Innovations

Blended learning instructional strategy: A tool for improving students' academic achievement in Biology

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Abstract

ThepaperexaminedBlendedlearninginstructionalstrategyasatoolforimprovingsecondaryschoolstudents'academicachievementinBiology.Tworesearchquestionsandhypothesesguidedthestudy.Thedesignofthestudywasquasiexperimentaldesign.ThesamplesizeconsistofOnehundred(100)seniorsecondaryschoolstudents.TheinstrumentusedinthestudywastheBiologyAchievementTest(BAT).BATwasvalidatedbythreeexpertsinthefieldsoftestandmeasurementandScienceEducation. ThereliabilityoftheBATwasestablishedusingPPMCwhichyieldedareliabilitycoefficientof0.906.DescriptiveStatisticswasusedtoanswertheresearchquestionswhilethehypotheseweretestedusingAnalysisofCovariance.Theresultshowedthattherewasasignificantdifferenceintheposttestachievementscoresofstudentstaughtusingblendedlearninginstructionalstrategyandthosetaughtusinglecturemethodinfavourofstudentstaughtusingblendedlearninginstructionalmethod[F(1,97)=40.66,ρ=0.00,partialetasquare=0.295).Theresearcherestablishedthatblendedlearninginstructionalstrategywassignificantlymoreeffectiveinimprovingstudents'academicachievementinBiologythanlecturemethod.Withrespecttogender,thestudyrevealedforstudentstaughtusingtheblendedlearningapproach,therewasnosignificantdifferenceinthemeanachievementscoresofmaleandfemalestudentsstrategies[F(1,51)=0.00,ρ=0.994,partialetasquare=0.000).Thisimpliedthatblendedlearningwasabletoimproveacademicachievementin Biologyirrespectiveofgender.Itwasthereforerecommendedthat biologyteachersinSecondarySchoolsshoulddoptheuseofblendedlearninginstructionalstrategy in the teaching and learning of Biology.

Keywords: *1.Blended Learning, 2.instructional, 3.Strategy, 4.improve, 5.achievement*

Introduction

Teaching and learning in the 21st century has evolved from the conventional method to more innovative methods. The role of computers, mobile devices and social media in teaching and learning process cannot be over emphasized. According to Edmentum (2015), the role of a teacher in the 21st century is to guide students in dealing with massive amount of contents, to develop the skills and understanding necessary to use technology as an effective tool in a responsible manner and to assist students in developing their personal learning styles.

Any learning that involves the use of Technology or makes use of practices that use technology is termed digital learning.Technology has been identified as playing a critical role in the scientific advancement in the 21st century.Digital learning includes blended learning and virtual learning.

Iroriteraye-Adjekpovu and Osimala (2020) stated that the type of teaching that is required for global learning in the 21st century is that which will encourage students active participation where they learn at their own pace, space and interact with both human and material resources to discover facts for themselves leading to meaningful learning.

Biology is the study of living things and their vital processes. It attempts to understand the teeming diversity of life on Earth which we are all part of(Ramalingam,2016).Biology is one of the important science subjects taught in Secondary Schools. A credit pass in Biology, qualifies students for the study of such disciplines as medicine, Nursing, Pharmacy, Public health,Biochemistry,anatomy and many others.

The objectives of the biology curriculum as contained in the National Policy of Education are to prepare students to acquire: adequate laboratory and field skill in biology, meaningful and relevant knowledge of the ability to apply scientific knowledge to everyday life in matters of personal and community health and agriculture as well and reasonable and finctionalscientific attitude (FRN,2013).

Teaching Biology includes the theoretical and practical (laboratory) aspects. The teaching of biology needs a teaching strategy that engages the students actively. The use of activities to the teaching of biology therefore be a rule rather than an option to biology teachers, if we hope to produce students that would be able to acquire the necessary knowledge, skills and competence needed to meet the scientific and technological demands of the nation.

One of the ideal instructional strategy in which students can participate actively while learning and also have access to Digital learning is Blended learning. Blended learning has been defined as a combination of multiple approaches to learning (Liebman, 2005 and Griffin, 2006). Blended learning is seen as a combination of the the traditional face to face learning and electronic learning(Graham,2006). Blended learning allows learner's to view, listen, feel and interact with learning materials. The unique feature of blended learning is the ability to use refined techniques from both e-learning and face to face(traditional) methods.

According to Thorne (2003),Blended learning is a way of addressing the challenges of tailoring learning and development to the needs of individuals by combining innovative a and technological advances offered by the best of traditional learning.

Blended learning is an instructional tool because it is a source of collaboration and interaction to help teachers and students create a learning community(Paily,2013).it is an effective strategy for teaching with technology within and outside the classroom. Blended learning has various advantages, this is according to Graham(2006).They include openness and ease in the learning environment, good quality interplay, increase in interest of students in learning and low monetary learning.

Garrison and Kanuka (2004) identified definite forms of blended teaching approach as Rotation model, Flex model, a la carte model, Enriched virtual model and face to face driver model.

Academic achievement has to do with the degree of attainment of set objectives of instruction. Academic achievement is defined as the academic standing of a student.It has to do with the successful accomplishment of objectives of the particular course of instruction.In this study, achievement was measured using Biology achievement Test before and after exposure to Blended learning instructional strategy in an attempt to find out if it will improve students achievement in Biology. The academic achievement of students can improve if the right method of teaching is employed.Empirical studies have shown that blended learning instructional strategy significantly improve students academic achievement (Abidoye, 2015; Udo and Udo,2020; Adeleye and Akinnodi,2020). Against this background, this study examined Blended learning as a tool for improving secondary students academic achievement in Biology.

Statement of the problem

The issue of what method is most appropriate in teaching in the 21st century necessitated this study.With the growing trend of information and communication Technology (ICT), the traditional Lecture method may no longer be adequate for teachingbiology.. There is need for teachers to move from the conventional lecture method to

instructional strategies that engage the students actively while supporting them to learn at their own pace. Blended learning is an instructional strategy that combines both face to face (Traditional) and online learning. The problem therefore is: Will blended learning instructional strategy improve Secondary School students Achievement in Biology?

Purpose of the study

The study sought to determine the:

1. difference in the mean Pretest and posttest achievement scores of students taught biology using blended learning instructional strategy and those taught using Lecture method;
2.difference in the mean achievement scores of male and female students taught biology using blended learning instructional strategy.

Research Questions

1. What is the difference between the mean Pretest and posttest achievement scores of students taught biology using blended learning instructional strategy and lecture methods?
2. What is the difference between the mean achievement scores of male and female students taught biology using blended learning instructional strategy?

Hypotheses

The following hypotheses were formulated and tested at 0.05 level of significance.

1. There is no significant difference in the mean achievement scores among students taught biology using blended learning instructional strategy and lecture method.
2. There is no significant difference in the mean achievement scores of male and female students taught biology using blended learning instructional strategy.

Methodology

The study adopted the Quasi-experimental design. The pretest post-test control group design was employed. The population for the study was 100 Biology students in separate classes

E: O_1 X BLIS : O_2

C: O_3 X LM. : O_4

$O_1$and O_3 =Pretests

O_2 and O_4 = Post- tests

X = Treatment

E = Experimental group

C = Control group.

BLIS = Blended Learning Instructional Strategy

LM = Lecture Method

The instrument for data collection was Biology Achievement Test (BAT). The BAT was made of 50 objectives drawn from past questions. The BAT covered circulatory and excretory systems. The BAT was validated by three experts in the fields of test and measurement and Science Education. The reliability of the BAT was established by test retest method using Pearson Product Moment Correlation (PPMC)which yielded a reliability coefficient of 0.906.

The treatment was conducted in two phases. The first phase comprised of the briefing of the biology teacher in the experimental group. The second phase comprised of test administration for the pretest and thereafter commencement of treatment using the instructional packages.

Treatment lasted for six (6) weeks. A week before the start of treatment, the researcher distributed the instructional units for both the experimental and control groups. Two days before the start of treatment, both the experimental and control groups were pretested with the 50 item BAT. On treatment of the control group, each of the content in the

instructional unit were presented to the students using lecture method. Students in the control group were not introduced to the internet. The experimental group received treatment using blended learning instructional strategy. This strategy involved the students doing most of the learning outside the classroom with the teacher acting as the facilitator. The teacher provided the students with the content of the topics and what they are expected to know at the end of the study. The teacher also gave the students websites to visit and study the topics. Students used personal internet enabled laptops and smartphones to surf the internet and watch videos, third party tutorials and textbook explanations on the topics being studied. Students were required to write down what they have gained and share with their classmates during the normal classroom lessons. Descriptive Statistics was used to answer the research questions while the hypotheses were tested using Analysis of Covariance.

Result

Research Question 1

What is the difference between mean pretest and posttest score of students taught using the blended learning and lecture method?

Table 1:

Group		Posttest	Pretest
Lecture Group	Mean	27.41	23.61
	N	46	46
	Std. Deviation	11.44	11.23
Blended Group	Mean	33.82	24.87
	N	54	54
	Std. Deviation	10.56	11.00
Mean Difference		6.41	1.26

The result presented in Table 1 shows that the difference in the mean score between the two groups of students studied (blended learning group (24.87± 11.00) and the lecture (23.61± 11.23) before the treatment is 1.26. After treatment, the table 1 shows that the difference in mean score became larger between the blended learning group (33.82±10.56) and Lecture group (27.41± 11.44). The mean difference after treatment was administered is 6.41.

Research Question 2

What is the difference between the mean achievement scores of male and female students taught biology using the blended learning instructional strategy?

Table 2: difference between the mean achievement scores of male and female in the blended learning group

Gender		Posttest	Pretest
Male	Mean	32.04	22.83
	N	24	24
	Std. Deviation	11.04	11.06
Female	Mean	35.23	26.50
	N	30	30
	Std. Deviation	10.12	10.84
Total	Mean	33.82	24.8704

The mean difference in the posttest scores between male (32.04±11.04) and female (35.23±10.12) students taught using the blended learning instructional strategy is 3.19.

Hypothesis One

There is no significant difference in the mean achievement scores between students taught using biology using blended learning instructional strategy and lecture methods

Table 3: ANCOVA in the mean achievement scores between students taught biology using blended learning instructional strategy and lecture method.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	11186.896[a]	2	5593.448	334.006	.000	.873
Intercept	1192.244	1	1192.244	71.193	.000	.423
Pretest	10168.887	1	10168.887	607.223	.000	.862
Group	680.822	1	680.822	40.655	.000	.295
Error	1624.414	97	16.747			
Total	108107.00	100				
Corrected Total	12811.310	99				

Dependent Variable: Posttest

The Table 3 presents the ANCOVA result obtained in the difference in the mean achievement scores of students taught biology using the blended learning instructional strategy and the lecture method. From the result presented in Table 3, while controlling for the influence of the pretest on students achievement score , there was a significant difference in the mean achievement scores of students taught using the blended learning instructional strategy and the lecture method [F(1, 97) = 40.66, ρ = 0.00, partial eta square = 0.295). the null hypothesis one is therefore rejected. The result implies that there is a significant difference in the mean achievement scores between students taught using biology using blended learning instructional strategy and lecture methods

Hypothesis Two

There is no significant difference in the achievement scores of male and females students taught biology using the blended learning instructional strategy.

Table 4:

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	4819.248[a]	2	2409.624	112.858	.000	.816
Intercept	1284.267	1	1284.267	60.150	.000	.541
Pretest	4683.425	1	4683.425	219.354	.000	.811
Gender	.001	1	.001	.000	.994	.000
Error	1088.900	51	21.351			
Total	67654.000	54				
Corrected Total	5908.148	53				

Dependent Variable: posttest scores

Table 4 shows that while controlling for the influence of the pretest on students posttest achievement score , there was no significant difference in the mean achievement scores between male and female students taught using the blended learning instructional strategies [F(1, 51) = 0.00, ρ = 0.994, partial eta square = 0.000). the null hypothesis two is accepted.

Discussion of findings.

Blended learning instructional strategy,lecture method and students achievement: The finding of the study indicated that there was a significant difference in the posttest mean scores of students taught using blended learning instructional strategy and lecture method in favour of blended learning. The significant difference was attributed to the fact that students in the blended learning group were exposed to online discussions that enabled them to explore the topics to greater depths to thereby facilitating proper understanding of the topics. This finding is in line with Udo and Udo (2020) who found that students taught chemical structure and bonding in chemistry using blended learning performed better than those taught using computer simulation strategy. The finding of this study is also in agreement

with Abidoye (2015) whofound that blended learning instructional approach was more effective in enhancing students achievement in Geography than conventional teaching method. The findings is also in agreement with Adeleye and Akinnodi(2020) who reported that blended learning instructional strategy was the most effective strategy of teaching Biology in Ekiti State, Nigeria.

The findings of this study revealed that there is no significant difference in the mean achievement scores between male and female students taught Biology using blended learning, this implied that blended learning instructional strategy is effective in teaching both male and female students in order to enhance their academic achievement. The finding is in agreement with Okeke(2007) and Oludipe (2012) who found that both male and females achieve adequately in science when given equal chance and facilities. The finding of the study however disagrees with the finding of Ribhi (2017) that there are significant differences due to gender at the significance level (0.05) in favour of females instead of males.

Conclusion

The aim of the study was to investigate blended learning instructional strategy as a tool for improving secondary schools students' academic achievement in biology. From the results obtained, blended learning instructional strategy significantly improved the academic achievement of secondary School students in biology. In the light of the study results, it is suggested that teachers Should adopt blended learning instructional strategy in the teaching and learning of Biology.

Recommendations

The study has recommended that:

1. biology teachers in Secondary Schools should adopt and integrate blended learning insructional strategy in the teaching and learning of biology;
2. Seminars and workshops should be organized to train teachers on how to effectively use blended learning instructional strategy in teaching biology; and
3. Government agencies whose responsibilities are to design and revise the secondary school curriculum should incorporate the use of blended learning in teaching.

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