that the mean value for the pre-test scores of the experimental group (Blended Learning) was 10.14 and a standard deviation (SD) of 3.27 while the mean value for the post-test score of the same group is 25.13 and a standard deviation (SD) of 6.61 respectively.

The result shows that there was an increase in the mean value of the experimental group with a mean gain of 14.99 and a slight increase in the SD of the same group. This shows that there was an improvement in the student's achievement after being exposed to the pre-test after one week.

Research Question 3: How does the achievement of students' taught with blended learning differ with does students taught with the traditional classroom learning environment in selected topics in Biology?

Table 3: Mean scores of students taught with blended learning teaching method and traditional classroom teaching method.

Group	Teaching method	Tests	N	$\bar{x}$	Mean Gain
Control Group	Traditional classroom	Pre-test	85	10.04	9.7
		Post-test	85	19.74	
Experimental Group	Blended learning	Pre-test	85	10.14	14.99
		Post-test	85	25.13	

Data in Table 3 points that the pre-test mean score of the control group is 10.04 while that of the experimental group is 10.14 and the table also shows that the post-test mean score of control group is 19.74 while that of the experimental group is 25.13 with a mean gain of 9.7 for the control group and a mean gain of 14.99 for the experimental group respectively. The value of the pre-test scores for the two groups are almost the same which shows that both group perform equally before the treatment, but comparing the mean gains of the two groups shows that the students taught with blended learning teaching method performed better than those taught with traditional classroom learning environment.

$H0_1$: There is no significant difference in the mean achievement of students taught with blended learning environment and those taught with traditional classroom learning environment in selected topics in Biology

Table 4: Summary of one-way ANCOVA result on difference in the mean achievement of students taught with blended learning environment and those taught with traditional classroom learning environment in selected topics in Biology

Source	TypeIII sum of Square	df	Mean Square	F	Sig	Partial Eta Squared
Coreccted model	1369.655[a]	2	684.828	17.275	.000	.167
Intercept	8227.803	1	8227.803	207.545	.000	.574
Pretest	102.034	1	102.034	2.574	.110	.015
Group	1270.433	1	1279.433	32.274	.000	.158
Error	6818.665	172	39.643			
Total	95683.000	175				
	8188.320	174				

Table 4 reveals that F(1,172) = 32.274, for group with a p-value of 0.000, was less than 0.05 for the set significant level for the Study. This implies that there is a significance difference in the achievement of students taught using Blended Learning environment and those taught using the Traditional Learning environment. The null hypothesis therefore was rejected. The result also shows that Blended Learning Environment enhanced students' achievement in some selected concepts in biology than the Traditional Classroom Learning Environment.

Discussion

Students Taught with Traditional Classroom Learning Environment

The result gotten from research question one as reflected in Table1 depicts that there was a positive effect in the level of student's achievements having been exposed to the pre-test in selected topics in biology. This also agrees with the press release that said and I quote, "After taking and teaching courses in both online and traditional classes, I have come to realized that students; consistently get much more valuable education by learning in a traditional classroom environment. As students interact with the instructor and with each other, they get the opportunity to practice group dynamics, cooperative activities and team work. As questions come up, instructors can provide immediate answers and clarification. PRLog (Press Release) Nov. 18, 2912.

Students Taught with Blended Learning Environment

The result as contained in Table 2, shows that there was an increase in the mean value of the experimental group with a mean gain of 14.99 and a slight decrease in the SD of the same group. This shows that there was an improvement in the student's performance after being exposed to the pre-test one week after.

This result agrees with Young's view that says "Despite its fame, online instruction has yielded inconsistent results when trying to produce positive student outcomes. Partially born out of this result is the increasing popularity of the hybrid/blended classroom format, a teaching style that combines both face-to-face lecture and online tools to offer students a multitude of learning options. Because of the relative novelty of the blended learning platform, few studies have looked at its effectiveness compared to the purely online and traditional face-to-face teaching styles, and studies that have compared the 3 instructional formats have produced inconsistent results (Young, 2009)."

Students Taught with Blended Learning Environment and Traditional Classroom Learning Environment.

The value of the pre-test scores for the two groups are almost the same which shows the both group perform equally, but comparing the mean gains of the two groups shows that the students taught with blended learning teaching method performed better than those taught with traditional classroom learning environment.

This is also in line with Garrison research that says that" It has also been argued that learning outcomes will be enhanced when the rich dynamics of fast-paced communication technology are thoughtfully integrated with traditional classroom instruction (Garrison et al, 2004)". In a research carried out by Morgan and Collins, they also have this to say" One of the practices that are most often mentioned among those provided by blending is the opportunity for development on educational applications prevailing in both computer-centered and face-to-face learning environments. Within this framework, blended learning environments might help increase the student-centered strategies and activities (Morgan, 2002); facilitate the transition from teacher-centered instruction to a student-centered one, increase student interest towards learning (Collins, 2003); and improve individual consultation services for students."

In a study, research showed that providing several online options in addition to traditional classroom training actually increased what students learned. It also showed that student interaction and satisfaction improved, along with students learning more, in courses that incorporated blended learning. (DeLacey and Leonard, 2002). The result gotten from the hypothesis as contained in Table 4 reveals that the F(1,172) =32.274, for group with a p-value of 0.000 is less than the set 0.05 level of significance level for the study, therefore the null hypothesis under investigation is rejected.

Conclusion

Findings shows that there was a significant difference in the mean score of both the experimental group and the control group. This means that blending normal traditional classroom learning environment with some online learning instructions increases the level of students; achievement in the Science Subjects especially Biology. Blended Learning increase in the achievement of students who were engaged in Blended learning, and that it helped students to have unlimited access to different educational contents, thereby enhancing their digital literacy, promote critical thinking and encourages constructivist learning.

Recommendations

Based on the research carried out, the following recommendations were made;

1. Since blended learning is connected with differentiated instruction, which involves "custom-designing instruction based on student needs.", educators can look at students' learning styles, interests, and decide which curriculum content, learning activities, products, and learning environments will best serve those individual students' needs
2. Understanding the essentials of what increases student learning satisfaction and interest will provide better management insights into developing effective strategies that will allow schools and curriculum developers to create new opportunities and value for their students and instructors.
3. Teachers can add relevant curriculum content that would be unavailable or difficult to comprehend outside of the internet
4. Learning activities and products can also be changed to include technology for classroom that uses blended learning in delivery to support learning which will entice learners to adopt the new approach and enhance their learning satisfaction.

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