International Journal of Multidisciplinary Research and Bulletin
ISSN 3108-1428
Volume 5 Issue 4 (July – Aug) 2026

Effects of tasked based teaching and lecture method on students' achievement in Basic Science in Delta Central Senatorial District, Delta State

EGHWRUDJE, A. Theophilus[1*], PROF. P.O. AJAJA[2]
*Correspondence: EGHWRUDJE, A. Theophilus
[1&2]Department of Science Education, Delta State University, Abraka, Nigeria.

Article History
Received: 14 Aug 2026 | Accepted: 20 Aug 2026 | Published: 29 Aug 2026
DOI: 10.5281/zenodo.22159997

ABSTRACT

This study examined the effects of task-based learning and lecture methods on secondary school students' achievement in Basic Science. A quasi-experimental non-equivalent pretest-posttest control group design using intact classes was adopted. The population comprised 22,702 JSSII students across 186 public schools in Delta Central Senatorial District. Using stratified simple random sampling, 236 JSSII students from six public mixed schools were selected. Data were collected using the 50-item Basic Science Achievement Test (BSAT), which yielded a Kuder-Richardson Formula 21 (KR-21) reliability coefficient of 0.79. Mean and standard deviation answered the research questions, while paired-sample t-tests and One-Way ANOVA tested hypotheses at a 0.05 significance level. Paired t-tests showed that both task-based instruction ($t=37.01$, $p<.05$) and lecture method ($t=29.50$, $p<.05$) significantly improved posttest scores over baseline pretest scores. However, One-Way ANOVA revealed no statistically significant difference in overall mean posttest achievement between the two strategies ($F(1,234)=1.25$, $p=.521$). It was concluded that both modalities are statistically comparable in driving cognitive achievement on standardized tests. Consequently, science educators are encouraged to flexibly integrate both task-based instruction and lecture method to optimize learning.

Keywords: Basic Science, Task-Based Teaching Strategy, Lecture Method, Student Achievement.

Introduction

By portraying science as a unified, coherent whole, basic science, an interdisciplinary field, seeks to break the boundaries between the many different fields. According to Mbonu-Adigwe et al (2021), basic science is the basis for all core scientific courses taken by senior secondary school students. According to Agbidye (2015), it serves as the cornerstone that provides the instruction required to

build scientific abilities in order to meet society's growing demands. For this reason, it is essential to give students the best possible experience in basic science instruction and learning in order to stimulate their interest in science at a young age. Ikechi (2018) claims that Basic Science prepares junior secondary school students for the study of physics, chemistry, and biology in senior secondary school. Basic Science is a mandatory subject for all students in Nigeria's educational system. However, there have been questions about how well this subject is taught, particularly in areas like the Delta Central Senatorial District. Although the lecture approach, which is frequently employed in Nigerian classrooms, is effective for swiftly covering the curriculum, it frequently results in rote learning and fails to actively engage students. The most popular teaching approach in Nigerian classrooms is lecture method, which discourages students from establishing goals for their education in favour of keeping an eye on, regulating, and managing their motivation, thinking, and behavior in relation to those objectives. The teacher would refer to the lecture approach as an address, a talk, a lesson, or any other kind of verbal presentation to the students (Ajaja, 2009). He continued by saying that while the lecture method can be used in any class size, large classrooms are where it is most commonly used. The lecture method, according to Roediger & Marsh (2005), is a teacher-directed teaching strategy in which students engage in little to no learning from the instructor. Students have little to no control over how they learn. Teachers employ the lecture method because it allows them to complete the material in a predetermined length of time.

The lecture method is an instructor-centered teaching and learning approach in which the teacher is seen as an authority who is giving knowledge to the students while the students contribute very little to the lesson. The lecture method was criticized by Adegoke (2011), who said that only diligent students might benefit from it. The students' bad attitude and subpar academic achievement in basic science could have been explained by this. The goal of this study is to determine which of the two study styles is most successful for teaching basic science. This approach has come under fire for failing to promote long-term memory retention and a thorough comprehension of scientific ideas (Akinola, 2019). It has been found that the lecture approach has not yet improved students' performance in basic science (Akinola, 2019).

It is necessary to experiment with different approaches that have different features from the lecture technique to see if they can enhance students' performance more than the lecture method. Task-based learning is one such approach. Task-based education, on the other hand, has drawn interest as a student-centered strategy that engages students in worthwhile assignments that mirror real-world issues. This approach encourages critical thinking, hands-on learning, and active engagement all of which are necessary for grasping scientific ideas. The pre-task phase of task-based learning starts with the teacher introducing the activity and giving the students pertinent background information.

In order to ensure comprehension, students are given directions on how to tackle the work during this phase, which are frequently accompanied by models or examples. Regarding the task at hand, the teacher gives the students precise instructions, explains everything to them, and sometimes even helps them. During the pre-task phase, a recording of someone executing the work is often played. There is now a clear example of what is expected of the students. The students may take notes as they prepare for the assignment. After that comes the task phase, during which students work on the real assignment, such finishing a project, solving a problem, or taking part in a simulation. This stage can be carried out in groups or alone. The instructor keeps an eye on the students' development during this phase, providing assistance as needed without interfering with the task's progress. After finishing the assignment, students frequently create a concrete product, like a report, presentation, or physical model. The students use their talents to complete a task in groups or pairs under the direction and assistance of the teacher. Students show their finished assignments to the class at the post-task phase, where they discuss their methods and results. After that, the instructor gives feedback, emphasizing both the procedure and the subject matter. Students are urged to evaluate their performance in order to pinpoint areas for growth and lessons learnt. In order to expand on the lessons learned from the first activity, the instructor may also introduce other activities.

During the planning phase, students write or provide a brief report to the class about what happened during their work. They then practice their speech in groups. If the students have any concerns while the teacher is working with them, they can consult the teacher in the interim. Students can either read the written report or present an oral report to the class at the report stage. The teacher chooses the order in which the students submit their reports, and they may also receive some brief feedback on the topic. At this stage, the teacher might also play a tape of someone else doing the same task so the students can compare. The instructor then emphasizes important ideas for the students to examine from the real-world examples during the analysis stage. They can ask the students to point out any interesting details in these instances. The instructor may also highlight the ideas that the students employed in order to evaluate the reports.

The instructor uses the knowledge from the task and report stages as well as the practical to work on with the class based on their needs during the practice stage. The students then complete practice assignments to record useful notions and improve their self-esteem. Since the 1980s, task-based learning has developed. Language instruction is the foundation of task-based education, often known as task-based approach (TBA). It highlighted the need of using stimulating or real-world exercises when teaching (Lin, 2009). When completing learning tasks in task-based learning, students must collaborate, participate, and communicate with one another. Task-based learning makes it easier for students to apply what they've learned to real-world scenarios. It facilitates the effective and

successful teaching of a certain subject. Cooperation among students is encouraged by task-based learning. It offers chances for reflection and promotes teamwork among pupils. As they complete tasks that range from easy to difficult, students develop their creativity, ingenuity, and problem-solving skills (Tian et al., 2017).

Academic achievement, according to Hattie (2009), is defined as performance results that demonstrate how successfully a student has accomplished certain goals that were the primary focus of activities in instructional environments, especially in school, college, and university. Academic achievement, according to Nwanze (2016), is the outcome of learning that shows how well the instructional objectives have been met. A student's performance in a subject as indicated by their score or mark on a standard test is known as academic achievement. Numerous studies conducted nowadays have shown that effective teaching strategies can raise students' academic performance regardless of their gender. The study's goal is to find out how students' achievement in Basic Science in Delta Senatorial District, Delta State, is affected by task-based learning and lectures. In particular, the research aims to:

1. compare the effect of task based, teaching on Basic Science achievement.
2. compare the difference in mean achievement scores in Basic Science among students taught with task based teaching and lecture method.

Hypotheses

1. There is no significant effect of task based teaching and lecture method on Basic Science achievement.
2. There will be no significant difference in mean achievement scores in Basic Science among students taught with task based teaching and lecture method.

Statement of the Problem

Concern over Nigerian students' low academic performance in Basic Science, especially in the Delta Central Senatorial District, has grown in recent years. Students' academic performance has fallen short of expectations despite the vital role that science education plays in creating a society that is scientifically literate. Based on the Basic Education Certificate Examination (BECE) scores from 2018 to 2022, an analysis of Delta State students' academic performance in Basic Science reveals a concerning pattern of below-average achievement. The percentage of students that pass Basic Science is lower than that of other subjects like Arts and Social Studies. Less than half of all students who took the BECE/JSCE in Basic Science between 2018 and 2022 were unable to obtain the required scores to pursue careers in science at the senior secondary school level, according to the BECE results, which show that student achievement has continuously remained below 50%. Teachers' passive involvement in the teaching and learning process has long been associated with the issue of

students' low performance in basic science. Most Basic Science instructors use lecture method to teach their students.

Methodology

The study employed a quasi-experimental design. Specifically, the study used a pretest, posttest, planned variation, and non-equivalent group design. Instead of dividing people into groups at random, this approach used complete classes to prevent interfering with classroom instruction. All junior secondary students enrolled in the public basic science program in the Delta Central Senatorial District made up the study's population. JSSII has twenty-two thousand seven hundred and two (22,702) basic science students enrolled. These students came from the Senatorial District's 186 public secondary schools. 236 JSSII Basic Science students from six public mixed secondary schools in Delta Central Senatorial were chosen as the study's sample using stratified simple random sampling techniques. The Basic Science Achievement Test (BSAT) was used as the research tool for data collection. The Basic Education Certificate Examination (BECE) is the source of 50 multiple-choice test items with options, one right answer, and three distracters on the concepts of habitats, drug abuse, work energy and power, force, crude oil and petrochemical and thermal energy. Section A of the instrument collects student biodata. The Basic Science Achievement Test (BSAT) reliability was assessed using the Kuder-Richardson formula 21. Forty junior secondary school students from one mixed secondary school outside the study area were given the Basic Science Achievement Test (BSAT) in order to verify the instrument's internal consistency. Following the instrument's distribution to the school's Basic Science students, the Kuder-Richardson 21 formula was applied to the data. The reliability coefficient value obtained from the analysis was 0.79. The mean and standard deviation data were used to address the research issues. The hypotheses were tested using the t-test.

Research question One:

What will be the effects of task based strategy and lecture method on Basic Science achievement?

Table 1: Mean and standard deviation of pre-test and posttest scores of students taught basic science using task-based teaching and lecture method

Group	N	Pretest		Posttest		Mean Gain
		Mean	SD	Mean	SD	
Task- based teaching strategy	136	25.27	5.14	55.46	12.13	30.19
Lecture	130	23.78	6.73	39.44	7.86	15.66
Total	236					

Table 1 shows that the mean achievement pretest score for students who learned basic science through task-based instruction was 25.27 with a standard deviation of 5.14, while the mean achievement pretest score for students who learned basic science thru lecture method was 23.78 with a standard

deviation of 6.73. Students in both groups have similar comprehension of the basic science concepts taught prior to treatment, according to a straightforward comparison of the mean scores. Students who received task-based teaching in basic science had an average accomplishment score of 55.46 with a standard deviation of 12.13, according to the posttest data (Table 1). In contrast, individuals who received instruction thru lectures had a mean score of 39.44 with a standard deviation of 7.86. The students in the task-based instruction group had the highest mean increase of 30, while their classmates in the lecture group had the lowest mean gain of 15.66.Nineteen.

Hypothesis One. There will be no significant effect of task based teaching and lecture method on Basic Science achievement.

Table 2: t-test comparison of pre-test and posttest mean achievement scores of students taught basic science using task based teaching, and lecture method

Group	N	Pretest		Posttest		Df	t-cal	Sig(2 tailed)	Decision
		Mean	SD	Mean	SD				
Task based	136	25.27	5.14	55.46	12.13	135	37.01	0.00	
Lecture	130	23.78	6.73	39.44	7.86	129	29.5	0.00	
Total	236								

Table 2 shows that task-based training (t=37.01, P(0.00)<0.05) and lecture style (t=29.5, P(0.00)<0.05) both have a substantial impact on achievement. As a result, the null hypothesis was refuted. Thus, task-based learning and the lecture approach have a major impact on students' performance in basic science. Thus, task-based and lecture-based teaching modalities have a major impact on students' progress in basic science..

Research question Two:

What will be the difference in mean achievement scores in Basic Science among students taught with task based teaching and lecture method?

Table 3: Mean and standard deviation of pre-test and posttest achievement scores of students taught basic science using task based teaching and lecture method

Group	N	Pretest		Posttest		Mean Gain
		Mean	SD	Mean	SD	
Task- based teaching	136	25.27	5.14	55.46	12.13	30.19
Lecture	130	23.78	6.73	39.44	7.86	15.66
Total	236					

Table 4.3 shows that the mean achievement pretest score for students who learned basic science through task-based learning was 25.27 with a standard deviation of 5.14, while the mean achievement pretest score for students who learned basic science thru lecture was 23.78 with a standard deviation

of 6.73. A simple comparison of the mean scores shows that the students in both groups have comparable levels of comprehension of the basic science concepts taught prior to treatment. Students who received task-based teaching in fundamental science had an average accomplishment score of 55.46 with a standard deviation of 12.13, according to Table 3's posttest data. In contrast, the average score for students who received instruction thru lectures was 39.44, with a standard deviation of 7.86. The students in the task-based instruction group had the highest mean gain of 30.19 compared to their classmates in the lecture group, who had the lowest mean gain of 15.66.

Hypothesis Two. There will be no significant difference in mean achievement scores in Basic Science among students taught with task based teaching, and lecture method.

Table 4: ANOVA comparison of pretest achievement scores of students taught Basic science using task based teaching and lecture method.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	35.424	1	35.424	1.25	0.521
Within Groups	6630.156	234	28.334		
Total	6665.580	235			

The conventional significance threshold of alpha =.05 is exceeded by the computed p-value of.521. As a result, there is no statistically significant difference between the group means according to the One-Way ANOVA. As a result, the null hypothesis (H0), which asserts that students taught using task-based instruction and the lecture technique do not significantly differ in their mean achievement scores in Basic Science, is kept (failed to be rejected). The Basic Science achievement scores of students taught using task-based learning and those taught using the conventional lecture technique do not differ statistically significantly (N=236). Rather than the instructional intervention, random sample variation is responsible for the small difference in mean scores between the two groups.

DISCUSION OF FINDINGS

All three instructional strategies—the lecture method and the task-based teaching strategy—show a notable increase in student achievement, according to the statistical analysis shown in Table 2. The analysis's findings showed that teaching strategy had a big impact on students' Basic Science achievement. The claim that task-based instruction has no appreciable impact on students' performance in basic science was disproved. This is due to the fact that both instructional methodologies' computed t-values were statistically significant at $p < 0.05$. All groups improved, although the learner-centered and teacher-centered approaches had quite different effects in terms of their magnitude:

The results demonstrated that students' performance significantly improved after being exposed to the task-based instructional technique. With a t-calculated value of 37.01 at df = 135, the pretest mean

score of 25.27 (SD = 5.14) rose to a posttest mean score of 55.46 (SD = 12.13). This suggests that students' performance in Basic Science was greatly improved by the task-based teaching approach. The improvement may be ascribed to the practical engagement and active participation inherent in task-based learning, which enables students to investigate scientific ideas thru relevant assignments and problem-solving exercises. The claim that task-centered learning enhances students' conceptual comprehension and academic achievement in scientific courses is supported by this research (Achor & Kurumeh, 2020; Bada & Olusegun, 2022).

The group that used task-based teaching strategies had the highest posttest means score (55.46). TBL demonstrated a high level of effectiveness with a t-calculated value of 37.01. According to this, pupils are better able to internalize Basic Science topics thru practical, goal-oriented projects than thru passive observation (Adekoya & Olatoye, 2022). The results also showed that students' performance improved when using the lecture method, tho this improvement was not as great as that seen in the task-based and self-regulated groups. The pretest mean score for the lecture group was 23.78 (SD = 6.73), while the posttest mean score was 39.44 (SD = 7.86). The t-calculated value was 29.5 at df = 129, which was likewise statistically significant at $p < 0.05$. The outcome shows that lecture techniques can still enhance students' learning, particularly when the teacher presents the material in an understandable manner.

The comparatively lower mean gain, however, raises the possibility that more participatory and learner-centered approaches may be more successful than standard lecture methods. This is consistent with research by Prince (2020) and Freeman et al. (2019), who found that active learning approaches typically result in superior academic accomplishment in science education, even though lecture methods may increase information acquisition. The lecture strategy had the lowest posttest mean (39.44) of the three, despite a considerable improvement (t=29.5). This demonstrates that active learning methodologies are more successful for high-level achievement in science than traditional methods, even if they offer a foundation (Gomez, 2023). The results show that secondary school students' academic performance in Basic Science was similar while using both task-based learning and the conventional lecture approach. These results demonstrate that task-based training did not outperform structured, direct instruction (lecture method) in terms of total student cognitive accomplishment, despite the fact that task-based instruction is ostensibly intended to promote active learning, practical problem-solving, and student autonomy.

The fact that neither approach proved to be statistically superior could be explained by a number of underlying factors: In science, direct lecture methods have historically been competitive with student-centered methods in areas like instant factual memory and conceptual understanding, which are frequently measured by standardized achievement exams. Compared to well-known lecture-based

routines, student-centered approaches such as task-based learning frequently require longer adaption periods for students to fully realize the benefits of active learning. When implementing novel tactics in the classroom, procedural fidelity is crucial to their effectiveness. These findings imply flexibility in instructional design for Basic Science instructors and curriculum designers. Teachers are free to choose or combine task-based teaching and lecture methods based on classroom dynamics, lesson complexity, time constraints, and available learning resources without endangering student test performance because raw achievement outcomes remain statistically equivalent between the two strategies. Both task-based learning and the conventional lecture approach are useful teaching techniques for raising secondary school pupils' cognitive achievement in Basic Science, according to the study's empirical findings. Both pedagogical techniques produced statistically significant improvements from pretest to posttest baseline levels within their respective treatment conditions, proving that both structured direct instruction and active, task-oriented tasks enhance student learning.

Conclusion

However, there was no discernible difference in total posttest accomplishment levels between students exposed to task-based learning and those taught via the lecture technique when comparing the relative efficacy of the two modalities, according to statistical analysis. The observed statistical equivalency indicates that neither approach has a clear, independent advantage over the other on standardized measures of science proficiency, even tho children in the task-based education group recorded higher raw posttest mean scores and better mean improvements. As a result, choosing between traditional direct instruction and student-centered active learning does not strictly limit students' success in Basic Science. Instead, the best learning results rely on how well teachers organize and use these techniques to address particular scientific ideas.

Article Publication Details

This article is published in the **International Journal of Multidisciplinary Research and Bulletin**, ISSN 3108-1428 (Online). In Volume 5 Issue 4 (July – Aug) 2026

The journal is published and managed by **IRPG**.

Acknowledgements

We sincerely thank the editors and the reviewers for their valuable suggestions on this paper.

Funding

The authors declare that no funding was received for this work.

Data availability

No datasets were generated or analyzed during the current study.

Declarations

Ethics approval and consent to participate

The author(s) declare that it is not applicable.

Consent for publication

The author(s) declare that this is not applicable.

Competing interests

The author(s) declare that they have no competing interests.

References

1. Achor, E. E., & Kurumeh, M. S. (2020). Effect of task-based instructional strategy on students' achievement in Basic Science. *Journal of Science Education Research*, 15(2), 45–54.
2. Adegoke, B. A. (2011). Effect of multimedia instruction on senior secondary school students' achievement in Physics. *European Journal of Educational Studies, 3(3),* 537-541.
3. Adekoya, A. F., & Olatoye, R. A. (2022). Effects of task-based and inquiry-only instructional strategies on students' academic achievement in basic science. *Journal of Science Education and Technology*, 31(4), 412-425.
4. Agbidye, N. (2015). Challenges and Prospects in the Teaching of Basic Science at the Upper Basic Level in Nigeria. *Journal of Qualitative Education*, 11 (1), 17-19.
5. Ajaja, O. P. (2009). *Teaching methods across disciplines*. Ibadan: Bomn Prints.
6. Akinola, B. (2019). The effectiveness of the lecture method in Nigerian secondary schools: A case study of Lagos State. *Nigerian Journal of Educational Technology*, 12(1), 89-102.
7. Bada, S. O., & Olusegun, S. (2022). Constructivism learning theory: A paradigm for teaching and learning. *Journal of Research in Education and Science*, 8(1), 66–75.
8. Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2019). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences*, 116(39), 19251–19255.
9. Gomez, M. S. (2023). Task-based learning vs. traditional lecture: A comparative study in middle school science classrooms. *International Journal of STEM Education*, 10(2), 88-102.
10. Hattie, J. (2009). *Visible learning.* Hattie rankings: 195 influences and effects sizes related to student achievement, University of South Australia, ACER.\

11. Ikechi, O. (2018). Academic Achievement of Students in Basic Science among Secondary Schools in Rivers State: Synergy of Parents‟ Educational Background, Socio Economic Status and School Location. *International Journal of Science and Research*, 7(1) 1185- 1192
12. Lin, Y. S. (2009). Teacher and pupil responses to a creative pedagogy -Case studies of two primary classes in Taiwan. Unpublished Master's Thesis. University of Exeter.
13. Mbonu-Adigwe, B. U., Eya, N. M., Umate B. A. & Attah, F. O. (2021). Effects of Multimedia Integrated Instruction on Students' Acquisition of Science Process Skills in Basic Science. *African Journal of Science, Technology and Mathematics Education (AJSTME)*, 6(1), 46-55.
14. Prince, M. (2020). Does active learning work? A review of the research. *Journal of Engineering Education*, 109(2), 223–231.
15. Roediger, H. L., & Marsh, E. J. (2005). The positive and negative consequences of multiple-choice testing. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 31*, 1155–1159
16. Tian, Y., Li, C., Wang, J., Cai, Q., Wang, H., Chen, X., Liu, Y., Mei, F., Xiao, L., Jian, R., & Li, H. (2017). Modified task-based learning program promotes problem-solving capacity among Chinese medical postgraduates: A mixed quantitative survey. *BMC Medical Education*, 17(1), 1–8. https://doi.org/10.1186/s12909-017-0994-0