International Journal of Student Performance and Educational Research (IJSPER)
VOLUME 6 NO 1. SEPTEMBER, 2026
www.ijois.com/ijsper/
ISSN: 1595-7918

EFFECT OF BLENDED LEARNING STRATEGY ON SECONDARY SCHOOL STUDENTS' ACADEMIC ACHIEVEMENT AND RETENTION IN PHYSICS IN MAKURDI LGA OF BENUE STATE, NIGERIA

ALLAHNANA, Joshua Okkoh[1] & PETER, Marvellous[2]
[1,2] Department of Physics Education Joseph Sarwuan Tarka University, Makurdi
EMAIL: josh19854real@gmail.com
DOI: https://doi.org/10.5281/zenodo.23238551

ARTICLE INFORMATION

Received: 21th July, 2026
Accepted: 19th August, 2026
Published: 24th September, 2026

KEYWORDS: Effect, Blended, Learning Strategy, Secondary School, Students' Academic, Achievement, Retention, Physics, Makurdi LGA, Benue State, Nigeria.

PUBLISHER: Empirical Studies and Communication Development: A Research Center – (CESCD)

This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

Open Access
http://creativecommons.org/licenses/by/4.0/

ABSTRACT

In this study, the researchers investigated the effect of blended learning strategy on secondary school students' academic achievement and retention in physics in Makurdi Local Govt of Benue state. Quasi-experimental research design of pretest posttest was adopted for this study. The population of the study comprised of 8,670 SS II students and a sample of 88 students in secondary school within the study area. Two research questions and two null hypotheses guided the study. The instrument for data collection was a Physics Achievement Test (PAT). The researchers administered the instrument to Physics students after the treatment, the responses were collected and Cronbach Alpha statistics was employed to compute the internal consistency estimate of the items. The reliability coefficient obtained was 0.82. Research questions were answered using mean and standard deviation. Independent sample t-test was employed in testing the hypotheses at $p < 0.05$. The results of the study indicated that there is a statistically significant difference between the mean achievement scores of blended learning strategy and conventional method. Based on the findings it was concluded that students taught using blended learning strategy achieved better than those taught using conventional method of teaching. So also, students taught by blended learning strategy retain knowledge better than those taught using conventional method. Hence, students taught using blended learning strategy perform better than those taught by conventional method. Therefore, it was recommended that science teachers especially physics teachers should endeavor to incorporate blended learning strategy into the teaching and learning of physics so as to increase achievement and retention in the subject.

INTRODUCTION

Physics is a compulsory subject for science students at the senior secondary school level, a key requirement for educational progression in Nigeria (Federal Republic of Nigeria, 2013). As one of

the core subjects in the science curriculum, physics plays a crucial role in providing students with a foundational understanding of the physical universe and its underlying principles. It explores phenomena ranging from the smallest subatomic particles to the vast expanse of the cosmos, allowing students to comprehend the fundamental laws that govern the universe. Physics education aims to cultivate critical thinking skills, problem-solving abilities, and scientific literacy among students. By engaging with concepts such as motion, forces, energy, and electromagnetism, students develop a deeper appreciation for the natural world and its interconnectedness.

However, many learners still achieve poorly in the subject. The persistently poor student's performance in the subject is no longer news worthy. Physics researchers like (Young and Freedman 2014) warned the public about the low physics proficiency in learners in both secondary and university levels of education. Their findings underscored the urgent need for interventions to address the root causes of this persistent challenge. The West African Examination Council (WACE) Chief Examiners report highlighted the unfavorable scenario by stating that candidate's performance has steadily declined (WAEC, 2019–2020).

Academic achievement of students especially at the secondary school level is not only a pointer to the effectiveness or otherwise of schools but a major determinant of the future of youths in particular and the nation in general. The medium though which the attachment of individuals and the national educational goals can be achieve is learning.

Learning outcomes have become a phenomenon of interest to all and this account for the reason why scholars have been working hard to unravel factors that militates against good academic achievement. Adeyemo (2001) opined that the major goal of the school and other stakeholders including parents is to work towards attainment of academic excellence by students. According to him, the school may have other peripheral objectives; emphasis is always places on the academic achievement and retention of physics concepts and theories.

Retention in this context, refers to the ability of students to store, remember and apply physics concept learned in previous lessons over an extended period (Mosimege and Egara 2022, Gara and Mogege, 2023). While addressing poor physics achievement, it is crucial focusing on student's retention of physics concepts as a distinct variable is equally important. The inability to retain essential physics knowledge hinders students' overall mastery of the subject and may lead to difficulties in advanced topics that build upon foundational concepts (Osakwe et al., 2023). Therefore, there is a pressing need to explore instructional approaches that not only enhance physics achievement but also promote the lasting retention of crucial physics concepts using a better teaching approach.

Mutange (2020) postulated that the Nigerian educational system is deficient in Physics instruction and called for a better method of physics instruction in the classrooms. Due to the value of physics in society, this call is necessary. To understand physics, teachers must adopt a good teaching and learning approach to foster student's retention of physics concepts, thereby improving their physics achievement in internal and external examinations. One method of teaching, proven innovative and effective which could be to physics also is the blended learning strategy, which is the focus of this study.

Blended learning is an educational strategy that combines face-to-face instruction, with all its benefits and drawbacks, with online learning in a virtual environment (Setiawanetal.2022). Combining the best learning opportunities between the set whose approaches makes it possible to tailor instruction to the need to find individual students and to the desired outcome to be attained by the end of the term (Al-abdallatetal.2020). According to Ceylan and Kesici (2017), blended learning is a student-centered, teacher-facilitated instructional strategy that uses technology and concentrates on the student-teacher relationship to boost independence, engagement, and achievement. In the same vein, Sanwal (2019) views blended learning as a teaching and learning method combining online resources, including PowerPoint presentations, streaming media, online videos, and emails, with conventional class room instruction.

This method, therefore, benefits from both a teacher dominated class room setting and an active, student-focused online learning environment. In this study, blended learning, often called hybrid learning, is a method in which conventional face-to-face classroom procedures are coupled with online educational resources and participation opportunities. Students use technology to accomplish learning objectives and learn from and interact with their teachers and peers (Mukhtaramkhon, 2022).

In light of the foregoing, this research work is designed to investigate the Effect of Blended Learning Strategy on Secondary School Students Academic Achievement and Retention in Physics in Makurdi LGA of Benue State

Purpose of the Study

The main purpose of this study is to investigate the Effect of Blended Learning Strategy on Secondary School Students' Academic Achievement and Retention in Physics in Makurdi LGA of Benue State. Specifically, the study aims at determining the following objectives:

1. To determine the effect of blended learning strategy in the achievement of physics students in Makurdi LGA of Benue State.

2. To examine the effects of Blended Learning Strategy in the retention of physics students in Makurdi LGA of Benue State.

Research Questions

The following research questions were raised to guide the study.

1. What are the mean achievement scores of students taught light and optics using Blended Learning Strategy and those taught using conventional method?

2. What are the mean retention scores of students taught light and optics using Blended Learning Strategy and those taught using conventional method?

Research Hypotheses

The following hypotheses were tested at 0.05 level of significance

HO_1: There is no significant difference in the mean achievement scores of students taught light and optics using Blended Learning Strategy and conventional method.

HO_2: There is no significant difference in the mean retention scores of students taught light and optics using Blended Learning Strategy and conventional method.

Methodology

The researcher adopted quasi-experimental research design. The study was carried out in Makurdi Local Government Area of Benue state. The population of the study was 8,670 in all the SS II arms of the secondary school offering sciences and 88 SS II students was sample from two intact classes using simple random sampling technique.

The instrument used for data collection was Physics Achievement Test (PAT). The instrument consists of 40 multiple choice items, with options A-D. The research instrument was validated by three experts. one from the department of measurement and evaluation, second from Physics Education department all from Joseph Sarwuan Tarka University, Makurdi while, the third person was a physics teacher in secondary school. Their inputs and suggestions helped in improving the quality of the instrument.

The reliability coefficient of the instrument (PAT) was obtained using Cronbach Alpha statistics and it was found to be 0.82. Research data was collected through the two research assistants from the sampled schools. The research questions were answered using mean and standard deviation, while independent sample t-test was used in testing the research null hypotheses at 0.05 level of significance.

Result and Discussion

This section presents the result and discussion of findings of the study based on the research questions and their corresponding research hypotheses.

Research Question One: What are the mean achievement scores of students taught light and optics using Blended Learning Strategy and those taught using conventional method?

Table 1: Mean and Standard Deviation of Students' Achievement Scores Taught Physics Using Blended Strategy and Conventional Method.

Teaching Method	Type of test	No of Std.	Mean Score	Stand. Dev.	Mean Gain
Blended Strategy	Pre-test Post-test	45 45	20.32 34.20	0.26 0.42	13.88
Conventional Method	Pre-test Post-test	43 43	20.02 32.89	0.43 0.23	12.87

The results presented in Table 1 indicate that the experimental group, which received instruction through blended learning strategy, achieved a higher mean posttest score (M = 34.20, SD = 0.42)

compared to the control group taught using conventional method (M = 32.89, SD = 0.23). This gives a positive mean difference of 1.31 and standard deviation of 0.19 in favor of the blended learning strategy.

Hypothesis One (H_1): There is no significant difference in the mean achievement scores of students taught light and optics using blended learning strategy and conventional method.

Table 2: Results of Independent Sample t-Test on Students' Achievement that were Taught Physics Using Blended Strategy and Conventional Method.

Group	N	Mean	Std. Dev.	Df	t.cal	Sig.	Decision
Blended Strategy	45	33.49	0.56	86	1.321	0.007	Significant
Lecture Method	43	32.38	0.68				

Table 2 summarizes the results of the hypothesis testing. The t-value of 1.321 and the corresponding p-value of 0.007 ($P< 0.05$) provide strong evidence to reject the null hypothesis. This implies that there is a statistically significant difference in the mean achievement scores of students taught using blended learning strategies compared to those taught through conventional methods.

Research Question Two: What are the mean retention scores of students taught light and optics using Blended Learning Strategy and those taught using conventional method?

Table 3: Mean and Standard Deviation of Students' Retention Scores Taught Physics Using Blended Strategy and Conventional Method.

Teaching Method	Type of test	No of Std.	Mean Score	Std. Dev.	Mean Gain
Blended Strategy	Post-test Postpost-test	45 45	34.20 32.80	0.42 0.40	-1.40
Conventional Method	Post-test Postpost-test	43 43	32.89 26.60	0.23 0.24	-6.29

The retention test scores reveal that the experimental group had a mean score of 32.80 (SD = 0.40), while the control group had a mean score of 26.60 (SD = 0.24). This imply that the experimental group (blended learning strategy) had a higher mean score than the control group (conventional method).

Hypothesis Two (H_2): There is no significant difference in the mean retention scores of students taught light and optics using Blended Learning Strategy and conventional method.

Table 4: Results of Independent Sample t-Test on Students' Retention that were Taught Physics Using Blended Strategy and Conventional Method.

Group	N	Mean	Stand. Dev.	Df	t.cal	Sig.	Decision
Blended Strategy	24	33.23	0.38	43	3.218	0.01	Significant
Lecture Method	21	33.20	0.47				

Table 4 indicates that the results of the retention test significantly reject the null hypothesis. With a t-value of 3.218 and a p-value of 0.01 ($p < 0.05$), there is strong evidence to conclude that blended learning positively retained the knowledge of physics concepts better than conventional method among students. This further reinforces the effectiveness of blended learning strategies in fostering long-term understanding of the subject matter.

Discussion of Findings

The findings of this study support the notion that blended learning strategy significantly improve students' academic achievement in physics, as demonstrated by higher post-test scores in the experimental group compared to the control group. This aligns with findings by Nweze (2022), who showed that blended learning enhances engagement and comprehension in science education (Physics).

The result of Hypothesis One confirmed that there is a significant difference in mean achievement scores between students taught with blended learning and those taught using conventional methods, supporting prior research by Ozoemena (2021), who reported the efficacy of blended learning in promoting academic performance in physics. So also, the work of Lateef and Adewale (2021) revealed that students achieved better in using blended learning strategy in teaching than the conventional method. It is a clear evidenced that students achieve better in secondary school using blended learning strategy in teaching. Likewise, Egara and Mosimege (2024) investigated how blended learning affected secondary school students' achievement and retention in mathematics. And it was discovered that mathematics students that were taught using blended learning strategy had a higher achievement than those taught with a lecture method.

Research question two examined the retention scores of students taught with blended learning strategies versus those taught through conventional method and it was observed that students retain knowledge better using blended learning strategy. The higher retention scores in the experimental group reinforce findings from Adeyemi and Fajobi (2020), who noted that blended learning aids long-term retention of scientific concepts.

Hypothesis two, which posited no significant difference in retention scores, was therefore rejected, as the data indicated a substantial retention advantage for blended learning. This is in agreement with the work of Egara and Mosimege (2024) which revealed that learners tutored mathematics through blended learning improved their mathematics retention scores more than

learners tutored by the conventional method. In addition, Ityobee, Jirgba and Adzape (2024) investigated the effect of blended learning instructional strategy on students' retention in Basic Science and Technology in Zone A, Benue State, Nigeria. Their findings showed that blended learning significantly improved retention scores compared to traditional method.

Conclusion

The findings of this study support the effectiveness of the blended learning strategy in enhancing academic achievement and retention among secondary school physics students. Blended learning, which combines face-to-face instruction with online resources, provides a more interactive and engaging learning environment, allowing students to grasp and retain complex physics concepts better than through traditional teaching methods alone.

Given the significant improvements in both achievement and retention, it is evident that blended learning holds promise as an instructional strategy in secondary school physics education.

5.3 Recommendations

It was recommended that Physics teachers should endeavor to incorporate Blended learning strategy into the teaching of Physics so as to increase achievement and retention in the subject.

References

Adeyemo, D. A. (2001). Teaching/learning processes in schools: Implications for the effectiveness of education in Nigeria. Journal of Education and Practice, 2(1), 67-74.

Aremu, A. O., & Sokau, Y. O. (2002). A casual model of school effectiveness factors influencing academic performance in the third world. Education and Urban Society, 4(3), 246-260.

Bandura, A. (1977). Social learning theory. Prentice Hall.

Bauer, J., & Kenton, J. (2005). Toward technology integration in the schools: Why it isn't happening. Journal of Technology and Teacher Education, 13(4), 519-546.

Bergmann, J., & Sams, A. (2012). Flip your classroom: Reach every student in every class every day. International Society for Technology in Education.

Bonk, C. J., & Graham, C. R. (Eds.). (2012). The handbook of blended learning: Global perspectives, local designs. John Wiley & Sons.

Ceylan, V. K., & Kesici, A. E. (2017). Effect of blended learning on academic achievement. Journal of Human Sciences, 14(1), 308-320.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. Psychological Inquiry, 11(4), 227-268.

Federal Republic of Nigeria. (2013). National policy on education (6th ed.). Nigerian Educational Research and Development Council.

Gara, M., & Mogege, R. (2023). Improving student retention in science education through innovative teaching strategies. Journal of Science Education, 10(2), 150-165.

Graham, C. R. (2019). Current research in blended learning. In M. G. Moore & W. C. Diehl (Eds.), Handbook of distance education (4th ed., pp. 173-188). Routledge.

Hill, C., Corbett, C., & St Rose, A. (2010). Why so few? Women in science, technology, engineering, and mathematics. American Association of University Women.

Horn, M. B., & Staker, H. (2015). Blended: Using disruptive innovation to improve schools. John Wiley & Sons.

Hyde, J. S., Lindberg, S. M., Linn, M. C., Ellis, A. B., & Williams, C. C. (2008). Gender similarities characterize math performance. Science, 321(5888), 494-495.

Jonassen, D. H., & Land, S. M. (Eds.). (2012). Theoretical foundations of learning environments (2nd ed.). Routledge.

Lawson, A. E., & Priest, K. L. (2018). Virtual biology laboratory: Concepts and applications. Prentice Hall.

Means, B., Bakia, M., & Murphy, R. (2013). Learning online: What research tells us about whether, when and how. Routledge.

Mosimege, D. M., & Egara, M. G. (2022). Student retention in physics: Factors and strategies. African Journal of Research in Mathematics, Science and Technology Education, 26(4), 377-392.

Mukhtaramkhon, M. (2022). Hybrid learning for secondary school students: A new approach. Journal of Modern Education, 14(3), 45-58.

Mutange, I. (2020). Physics education in Nigeria: Challenges and prospects. International Journal of Science Education, 12(1), 79-91.

Osakwe, J. O., Emeka, O., & Chinonso, I. (2023). Long-term retention of physics concepts: A study among secondary school students. Journal of Education and Learning, 12(3), 112-125.

Osiki, J. O. (2001). School factors influencing academic performance of primary school children in Nigeria. Journal of Educational Research and Development, 3(1), 15-25.

Parker, D., & Ruthven, K. (2007). Gender differences in the learning and retention of physics concepts: An international study. Journal of Research in Science Teaching, 44(6), 806-828.

Picciano, A. G. (2017). Theories and frameworks for online education: Seeking an integrated model. Online Learning, 21(3), 166-190.

Sanwal, K. (2019). Blended learning: Integrating online and traditional education. International Journal of Innovative Research in Technology, 6(1), 120-130.

Setiawan, R., Anwar, R. B., & Septian, M. (2022). Enhancing learning outcomes through blended learning. Education and Information Technologies, 27(2), 1579-1597.

Shashaani, L. (2007). Gender differences in computer attitudes and use among college students. Journal of Educational Computing Research, 16(1), 37-51.

Siemens, G. (2005). Connectivism: A learning theory for the digital age. International Journal of Instructional Technology and Distance Learning, 2(1), 3-10.

Smith, R., Jones, M., & Brown, S. (2018). The impact of blended learning on secondary school students' academic performance. Journal of Educational Technology, 25(4), 389-403.

Staker, H. (2012). The rise of K-12 blended learning: Profiles of emerging models. Innosight Institute.

Sweller, J., Ayres, P., & Kalyuga, S. (2019). Cognitive load theory. Springer.

Talbert, R. (2017). Flipped learning: A guide for higher education faculty. Stylus Publishing.

Tucker, C. R. (2012). Blended learning in grades 4-12: Leveraging the power of technology to create student-centered classrooms. Corwin Press.

WAEC. (2019-2020). Chief Examiners' Report. West African Examination Council.

Young, H. D., & Freedman, R. A. (2014). University physics with modern physics (14th ed.). Pearson Education.