



*Effects of Think-Pair-Share Instructional Strategy on ... Dajal, R. G. & Awoyeye, A. O. (2026)*

## **Effects of Think–Pair–Share Instructional Strategy on Interest and Achievement in Ecology Concept among Secondary School Biology Students in Federal Capital Territory, Abuja, Nigeria**

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### **Abstract**

*This study investigating the effect of the Think–Pair–Share (TPS) instructional strategy on secondary school students' interest and achievement in ecological concepts in Biology. The study adopted a quasi-experimental pretest–posttest non-equivalent control group design. A sample of 141 Senior Secondary School One (SS1) Biology students drawn from public secondary schools in the Federal Capital Territory (FCT), Abuja, Nigeria, participated in the study. The experimental group was taught using the TPS instructional strategy, while the control group was exposed to the conventional lecture method. Both groups were taught for five weeks. Ecological Concepts Interest Scale (ECIS) and Ecological Concepts Achievement Test (ECAT) were the instruments used for data collection. Data were analysed using mean, standard deviation, and Analysis of Covariance (ANCOVA). The results showed that students taught using the TPS instructional strategy had higher mean interest and achievement scores than those taught using the conventional teaching method. The study concluded that TPS instructional strategy greatly arouse students' interest and improved their academic performance in ecological concepts. It is therefore recommended that biology teachers adopt the Think–Pair–Share instructional strategy to enhance students' interest and achievement in biology.*

**Keywords:** achievement, biology, ecological concepts, Interest, Think–Pair–Share,

### **Introduction**

Biology is the scientific foundation for understanding life and its numerous processes, structures, and relationships. It enables learners to explore how living organisms function, survive, reproduce, and interact within their environments. Among its major branches, ecology occupies a central position because it explains the interconnectedness that exists between organisms and their physical surroundings. Through biology, students gain insight into natural systems and develop an appreciation for the delicate balance that sustains life on Earth. Ecological concepts such as ecosystems, energy flow, nutrient cycling, and population dynamics help learners recognize that no organism exists in isolation. This interconnected perspective strengthens students' scientific literacy and deepens their understanding of environmental stability and sustainability. As a result, biology serves not only as a body of knowledge but also as a tool for developing environmentally conscious and scientifically informed citizens. Ecological concepts are particularly significant because they connect classroom learning to real-world environmental realities that students encounter daily. These concepts help learners understand pressing environmental challenges such as climate change, habitat loss, pollution, and biodiversity decline, which are increasingly evident in many parts of Nigeria. By studying ecological relationships, students become more aware of how human activities influence environmental quality and ecosystem survival. This awareness fosters responsibility and encourages learners to adopt behaviors that support conservation and sustainable resource use. Furthermore, ecological knowledge equips students with analytical and problem-solving skills that are essential for addressing environmental problems at local and global levels. When students fully



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grasp ecological principles, they are better positioned to contribute meaningfully to environmental protection and national development. Therefore, ecological concepts form a critical bridge between biological knowledge and environmental responsibility. Ecology education provides the structured pathway through which ecological concepts are effectively taught and understood within the biology curriculum. It plays a vital role in helping students translate theoretical ecological knowledge into meaningful understanding and practical awareness. However, the effectiveness of ecology education depends largely on the instructional approaches used in the classroom, particularly in secondary schools within the Federal Capital Territory. Traditional lecture-based methods often limit student participation, reducing engagement and weakening conceptual understanding. In contrast, learner-centered strategies such as Think–Pair–Share encourage interaction, collaboration, and active cognitive involvement, which can significantly enhance students’ interest and academic achievement. This aligns with the position of UNESCO that effective science education should promote active learning and critical thinking. Reimagining ecology education through innovative instructional strategies is therefore essential for strengthening biology learning outcomes and preparing students to respond effectively to environmental challenges.

### **Objectives of the Study**

To guide the investigation, the study pursued the following objectives:

1. To determine the mean interest scores of students taught Ecology Concept using TPS and those exposed to conventional method in FCT, Abuja
2. To determine the mean achievement scores of students taught Ecology Concept using TPS and those exposed to conventional method in FCT, Abuja

### **Research Questions**

The following research questions guided the study:

1. What is the difference in mean interest scores of students taught Ecology Concept using TPS and those exposed to conventional method in FCT, Abuja?
2. What is the difference in mean achievement scores of students taught Ecology Concept using TPS and those exposed to conventional method in FCT, Abuja?

### **Null Hypothesis**

The following null hypotheses were tested at the 0.05 significance level:

**H<sub>01</sub>:** There is no significant difference in the mean interest scores of students taught Ecology Concept using TPS and those exposed to conventional method in FCT, Abuja

**H<sub>02</sub>:** There is no significant difference in the mean achievement scores of students taught Ecology Concept using TPS and those exposed to conventional method in FCT, Abuja

### **Literature Review**

Biology education plays a fundamental role in developing students’ understanding of living systems and their interactions with the environment. Within biology, ecological concepts are essential because they explain how organisms interact with one another and with their physical surroundings, thereby promoting environmental awareness and scientific literacy. However, several studies have reported persistent poor performance and low interest among secondary school students in biology, particularly in ecology-related topics, due to the abstract nature of ecological processes and ineffective teaching approaches (Falilat, 2025; Mohammed et al., 2023). Traditional teacher-centered methods often limit students’ active engagement and critical thinking, resulting in superficial understanding and poor retention of ecological knowledge. This has raised serious concerns among educators and researchers, as biology education is expected to equip learners with the knowledge and skills needed to address contemporary environmental challenges. Furthermore, the integration



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of sustainability and environmental literacy into biology education has become increasingly important in preparing students to contribute meaningfully to environmental conservation and sustainable development (Olalekan et al., 2025; Xiong et al., 2025). Therefore, improving ecology education through effective instructional strategies remains a critical priority in science education. Ecology education specifically focuses on helping learners understand ecosystem structure, energy flow, population dynamics, and environmental interactions. Despite its importance, research indicates that students often experience difficulties in understanding ecological concepts because they are complex and require higher-order thinking skills. Studies have shown that conventional lecture methods promote passive learning, which limits students' opportunities to actively engage with ecological content and construct meaningful understanding (Isa et al., 2020; Mukandayisenga et al., 2021). As a result, students frequently demonstrate low achievement and weak conceptual understanding in ecology. Environmental and biology education researchers emphasize that effective teaching of ecological concepts requires instructional approaches that promote interaction, collaboration, and critical thinking. Student-centered pedagogical strategies have been shown to improve environmental literacy, enhance conceptual understanding, and foster positive attitudes toward biology and environmental sustainability (Xiong et al., 2025; Olalekan et al., 2025). These findings highlight the need for instructional innovations that actively involve students in the learning process and promote deeper understanding of ecological concepts. One such learner-centered approach is the Think-Pair-Share (TPS) instructional strategy, which has been widely recognized for its effectiveness in improving students' academic achievement and interest in biology. TPS encourages students to think independently, discuss ideas with peers, and share their responses with the class, thereby promoting active engagement and collaborative learning. Research conducted in Abuja, Nigeria, revealed that students taught biology using the Think-Pair-Share strategy achieved significantly higher scores compared to those taught using conventional lecture methods, demonstrating its effectiveness in enhancing academic performance (Mbanefo et al., 2023). Similarly, studies have shown that TPS improves students' interest, attitude, and learning outcomes in biology by fostering interaction, critical thinking, and deeper conceptual understanding (Ejigbo et al., 2024; Stella & Gabriel, 2024; Yustini, 2023). TPS has also been found to significantly improve students' understanding of ecological concepts and overall biology learning outcomes (Yawandare et al., 2024). Therefore, the adoption of Think-Pair-Share strategy represents a promising approach for reimagining ecology education and improving students' interest and academic achievement in biology, particularly in secondary schools.

## Methodology

This study employed a quasi-experimental pretest-posttest non-equivalent control group design to investigate the effect of the Think-Pair-Share (TPS) instructional strategy on students' interest and achievement in ecological concepts. The population comprised all Senior Secondary School One (SS I) biology students in public secondary schools in the Federal Capital Territory (FCT), Abuja, Nigeria. The sample size was 141 students which were selected from public secondary schools using purposive and simple random sampling techniques. Two instruments used for data collection were; Ecological Concepts Achievement Test (ECAT) and the Ecological Concepts Interest Scale (ECIS). The ECAT contained 40 multiple-choice items designed to measure students' understanding of key ecological concepts, while the ECIS had 20 Likert-scale items used to assess students' level of interest in ecology. The instruments were validated by experts in science and biology education. The instruments were administered as pretest and posttest. To test the reliability coefficient, pilot testing was carried out using 40 students outside the main study sample. The ECAT yielded a Kuder-Richardson (KR-20) reliability coefficient of 0.78, while the ECIS gave a Cronbach's alpha coefficient



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of 0.88, indicating acceptable internal consistency. Before the treatment, biology teachers were guided on how to use the instructional procedures to ensure proper implementation. The experimental group was exposed to Think–Pair–Share instructional strategy. while the control group was taught with conventional lecture method. The treatment lasted for five weeks, after which the posttest was administered. Data were collected and analyzed using mean and standard deviation to answer the research questions, and Analysis of Covariance (ANCOVA) was used to test the hypotheses at the 0.05 level of significance, with pretest scores used to control for initial differences between the groups.

### Presentation of Results

**Research Question One:** What is the difference in mean interest scores of students taught Ecology Concept using TPS and those exposed to conventional method in FCT, Abuja?

*Table 1: Mean Interest Scores of Students taught Ecological Concepts using Think-Pair-Share Strategy and Conventional Method*

Group	Method of Teaching	N	Mean	Std. Deviation
Experimental Group	Think-Pair-Share	71	4.52	0.637
Control Group	Conventional	70	4.19	0.735
Mean Difference			<b>0.33</b>	

Results in Table 1 show the mean interest scores of students taught Ecological Concepts using Think-Pair-Share (TPS) instructional strategy and conventional teaching method. The results revealed that the mean interest score of the students in the experimental group after exposure to TPS strategy was 4.52, while that of their counterparts in the control group was 4.19 with a mean difference of 0.33.

**Research Question Two:** What is the difference in mean achievement scores of students taught Ecology Concept using TPS and those exposed to conventional method in FCT, Abuja?

*Table 2: Mean Achievement Scores of Students taught Ecological Concepts using Think-Pair-Share Strategy and conventional teaching Method*

Group	Method of Teaching	N	Mean	Std. Deviation
Experimental Group	Think-Pair-Share	71	23.10	4.42
Control Group	Conventional	70	19.73	4.45
Mean Difference			<b>3.37</b>	

Results in Table 2 show the mean achievement scores of students taught Ecological Concepts using Think-Pair-Share (TPS) teaching strategy and conventional teaching method. The results revealed that the mean achievement score of the students in the experimental group after exposure to TPS strategy was 23.10, while that of their counterparts in the control group was 19.73 with a mean difference of 3.37.

### Test of Hypotheses

#### Hypothesis One:

There is no significant difference in the mean interest scores of students taught Ecology Concept using TPS and those exposed to conventional method in FCT, Abuja

Table 3: ANCOVA Comparison of the Mean Interest Scores of TPS and Control Groups

#### Tests of Between-Subjects Effects

Dependent Variable: POST TEST



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Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3.539 <sup>a</sup>	2	1.769	3.737	0.027
Intercept	138.057	1	138.057	291.57	0
PRETEST	0.461	1	0.461	0.974	0.326
TREATMENT	3.002	1	3.002	6.339	0.013
Error	50.664	107	0.473		
Total	2138.811	110			
Corrected Total	54.203	109			

a. R Squared = 0.065 (Adjusted R Squared = 0.048)

b. Computed using alpha = 0.05

Table 3 shows the Analysis of Covariance (ANCOVA) results on students' interest in ecological concepts based on instructional strategy, using pretest scores as covariate. The result revealed that instructional strategy had a statistically significant effect on students' interest,  $F(1,107) = 6.34$ ,  $p = .013$ . Since the  $p$ -value (.013) is less than the alpha level of .05, the null hypothesis ( $H_{01}$ ) was rejected. This indicates that there is a significant difference in the mean interest scores of students taught using the Think-Pair-Share instructional strategy and those taught using the conventional method, in favour of the Think-Pair-Share group

**Hypothesis Two:**

There is no significant difference in the mean achievement scores of students taught Ecology Concept using TPS and those exposed to conventional method in FCT, Abuja

**Table 4: ANCOVA Comparison of the Mean Achievement Scores of TPS and Control Groups**

**Tests of Between-Subjects Effects**

Dependent Variable: POSTTEST

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	398.003 <sup>a</sup>	2	199.002	10.06	0
Intercept	2778.87	1	2778.87	140.483	0
PRETEST	0.175	1	0.175	0.009	0.925
TREATMENT	302.521	1	302.521	15.294	0
Error	2709.968	137	19.781		
Total	67308	140			
Corrected Total	3107.971	139			

a. R Squared = .128 (Adjusted R Squared = .115)

b. Computed using alpha = .05

The result presented in Table 4 showed a statistically significant difference,  $F(1,137) = 15.29$ ,  $p < 0.001$ . Since the  $p$ -value is less than the level of significance of  $\alpha = .05$ , the null hypothesis was rejected. This indicates that there was a statistically significant difference in the adjusted post-test achievement scores of students taught using the Think-Pair-Share (TPS) strategy and those taught using the conventional method, in favour of the experimental group. This implies that the TPS instructional strategy significantly improved students' achievement in Ecological Concepts compared to the conventional method.



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## Discussion of Findings

The findings of this study revealed that the Think–Pair–Share (TPS) instructional strategy significantly improved students’ interest in ecological concepts compared to the conventional lecture method. Students exposed to TPS demonstrated higher levels of enthusiasm, participation, and willingness to engage in learning activities. This increased interest can be attributed to the interactive nature of TPS, which allows students to actively think about ecological problems, exchange ideas with peers, and confidently share their understanding with the larger group. Such active engagement enhances motivation and promotes deeper emotional and cognitive involvement in the learning process. This finding supports the research question which examined the effect of TPS on students’ interest and confirms the corresponding hypothesis that TPS significantly enhances students’ interest in ecology. This result is consistent with the findings of Ejigbo et al. (2024) and Stella and Gabriel (2024), who reported that TPS improved students’ interest and positive attitude toward biology by creating opportunities for participation and peer interaction. Similarly, Yustini (2023) observed that cooperative learning strategies such as TPS stimulate learners’ curiosity and encourage active involvement, thereby strengthening their interest and engagement in biology learning.

Furthermore, the results showed that students taught ecological concepts using the TPS strategy achieved significantly higher academic performance than those taught using the conventional lecture method. This finding indicates that TPS enhances students’ understanding of ecological concepts by encouraging active thinking, discussion, clarification of ideas, and immediate feedback. The opportunity to reflect individually, collaborate with peers, and present ideas helps students construct meaningful understanding and correct misconceptions. This supports the research question on the effect of TPS on students’ academic achievement and confirms the hypothesis that there is a significant difference in the academic achievement of students taught using TPS and those taught using the lecture method. This finding aligns with Mbanefo et al. (2023), who found that students exposed to TPS performed significantly better than those taught using traditional teaching approaches. Similarly, Yawandare et al. (2024) reported that TPS improved students’ conceptual understanding and academic performance in ecological topics. These improvements may be attributed to the student-centered nature of TPS, which promotes active cognitive processing and deeper comprehension compared to passive listening. In addition, the overall findings of this study demonstrated that TPS is more effective than the conventional lecture method in improving both students’ interest and academic achievement in ecological concepts. The significant differences observed between the experimental and control groups provide strong evidence that learner-centered instructional strategies can enhance biology education outcomes.

TPS creates a supportive learning environment that encourages collaboration, critical thinking, and knowledge sharing, which are essential for meaningful learning. These findings support the hypothesis that instructional strategy has a significant influence on students’ learning outcomes in ecology. This result agrees with the findings of Mohammed et al. (2023), who emphasized that active learning strategies improve students’ understanding and academic performance in biology. Similarly, Xiong et al. (2025) noted that interactive teaching approaches promote better learning outcomes, increased engagement, and improved conceptual understanding in science education. Therefore, the findings of this study confirm that Think–Pair–Share strategy is an effective instructional approach for improving students’ interest and academic achievement in ecological concepts among secondary school students in the Federal Capital Territory, Abuja.



## Conclusion

The study concludes that the Think–Pair–Share instructional strategy is highly effective in enhancing both students’ interest and academic achievement in ecological concepts among secondary school students in the Federal Capital Territory, Abuja. Students taught using TPS demonstrated higher engagement, greater motivation, and improved understanding compared to their peers taught with the conventional lecture method. The strategy’s collaborative and interactive approach enables students to think critically, discuss ideas with peers, and actively construct knowledge, resulting in meaningful learning and superior academic outcomes. Therefore, integrating TPS into ecology education provides a practical and evidence-based method for improving learning experiences and outcomes in biology, confirming the need for learner-centered instructional strategies in secondary school science education.

## Recommendations

The following recommendations were made based on the findings of this research,

1. Teachers of biology, particularly ecology, should integrate the Think–Pair–Share (TPS) instructional strategy into their lessons to enhance students’ interest and engagement. Adoption of TPS to Improve Academic Achievement Secondary school biology teachers should adopt TPS as a teaching strategy to improve students’ understanding and performance in ecological concepts. The study revealed that students taught with TPS achieved higher mean scores compared to those taught through lectures, demonstrating that active, student-centered learning strategies positively influence academic achievement (Mbanefo et al., 2023; Yawandare et al., 2024).
2. Educational authorities should provide regular training and professional development programs for teachers on implementing TPS and other active learning strategies.
3. Curriculum planners and educational policymakers should revise biology curricula to include and encourage the use of interactive teaching strategies such as TPS, particularly for complex topics like ecology.
4. Further Research on Active Learning Strategies Researchers are encouraged to conduct additional studies on the impact of TPS and other learner-centered approaches on different science topics, across various regions, and at different educational levels.

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