Zamfara International Journal of Education (ZIJE)
The Official Journal of the Faculty of Education
Federal University Gusau, Zamfara State, Nigeria
Volume 5, Number 4, August, 2025
pISSN: (Hard Copy): 2814 – 1377; eISSN (Online): 2814 – 1369 www.foefugusau.com.ng
DOI: https://doi.org/10.64348/zije.202585

Effects of Scaffolding Strategy on Interest and Performance in Basic Science among Students in Kachia Education Zone, Kaduna State

YAHAYA, Nasibatu Inuwa
inuwaynasibat@gmail.com
09034413598

College of Education, Gidan-Waya, Kaduna State, Nigeria

Abstract
This study examined the Effects of Scaffolding Strategy on interest and Performance in Basic Science among Students in Kachia Education Zone, Kaduna State. A quasi-experimental, pretest-posttest control group design was adopted. A total of 80 students from two intact classes were purposively sampled. The experimental group was taught using the scaffolding strategy, while the control group received instruction through the conventional method. Two validated research instruments—the Basic Science Performance Test (BSPT) and the Students' Interest Questionnaire (BSIQ) were used for data collection. The instruments had reliability indices of 0.82 and 0.79, respectively. Data were analyzed using mean, standard deviation, independent sample t-test and Mann Whitney U-test. The findings revealed that students taught with the scaffolding strategy demonstrated significantly higher academic performance and greater interest in Basic Science compared to those in the control group. The results also indicated a significant effect of scaffolding on both performance and interest at the 0.05 level of significance. These findings support the effectiveness of scaffolding in enhancing learning outcomes in science education. It was recommended that science teachers adopt scaffolding strategies to promote students' engagement and conceptual understanding. Curriculum planners should also incorporate scaffolding frameworks to encourage active and meaningful learning.

Keyword: scaffolding strategy, academic performance, interest, Basic Science, Upper Basic II

Introduction
Science education forms the bedrock of technological advancement and sustainable development in any nation. In Nigeria, Basic Science is introduced at the upper basic education level to equip students with foundational knowledge, skills, and attitudes necessary for understanding their environment and solving everyday problems (Oginni et al., 2024). The subject is intended to cultivate critical thinking, creativity, and scientific literacy. However, over the past decade, Basic Science has suffered from persistent challenges, especially in terms of low student performance and declining interest (Ndjangala et al., 2021). Student performance in Basic Science has been particularly worrisome. According to Assem et al., (2023) many students struggle with core science concepts, resulting in poor test scores, shallow understanding, and negative attitudes towards the subject. This problem is compounded by over-reliance on traditional teaching methods such as lecture and rote memorization, which fail to engage learners actively or accommodate individual differences (Fakhridinovna, 2025). As a result, both cognitive achievement and affective engagement in science remain low, especially among student.

To address these concerns, researchers have advocated for learner-centered instructional strategies that promote meaningful learning and foster students' interest and participation. One such approach is the scaffolding strategy, an instructional technique rooted in Vygotsky's (1978) sociocultural theory and the concept of the Zone of Proximal Development (ZPD). Scaffolding involves the provision of temporary, structured support by the teacher or a more knowledgeable peer to help students perform tasks they may not be able to accomplish independently. These supports such as modeling, questioning, cueing, and guided practice—are gradually withdrawn as learners gain competence and confidence (Puntambekar, 2022). The potential of scaffolding to enhance both academic performance and interest in the teaching of science has been widely documented. Several studies conducted in Nigeria have demonstrated that scaffolding improves students' understanding of science concepts and leads to higher academic achievement compared to conventional teaching methods (Onah, 2022; Awodun, 2024). Moreover, scaffolding has been found to positively influence students' interest by encouraging active participation, increasing confidence, and fostering a sense of ownership in the learning process (Acosta-Gonzaga & Ramirez-Arellano, 2022). Interest in science is a critical affective domain that determines students' willingness to engage with scientific content and pursue science-related careers. Despite researches conducted supporting scaffolding strategies in other parts of Nigeria, there is a limited of research focusing on its application within Kaduna State**,** and particularly in Kachia Education Zone**.** While some studies in the area have examined the effects of other teaching methods such as

Zamfara International Journal of Education (ZIJE)
The Official Journal of the Faculty of Education
Federal University Gusau, Zamfara State, Nigeria
Volume 5, Number 4, August, 2025
pISSN: (Hard Copy): 2814 – 1377; eISSN (Online): 2814 – 1369 www.foefugusau.com.ng
DOI: https://doi.org/10.64348/zije.202585

inquiry-based strategies on student interest or achievement in Basic Science (Margie, 2025), there remains a significant gap in the literature regarding the impact of scaffolding strategy on both interest and academic performance among Upper Basic II students in the zone. This study, therefore, examined the effect of scaffolding strategy on students' interest and performance in Basic Science concepts among Upper Basic II students in Kachia Education Zone.

The teaching and learning of Basic Science in Nigerian upper basic schools have faced persistent challenges, notably poor academic performance and low levels of student interest. This situation is particularly troubling in rural and peri-urban regions such as Kachia Education Zone in Kaduna State, where infrastructural limitations, teacher-centered pedagogies, and a lack of instructional innovation continue to hinder effective science education (Folashade, 2023; Oyubu & Agbigbe, 2025). According to Agboola (2025) despite the inclusion of Basic Science in the national curriculum to promote scientific literacy and stimulate students' interest in STEM careers, many students remain disengaged, underperforming, and uninspired. One major contributing factor to this decline is teachers' reliance on traditional teaching methods such as rote memorization, lecture, and note-copying that do not adequately engage learners or address their individual learning needs (Umeji, 2025). These methods often fail to provide the cognitive and emotional support required to promote deep understanding and interest in science concepts, especially among students at the middle basic level who are still developing foundational skills. Therefore, there is an urgent need for research-driven instructional strategies that can address both the cognitive (performance) and affective (interest) dimensions of learning.

Onah et al., (2025) reported that, scaffolding instructional strategy, which involves the gradual transfer of responsibility from teacher to student through structured support, has been shown in several studies to significantly enhance students' learning outcomes and motivation in science subjects. However, despite its demonstrated effectiveness in other parts of Nigeria, there is limited empirical evidence on the impact of scaffolding strategies in the specific context of Kaduna State, and more particularly within Kachia Education Zone. This gap in the literature highlights the need for a holistic investigation into the dual impact of scaffolding on both interest and performance in Basic Science. It is against this backdrop that this study seeks to investigate the effect of scaffolding strategy on interest and performance in Basic Science concepts among Upper Basic II students in Kachia Education Zone, Kaduna State.

Objectives of the study

This study guided by the following objectives which are to:

1. Determine the effect of scaffolding strategy on students' academic performance in Basic Science concepts among Upper Basic II students in Kachia Education Zone.
2. Examine the effect of scaffolding strategy on students' interest in Basic Science among Upper Basic II students in Kachia Education Zone.

Research Questions

The following research questions were answered in the study:

1. What is the difference between mean performance scores of Upper Basic II students taught Basic science concepts using Scaffolding Instructional Strategy and those taught using conventional method?
2. What is the difference between interest level Upper Basic II students taught Basic science concepts using Scaffolding Instructional Strategy and those taught using conventional method?

Hypotheses

Based on the research questions, the following null hypotheses were formulated and tested at $P \leq 0.05$ level of significance:

Ho_1: There is no significant difference in the academic performance of Upper Basic II students taught Basic Science using scaffolding strategy and those taught using conventional teaching methods in Kachia Education Zone.

Ho_2: There is no significant difference in the interest levels of Upper Basic II students taught Basic Science using scaffolding strategy and those taught using conventional teaching methods in Kachia Education Zone.

Methodology

The study employed a quasi-experimental research design, specifically the non-equivalent control group pretest-posttest design. This design was considered appropriate because the participants were drawn from existing intact classes without random assignment. The design involved two groups: an experimental group that was exposed to the scaffolding

Zamfara International Journal of Education (ZIJE)
The Official Journal of the Faculty of Education
Federal University Gusau, Zamfara State, Nigeria
Volume 5, Number 4, August, 2025
pISSN: (Hard Copy): 2814 – 1377; eISSN (Online): 2814 – 1369 www.foefugusau.com.ng
DOI: https://doi.org/10.64348/zije.202585

instructional strategy, and a control group that was taught using conventional methods. Both groups were pretested and posttested to determine the effect of the intervention on students' academic performance and interest in Basic Science.

The population for the study consisted of all Upper Basic II students in public junior secondary schools in Kachia Education Zone of Kaduna State, Nigeria. The Kachia Education Zone comprises several schools with a significant number of students offering Basic Science. According to data obtained from the Kaduna State Ministry of Education (2024), there were over 4,200 students in this category across all the public junior secondary schools in the zone. The sample for the study comprised 104 Upper Basic II students selected from two co-educational public schools within the Kachia Education Zone. A simple random sampling technique was used to select two schools. From each school, one intact class was selected. One class served as the experimental group with 55 students and the other served as the control group with 49 students. Two research instruments were used for data collection. The first instrument was the Basic Science Performance Test (BPT). This test consisted of 30 multiple-choice items designed to assess students' understanding of selected Basic Science concepts taught during the intervention. The test was developed by the researcher and was validated by experts in Science Education and Measurement and Evaluation. The reliability of the BSAT was established using the Kuder-Richardson Formula 20 (KR-20), and it yielded a reliability coefficient of 0.82, which was considered acceptable.

The second instrument was the Basic Science Interest Questionnaire (BSIQ), which was designed to measure students' interest in Basic Science. It consisted of 20 items based on a 4-point Likert scale ranging from Strongly Agree (4) to Strongly Disagree (1). The BSIS was adapted from existing validated interest scales and subjected to face and content validation by three experts two from Science Education and one from Educational Psychology of the Ahmadu Bello University, Zaria. The reliability of the instrument was determined using Cronbach's alpha, which yielded a reliability index of 0.86. The validation of the instruments involved a thorough review by the experts mentioned above. Their suggestions and recommendations led to revisions in some of the test items and statements to improve clarity, alignment with curriculum content, and appropriateness for the target population. These revisions helped to ensure the validity of the instruments. Data collection was conducted over a period of six weeks. During the first week, pretests (BSPT and BSIQ) were administered to both the experimental and control groups to determine their baseline performance and interest levels. The intervention was conducted for a period of 6 weeks. During this period, the experimental group was taught selected Basic Science concepts using the scaffolding strategy. The strategy involved instructional techniques such as teacher modeling, guided questioning, the use of visual aids, structured tasks, and the gradual withdrawal of support as students gained mastery. The control group, on the other hand, was taught the same content using the conventional method. In the sixth week, posttests were administered to both groups using the same instruments (BSPT and BSIQ) to measure any changes in academic performance and interest. Data collected were analyzed using both descriptive and inferential statistics. Mean and standard deviation were used to answer the research questions. To test the null hypotheses, independent sample t-test and Mann Whitney U-test were used at a significance level of 0.05.

Presentation of Results

Research Question 1

What is the difference between mean academic performance scores of Upper basic II students taught Basic science concepts using Scaffolding Instructional and those taught using conventional method?

To answer this question, the mean scores and standard deviations of the pretest and posttest BSAT results for both experimental and control groups were computed and compared.

Table 1: Mean, Standard Deviation Statistics Posttest EPT scores for Students in Experimental and Control Groups

Group	N	Mean	Std	Mean difference
Experimental	55	35.03	1.78	6.02
Control	49	29.01	3.03	

In Table 1, the result of the analysis shows that there was difference in the mean performance scores of students taught Basic science concepts using Scaffolding Strategy and those taught using conventional method. Their mean Academic Performance Scores were 35.03 and 29.01 with a mean difference of 6.02 in posttest scores of the experimental and control groups respectively.

Research Question Two: What is the difference between the mean interest score of students taught Basic science concepts using Scaffolding Strategy and those taught using conventional method?

To answer research question three, the data obtained from posttest score on BSIQ was subjected to descriptive statistics of mean rank and sum of rank and summary of findings is shown in Table 1.3.

Table 2: Mean Rank, Sum of Rank Statistics of Posttest BSIQ Interest Scores for Students in Experimental and Control Groups

Group	N	Mean Rank	Sum of Ranks	Mean diff
Experimental	55	98.76	5432.00	

Zamfara International Journal of Education (ZIJE)
The Official Journal of the Faculty of Education
Federal University Gusau, Zamfara State, Nigeria
Volume 5, Number 4, August, 2025
pISSN: (Hard Copy): 2814 – 1377; eISSN (Online): 2814 – 1369 www.foefugusau.com.ng
DOI: https://doi.org/10.64348/zije.202585

				35.01
Control	49	63.75	3124.00	

Table 2 shows that a difference exists between mean Interest scores of Upper basic II students taught Basic science concepts using Scaffolding Strategy and their counterpart taught using conventional method. The computed Mean Rank Interest scores are 98.76 and 63.75 for Upper basic II students taught Basic science concepts using Scaffolding Strategy and their counterpart taught using conventional method respectively indicating a mean rank difference of 35.01 in favour of the experimental group.

Hypothesis 1

There is no significant difference in the academic performance of Upper Basic II students taught Basic Science using scaffolding strategy and those taught using the conventional method.

To test this hypothesis, independent sample t-test was conducted on the posttest scores of the experimental and control groups and a summary of the analysis is presented in Table 3

Table 3: Summary of Independent Sample t-test of Mean Posttest EPT Scores for the Experimental and Control Groups.

Group	N	Mean	Std	Mean diff.	df	t-value	p-value	Remark
Experimental	55	35.03	1.78					
				6.02	102	29.1	0.002	Sig
Control	49	29.01	3.03					

Significant at p≤0.05

Table 3 shows a p-value of 0.002, observed at degree of freedom of 102. This p-value is less than the 0.05 level of significance, indicating that there is significant difference between the mean academic performance scores of upper basic II students taught Basic science concepts using Scaffolding Strategy and their counterparts taught same concept using conventional method. The observed difference is in favour of the experimental group who were exposed to the scaffolding strategy. Hence, the null hypothesis is rejected, implying that Scaffolding Strategy significantly enhanced upper basic II students' academic performance in Basic science than the conventional method.

Hypothesis 1

There is no significant difference between mean interest score of Upper basic II students taught Basic science concepts using Scaffolding strategy and their counterpart taught using conventional method.

To test null hypothesis three, the scores obtained from posttest score of BSIQ was analyzed using Mann Whitney statistics and the result is presented in Table 4.

Table 4: Summary of Mann Whitney Mean Posttest BSIQ Score for Experimental and Control Groups.

GROUP	N	Mean Rank	Sum of Ranks	df	p-value	Remark
Experimental	55	98.76	5432.00		0.001	
				102		Sig
Control	49	63.75	3124.00			

Significant at p≤0.05

The data shows a significant difference between the experimental and control groups in terms of interest towards Basic science concepts. The experimental group have a mean rank of 98.76 and a sum of ranks of 5432.00 while the control group have a mean rank of 63.75 and a sum of ranks of 3124. a p-value of 0.001 is less than 0.5 at degree of freedom (df) of 102, which indicates a significant difference in favor of the experimental group. This shows that students taught basic science concepts using scaffolding strategy have higher interest compared to those taught using the conventional method. Therefore, the null hypothesis that states that, there is no significant difference between the interest level of Upper basic 1I students taught Basic science concepts using scaffolding strategy and those taught using conventional methods, is hereby rejected.

Discussion of Findings

This study investigated the effect of scaffolding instructional strategy on students' interest and academic performance in Basic Science concepts among Upper Basic II students in Kachia Education Zone, Kaduna State. The finding indicated that students taught using the scaffolding strategy significantly outperformed their counterparts taught with conventional methods. This supports the view of Awodun (2024) who reported that scaffolding instruction enhances cognitive

Zamfara International Journal of Education (ZIJE)
The Official Journal of the Faculty of Education
Federal University Gusau, Zamfara State, Nigeria
Volume 5, Number 4, August, 2025
pISSN: (Hard Copy): 2814 – 1377; eISSN (Online): 2814 – 1369 www.foefugusau.com.ng
DOI: https://doi.org/10.64348/zije.202585

engagement and promotes deeper understanding. The result also aligns with that of Folashade (2023) and Akubor et al., (2025), who found improved student performance in science subjects when learner-centered instructional approaches were used.

The study also revealed that students in the experimental group demonstrated significantly higher interest in Basic Science than their counter parts in the control group. This finding agrees with Hiğde and Aktamış (2022), and Krishan (2023) who found that interest and motivation in science learning improved when instructional strategies focused on active participation and learner support. The findings demonstrate that scaffolding not only improves students' academic performance but also positively influences their interest.

Conclusion

Based on the findings of this study, it can be concluded that the scaffolding instructional strategy is an effective teaching approach for improving both students' academic performance and interest in Basic Science at the Upper Basic level. The strategy's capacity to provide structured guidance and gradual release of learning responsibility made it particularly effective in engaging students cognitively and emotionally. The study shows that innovative and student-centered teaching strategies are important for addressing the persistent problems of poor performance and low interest in science subjects, particularly Basic science

Recommendations

Based on the findings of this study, the following recommendations were made:

1. Basic Science teachers should adopt scaffolding instructional strategies in their lesson delivery to enhance students' understanding and engagement in science concepts.
2. Educational administrators and curriculum planners should provide training and workshops for teachers on how to effectively implement scaffolding strategies and other learner-centered methods in science classrooms.
3. Textbook developers and instructional material designers should incorporate scaffolding elements such as prompts, guided questions, and graduated tasks to support learners' progression and autonomy.
4. Government and policymakers in education should encourage a shift from traditional lecture-based teaching to constructivist approaches like scaffolding, particularly in areas like Kachia.

References

Acosta-Gonzaga, E., & Ramirez-Arellano, A. (2022). Scaffolding matters? Investigating its role in motivation, engagement and learning achievements in higher education. *Sustainability, 14*(20), 13419. https://doi.org/10.3390/su142013419

Agboola, O. S. (2025). Science education in Nigeria: The emergence, challenges and expectations.

Akubor, F., Achimugu, L., Fasanya, A. G., & Oche, O. A. (2025). Effect of scaffolding instructional strategy on senior secondary students' academic performance in physics in Kogi State, Nigeria. *Journal of Science, Technology and Mathematics Pedagogy, 3*(1), 37–48.

Assem, H. D., Nartey, L., Appiah, E., & Aidoo, J. K. (2023). A review of students' academic performance in physics: Attitude, instructional methods, misconceptions, and teacher qualification. *European Journal of Education and Pedagogy, 4*(1), 84–92. https://doi.org/10.24018/ejedu.2023.4.1.601

Awodun, A. O. (2024). Effects of scaffolding teaching strategy on students' academic performance in secondary school physics in Ekiti State for creativity and economic development. *IPHO-Journal of Advance Research in Education & Literature, 2*(2), 8–20.

Fakhridinovna, I. D. (2025). Distinction between traditional and modern educational system. *American Journal of Multidisciplinary Bulletin, 3*(3), 71–81.

Folashade, A. J. (2023). Exploring the challenges and possibilities of using learner-centered approach to teach in Nigerian public secondary schools. *African Perspectives of Research in Teaching and Learning, 7*(2), 213–232.

Hiğde, E., & Aktamış, H. (2022). The effects of STEM activities on students' STEM career interests, motivation, science process skills, science achievement and views. *Thinking Skills and Creativity, 43*, 101000. https://doi.org/10.1016/j.tsc.2021.101000

Krishan, I. Q. (2023). The effect of technology-oriented differentiated instruction on motivation to learn science. *International Journal of Instruction, 16*(1), 961–982. https://doi.org/10.29333/iji.2023.16154a

Margie, N. (2025). The role of inquiry-based learning in science education: A shift from traditional methods.

Ndjangala, M. N. N., Abah, J., & Mashebe, P. (2021). Teachers' views on challenges affecting learners' performance in natural science. *International Journal of Evaluation and Research in Education, 10*(1), 48–56. https://doi.org/10.11591/ijere.v10i1.20967

Oginni, A. M., Saibu, S. O., Awobodu, V. Y., & Olusegun, B. E. (2024). Linking basic science teaching to daily activities of learners: An impetus for sustainable global development. *Faculty of Natural and Applied Sciences Journal of Mathematics and Science Education, 6*(1), 41–49.

Zamfara International Journal of Education (ZIJE)
The Official Journal of the Faculty of Education
Federal University Gusau, Zamfara State, Nigeria
Volume 5, Number 4, August, 2025
pISSN: (Hard Copy): 2814 – 1377; eISSN (Online): 2814 – 1369 www.foefugusau.com.ng
DOI: https://doi.org/10.64348/zije.202585

Onah, K. T. (2022). Effect of scaffolding teaching approach on students' academic achievement in quantum physics in Enugu education zone. *Greener Journal of Educational Research, 12*(1), 13–21.

Onah, O., Ubah, G. N., & Gideon, N. M. (2024). Effects of scaffolding-based supervision and directed independent study on students' research knowledge and skill development in agricultural education programme in a Nigerian university. *International Journal of Agricultural Education & Research, 2*(2), 14–33.

Oyubu, G., & Agbigbe, K. E. (2025). Innovative strategies for teaching science and their challenges in Nigerian rural areas. *Mosogar Journal of Science Education, 10*(1), 134–143.

Puntambekar, S. (2022). Distributed scaffolding: Scaffolding students in classroom environments. *Educational Psychology Review, 34*(1), 451–472. https://doi.org/10.1007/s10648-021-09601-1

Umeji, I. C. (2025). Factors responsible for the students' declining interest in primary education in Anambra State, Nigeria. *Indonesian Journal of Character Education Studies, 2*(1), 12–20.