Effects of Think-Pair-Share Strategy on Students' Interest and Academic Performance in Basic Science, Benue State, Nigeria

Paul Terkura TORKULA[1] & Cynthia Shidoo KYAUSU[2]

[1]Department of Integrated Science, School of Sciences,
Federal College of Education, Okene, Kogi State, Nigeria
ernesttorkula@gmail.com | +2348130408468 / +2349153656526

[2]Department of Educational Foundations, Faculty of Education,
Rev. Fr. Moses Orshio Adasu University, Makurdi, Benue State, Nigeria
shidookyausu@gmail.com | +234 7067796291

DOI: https://doi.org/10.5281/zenodo.20038679

Abstract

This study investigated the effect of Think-Pair-Share instructional strategy on students' interest and academic performance in Basic Science among Upper Basic II students in Vandeikya Education Zone, Benue State, Nigeria. Two research questions examined differences in mean interest ratings and academic performance between students taught using Think-Pair-Share Strategy and chalk-and-talk method. Two null hypotheses were tested at 0.05 significance level. A pre-test, post-test quasi-experimental and survey design was adopted with two groups: Experimental Group I (Think-Pair-Share Strategy, n=106), and Control Group (chalk-and-talk, n=106). The population comprised 13,009 Upper Basic II students in 96 schools. Multi-stage sampling yielded 321 students from six intact classes across three schools. Data were collected using the Basic Science Interest Questionnaire with 30 items (Cronbach Alpha=0.86) and the Basic Science Performance Test with 50 multiple-choice items (KR-21=0.79), both validated by five experts and trial-tested on 40 students. Data analysis employed mean, standard deviation, and ANCOVA. Findings revealed that Think-Pair-Share Strategy significantly improved interest and performance compared to chalk-and-talk. The study concluded that Think-Pair-Share Strategy significantly outperforms traditional approaches in fostering interest and performance in Basic Science. Recommendations included integrating Think-Pair-Share Strategy into classroom practice, providing professional development for teachers.

Key words: Think Pair Share, Student interest, Academic performance.

Introduction

The trajectory of national development in the 21st century is inextricably linked to scientific advancement and technological innovation. Nations that have prioritized science education have witnessed transformative changes across healthcare, agriculture, environmental sustainability, and economic diversification (UNESCO, 2021; World Bank, 2020). Science is not merely an academic discipline but a critical driver of societal progress, making the quality of science education at foundational levels a matter of urgent scholarly attention and pedagogical reform. Orji and Anaduaka (2020) corroborate this, noting that science stimulates reasoning, intellectual effort, and new ideas, occupying a central position in education and national development.

In Nigeria, Basic Science and Technology is a core subject at the Upper Basic level, designated by the Federal Ministry of Education (FME, 2023) to develop scientific literacy and technological competence. Despite its foundational importance, student performance in the subject has remained chronically poor. Data from the Benue State Examination Board (2024) reveal that credit pass rates in the Basic Education Certificate Examination (BECE) ranged from only 19.20% to 31.67% between 2015 and 2024, with failure rates reaching 56%, pointing to systemic instructional inadequacies that demand urgent pedagogical reform.

Yet a troubling disconnect exists between curricular aspirations and classroom realities. Although the curriculum explicitly advocates activity-based, student-centered approaches, actual practice reveals continued dominance of traditional chalk-and-talk methodology fundamentally at odds with constructivist principles undergirding contemporary science education. This methodological conservatism represents a systemic barrier to achieving curricular outcomes (Obi &Mbah, 2021; Njoku, 2019). The chalk-and-talk method positions students as passive consumers rather than active producers of knowledge, privileging memorization over understanding and teacher authority over student inquiry, drastically limiting opportunities for hands-on exploration and collaborative problem-solving that characterize authentic scientific practice. Agboghoroma (2024) argues that effective Basic Science instruction requires strategies fostering productive learning experiences addressing cognitive, affective, and psychomotor dimensions simultaneously. Traditional instruction typically addresses only lower cognitive levels while the affective and psychomotor domains receive minimal attention, making it unsurprising that research links teacher-centered instruction to poor academic performance (Katcha & Babagana, 2022).

Think-Pair-Share represents a fundamental reconceptualization of classroom interaction. This cooperative learning approach transforms classrooms into collaborative knowledge-building communities where students actively construct understanding through structured peer interaction via three sequenced phases. In the Think phase, students engage in individual reflection, allowing personal cognitive processing before social interaction ensuring all students formulate preliminary ideas (Lyman, 1981; McTighe & Lyman, 1988). The Pair phase introduces collaborative dialogue as students discuss reflections with partners, articulating reasoning and refining understanding. In the Share phase, pairs present collaboratively developed ideas to the larger community, exposing all students to multiple perspectives and enabling teachers to assess understanding. This progression creates multiple opportunities for cognitive engagement, ensures broad participation, and facilitates social knowledge construction central to meaningful learning (Lyman, 1981).

However, advocacy and theoretical promise are insufficient. What is needed is rigorous empirical investigation of whether student-centered strategies like Think-Pair-Share actually improve learning outcomes in specific contexts. Despite the strategy's theoretical alignment with constructivist principles and documented effectiveness in various settings, a significant gap exists in research literature concerning its impact specifically on Basic Science learning in Benue State, Nigeria. This gap is particularly problematic given that instructional effectiveness is never entirely context-independent; strategies proving effective in one context may require adaptation in alternative settings. Therefore, context-specific empirical investigation is essential for generating actionable evidence to inform instructional practice and policy decisions. The present study addresses this gap by investigating Think-Pair-Share strategy effects on students' interest and academic performance in Basic Science within public secondary schools in the Vandeikya Education Zone of Benue State, Nigeria. By systematically comparing learning outcomes under Think-Pair-Share instruction with conventional chalk-and-talk methods, this study provides empirical evidence regarding the strategy's effectiveness in this specific context, contributing to broader scholarly conversations about effective science pedagogy while generating practical insights to guide instructional improvement efforts. Given persistent underperformance in Basic Science and its far-reaching implications for students' educational trajectories and Nigeria's scientific capacity, such evidence is urgently needed for informed educational reform.

Statement of the Problem

Despite the widespread advocacy for student-centered instructional approaches in science education, Basic Science performance among Upper Basic II students in Vandeikya Education Zone of Benue State has remained persistently poor, as evidenced by credit pass rates of between 19.20% and 31.67% in the Basic Education Certificate Examination (BECE) between 2015 and 2024 (Benue State Examination Board, 2024). A key factor contributing to this underperformance is the continued dominance of the chalk-and-talk method in classroom instruction, which positions students as passive recipients of knowledge and fails to promote the active engagement, collaborative inquiry, and higher-order thinking that effective science learning demands. While the Think-Pair-Share (TPS) strategy has been theoretically aligned with constructivist principles and demonstrated effectiveness in various subject areas, empirical evidence of its impact on students' interest and academic performance in Basic Science within the specific context of Vandeikya Education Zone remains limited. This gap in context-specific evidence makes it difficult to justify or guide the adoption of TPS as an instructional alternative in this setting. Against this backdrop, this study investigated the effects of the Think-Pair-Share strategy on students' interest and academic performance in Basic Science among Upper Basic II students in public secondary schools in Vandeikya Education Zone, Benue State, Nigeria.

Purpose of the Study

This study investigated the effects of Think-Pair-Share (TPS) instructional strategy on students' interest and academic performance in Basic Science among Upper-Basic II classes in public secondary schools in the Vandeikya Education Zone of Benue State, Nigeria. Specifically, the study seeks to:

1. Investigate students' interest in Basic Science when taught using Think-Pair-Share (TPS) strategy and those taught using chalk and talk method.
2. Determine students' academic performance in Basic Science when taught using Think-Pair-Share (TPS) strategy and those taught using chalk and talk method.

Research Questions

1. What is the difference between the mean interest ratings of students in Basic Science taught using Think-Pair-Share (TPS) strategy and those taught using the chalk and talk method?

2. What is the difference between the mean academic performance scores of students in Basic Science taught using Think-Pair-Share (TPS) strategy and those taught using the chalk and talk method?

Hypotheses

The following null hypotheses were formulated and tested at a 0.05 level of significance:

1. There is no significant difference between the mean interest ratings of students in Basic Science taught using Think-Pair-Share (TPS) strategy and those taught using the chalk and talk method.
2. There is no significant difference between the mean academic performance scores of students in Basic Science taught using Think-Pair-Share (TPS) strategy and those taught using the chalk and talk method.

Methodology

The study adopted a quasi-experimental and survey design (non-equivalent, non-randomized, pre-test/post-test control group). This design was considered appropriate because it allows for the comparison of outcomes between two groups (experimental and control) without random assignment of participants. The population of the study comprised 13,009 Upper Basic II students offering Basic Science in the 96 public Basic Schools in the Vandeikya Education Zone of Benue State, Nigeria, for the 2024/2025 academic session (Benue State Examination Board, 2025). The population was distributed across four Local Government Areas: Vandeikya, Konshisha, Ushongo, and Kwande with students aged between 12 and 15 years. Multi-stage sampling procedure was used to select 321 Upper Basic II students from three schools in the study area.

The students in the experimental groups were taught with the Think-Pair-Share teaching strategy while the control groups were taught using the chalk-and-talk teaching strategy. Two instruments were used for data collection: the Basic Science Interest Scale (BSIS) and the Basic Science Performance Test (BSPT), both developed by the researcher. The instruments were given to two science education experts and one specialist in measurement and evaluation, Benue State University, Makurdi, along with two experienced Basic Science teachers for validation. The suggestions from their observation were effected before taking them to the field. The BSPT comprised 50 multiple-choice items adapted from NECO past questions covering the years 2020

to 2024, designed to assess students' understanding of selected Basic Science topics including Types of Energy, Thermal Energy, Living Things, Chemicals, Work, Energy, and Power. Each item had four options with one correct answer, and students were given 50 minutes to complete the test, with one mark allocated for each correct answer, giving a maximum obtainable score of 50 marks. The trial-testing was carried out on 40 students in a school within the study area that was not part of the sampled schools to determine the internal consistency of the instruments. The result of the data analyzed using Cronbach Alpha yielded a reliability coefficient of 0.97 for the BSIS; this statistic was used because the items in the instrument were not scored dichotomously. The BSPT yielded a Kuder-Richardson Formula 21 (K-R21) coefficient of 0.79, which was appropriate due to its dichotomous scoring nature.

The experimental group was taught the selected Basic Science topics using Think-Pair-Share strategy while the control group was taught using the chalk-and-talk strategy. Each lesson lasted 80 minutes, and the treatment lasted for five weeks after which a post-test was administered to the students. Mean and standard deviation were used to answer the research questions. ANCOVA was used to test the formulated hypotheses at 0.05 level of significance.

Results

Research Questions

What is the difference between the mean interest ratings of students in Basic Science taught using Think-Pair-Share (TPS) strategy and those taught using the chalk and talk method?

Table 1: Mean and Standard Deviation of mean interest ratings of students in Basic Science taught using Think-Pair-Share (TPS) strategy and those taught using the chalk and talk method

Method	N	Pre-interest		Post-interest		Mean gain	Mean Difference
		x	SD	*x*	SD		
Think-Pair-Share (TPS) (Experimental Group)	109	1.92	.894	2.87	.851	0.95	
Chalk and talk method (Control Group)	106	1.83	.856	2.05	.989	0.22	0.73

Table 1 shows the mean interest ratings of students taught Basic Science using Think-Pair-Share (TPS) strategy and those taught using the chalk and talk method. The table reveals that the mean

interest rating of students taught with TPS was 1.92 with a standard deviation of 0.894 at pre-interest, while their post-interest score was 2.87 with a standard deviation of 0.851. On the other hand, students taught using the chalk and talk method had a mean interest rating of 1.83 with a standard deviation of 0.856 at pre-interest, and a post-interest mean rating of 2.05 with a standard deviation of 0.989. Furthermore, the table shows that the mean gain of students taught with the TPS strategy was 0.95, whereas those taught using the chalk and talk method had a mean gain of 0.22. The mean difference between the scores of students taught Basic Science using TPS strategy and those taught using chalk and talk method was 0.73, in favour of the TPS strategy. This indicates that students exposed to the TPS strategy developed greater interest Basic Science compared to their counterparts taught using the conventional chalk and talk method.

Research Questions 2

What is the difference between the mean academic performance scores of students in Basic Science taught using Think-Pair-Share (TPS) strategy and those taught using the chalk and talk method?

Table 2: Mean and Standard Deviation of mean academic performance scores of students in Basic Science taught using Think-Pair-Share (TPS) strategy and those taught using the chalk and talk method

Method	N	Pre-test		Post-test		Mean gain	Mean Difference
		x	SD	*x*	SD		
Think-Pair-Share (TPS) (Experimental Group)	109	25.85	8.51	40.96	5.75	15.11	
Chalk and talk method (Control Group)	106	25.30	8.86	28.17	9.89	2.87	
							12.79

Table 2 shows the mean academic performance scores of students taught Basic Science using Think-Pair-Share (TPS) strategy and those taught using the chalk and talk method. The table reveals that the mean performance score of students taught with TPS was 25.85 with a standard deviation of 8.51 at pre-test, while their post-test mean score was 40.96 with a standard deviation of 5.75. Conversely, the mean performance score of students taught using the chalk and talk method was 25.30 with a standard deviation of 8.86 at pre-test, and a post-test mean score of

28.17 with a standard deviation of 9.89. Furthermore, the results show that students taught with the TPS strategy had a mean gain of 15.11, while those taught with the chalk and talk method had a mean gain of 2.87. The mean difference between the post-test scores of students taught Basic Science using TPS and those taught with chalk and talk method was therefore 12.79 in favour of the TPS strategy. This indicates that students exposed to the TPS strategy performed better academically in Basic Science than those taught with the chalk and talk method.

Hypotheses

Hypotheses One

There is no significant difference between the mean interest ratings of students in Basic Science taught using Think-Pair-Share (TPS) strategy and those taught using the chalk and talk method.

Table 3: ANCOVA on mean interest ratings of students in Basic Science taught using Think-Pair-Share (TPS) strategy and those taught using the chalk and talk method

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	75.438[a]	2	37.719	56.293	.000
Intercept	91.148	1	91.148	136.032	.000
Pre-interest	38.915	1	38.915	58.078	.000
Strategy	32.763	1	32.763	48.896	.000
Error	142.051	212	.670		
Total	1524.000	215			
Corrected Total	217.488	214			

Table 3 reveals that F (1, 212) = 48.896; p = 0.000 < 0.05. Since the p-value is less than the 0.05 alpha level, the null hypothesis is rejected. This indicates that the teaching strategy (TPS vs. chalk and talk) had a significant effect on students' interest in Basic Science. The result therefore implies that there is a significant difference in the mean interest ratings of students taught using Think-Pair-Share (TPS) strategy compared to those taught with the chalk and talk method.

Furthermore, the R Squared value of 0.347 suggests that about 34.7% of the variation in students' interest ratings can be explained by the teaching strategy and pre-interest scores, which indicates a moderate effect size. Thus, based on the evidence from data analysis, it can be concluded that the Think-Pair-Share (TPS) strategy significantly enhanced students' interest in Basic Science more than the chalk and talk method.

Hypotheses Two

There is no significant difference between the mean academic performance scores of students in Basic Science taught using Think-Pair-Share (TPS) strategy and those taught using the chalk and talk method.

Table 4: ANCOVA on mean academic performance scores of students in Basic Science taught using Think-Pair-Share (TPS) strategy and those taught using the chalk and talk method

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	13319.216[a]	2	6659.608	151.496	.000
Intercept	9718.346	1	9718.346	221.077	.000
Pre-test	4523.482	1	4523.482	102.902	.000
Strategy	8389.598	1	8389.598	190.850	.000
Error	9319.315	212	43.959		
Total	280859.000	215			
Corrected Total	22638.530	214			

Table 4 shows that F (1, 212) = 190.850; p = 0.000 < 0.05. Since the p-value is less than the 0.05 alpha level, the null hypothesis is rejected. This implies that the teaching strategy had a significant effect on students' academic performance in Basic Science. Therefore, there is a significant difference between the mean academic performance scores of students taught using Think-Pair-Share (TPS) strategy and those taught with the chalk and talk method. The R Squared value of 0.588 indicates that approximately 58.8% of the variance in students' academic performance can be explained by the teaching strategy and pre-test scores, suggesting a strong effect size. Thus, based on evidence from data analysis, it is concluded that the Think-Pair-Share (TPS) strategy significantly improved students' academic performance in Basic Science compared to the chalk and talk method.

Discussion of Findings

The study revealed that there was a significant difference between the mean interest ratings of students in Basic Science taught using the Think-Pair-Share strategy and those taught using the chalk-and-talk method, with students in the Think-Pair-Share group demonstrating greater interest. Students exposed to Think-Pair-Share were found to develop higher levels of

enthusiasm, curiosity, and engagement than those taught using the conventional method. This may be because the interactive and participatory nature of Think-Pair-Share allowed learners to think individually, pair up to share ideas, and participate in class discussions, which supports deeper engagement, cooperative learning, and peer interaction, helping students clarify misconceptions and connect scientific concepts with real-life experiences. Unlike the chalk-and-talk method, which promotes passive listening and teacher dominance, Think-Pair-Share encourages active involvement and nurtures intrinsic motivation. This finding aligns with Abraham *et al*. (2023), Adagwine (2023), Oluwasegun (2022), Achufusi*et al*. (2024), and Akinduro (2025), who reported that Think-Pair-Share significantly enhanced students' motivation, interest, and engagement across various science subjects, emphasizing that its collaborative structure fosters active participation and provides a platform for learners to exchange ideas in a supportive environment. The implication is that effective enhancement of students' interest in Basic Science requires the adoption of interactive strategies such as Think-Pair-Share that promote collaborative learning and active involvement, rather than relying on passive, teacher-dominated approaches.

The study further revealed that there was a significant difference in the mean academic performance scores of students in Basic Science taught using the Think-Pair-Share strategy and those taught using the chalk-and-talk method, with students in the Think-Pair-Share group achieving higher performance. Students exposed to Think-Pair-Share were found to demonstrate superior understanding, knowledge acquisition, and application of scientific concepts. This may be because the collaborative and reflective nature of Think-Pair-Share fosters deeper understanding, promotes peer teaching, and allows students to articulate and refine their thoughts through interaction and feedback, thereby developing higher-order thinking skills. Unlike the chalk-and-talk method, which encourages rote memorization and passive learning, Think-Pair-Share provides opportunities for active participation and knowledge construction. This finding corroborates with Ogbaga et al. (2022), Wokocha (2024), Peveret al. (2024), Oluwasegun (2022), Abraham et al. (2023), Achufusi et al. (2024), and Akinduro (2025), who reported that Think-Pair-Share significantly enhanced students' academic achievement across science subjects, promoting higher engagement, cooperative learning, and critical thinking. The implication is that improving students' academic performance in Basic Science requires implementing strategies like Think-Pair-Share that foster collaborative learning and active engagement, highlighting the

need for educators to adopt learner-centered approaches that promote deeper comprehension and long-term mastery of scientific concepts.

Conclusions

Based on the findings of this study, the following conclusions were drawn:

Findings from this study have shown that the use of Think-Pair-Share Strategy (TPS), in teaching Basic Science at the Upper Basic II level was more effective than the conventional chalk-and-talk method in enhancing students' interest and academic performance.

Recommendations

i. Basic Science teachers should regularly adopt TPS to stimulate students' active participation, as it enhances interest and improves academic performance compared to the chalk-and-talk method.

ii. School administrators and curriculum planners should provide adequate training and professional development programmes for Basic Science teachers on the effective implementation of the Think-Pair-Share strategy in classrooms.

iii. Government and educational policy makers should integrate learner-centered instructional approaches such as Think-Pair-Share into the official Basic Science curriculum, and provide necessary resources to support its implementation in public secondary schools across Nigeria.

References

Abraham, T. O., Okoro, F. N., &Adeyemi, B. A. (2023). Effects of Think-Pair-Share strategy on students' motivation and achievement in chemistry. *Journal of Science Education and Technology*, 32(4), 456-470.

Achufusi, N. N., Eze, G. N., &Okeke, S. I. (2024). Impact of Think-Pair-Share on secondary school students' performance in biology. *African Journal of Educational Research*, 12(2), 89-105.

Adagwine, V. T. (2023). Think-Pair-Share instructional strategy and students' interest in physics: An experimental study. *Journal of Educational Psychology*, 28(3), 234-249.

Agboghoroma, T. E. (2024). Enhancing cognitive and affective outcomes in Basic Science through activity-based learning. *Nigerian Journal of Science Education*, 12(1), 34-48.

Akinduro, A. L. (2025). Collaborative learning strategies and students' engagement in Basic Science: A comparative analysis. *West African Journal of Education*, 35(1), 78-94.

Benue State Examination Board. (2024). *Basic Education Certificate Examination (BECE) statistics 2015–2024.* BSEB Publications.

Federal Ministry of Education [FME]. (2023). *National policy on education* (7th ed.). NERDC Press.

Katcha, M. A., &Babagana, M. (2022). Challenges of teaching Basic Science in Nigerian secondary schools. *Journal of Science and Technology Education,* 10(3), 145-158.

Lyman, F. T. (1981). The responsive classroom discussion. In A. S. Anderson (Ed.), *Mainstreaming Digest* (pp. 109–113). University of Maryland College of Education.

McTighe, J., & Lyman, F. T. (1988). Cueing thinking in the classroom: The promise of theory-embedded tools. *Educational Leadership,* 45(7), 18–24.

Njoku, Z. C. (2019). Factors affecting students' performance in Basic Science in Nigerian junior secondary schools. *Journal of Science Education Research,* 3(1), 45–58.

Obi, C. N., &Mbah, G. C. (2021). Curriculum implementation challenges in Basic Science education in Nigeria. *Nigerian Journal of Educational Research,* 16(2), 112–126.

Ogbaga, C. C., Onu, V. C., &Ogwunte, P. C. (2022). Effect of Think-Pair-Share strategy on students' achievement in senior secondary biology. *Journal of Science Teachers Association of Nigeria,* 57(2), 134-148.

Oluwasegun, T. M. (2022). Comparative effects of Think-Pair-Share and traditional methods on students' performance in chemistry. *African Journal of Science Education,* 18(3), 201-216.

Orji, C. T., &Anaduaka, U. S. (2020). Science education and national development: The Nigerian experience. *International Journal of Scientific Research in Education,* 13(2), 145-163.

Pever, T. J., Ukwuije, R. P., &Anzenge, J. M. (2024). Think-Pair-Share strategy and students' academic achievement in physics. *Journal of STEM Education Research,* 11(1), 67-83.

UNESCO. (2021). Education for sustainable development: A roadmap. United Nations Educational, Scientific and Cultural Organization.

Wokocha, A. M. (2024). Effect of Think-Pair-Share on students' achievement and retention in technical education. *Nigerian Journal of Educational Technology,* 15(2), 112-127.

World Bank. (2020). *The World Bank education overview: Higher education*. World Bank Publications.