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Teaching Strategies of Public Secondary School Science Teachers in District V-B, San Carlos City Division

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Abstract

This study aimed to determine the extent of practice of teaching strategies in science among public secondary school science teachers in District V-B, San Carlos City Division, during the School Year 2025–2026. Specifically, it assessed the extent to which selected teaching strategies—namely lecture method, laboratory experiments, demonstration method, inquiry-based learning, and cooperative learning—were practiced as perceived by teachers and school heads. The study also examined whether a significant difference existed between the perceptions of teachers and school heads regarding the extent of practice of these teaching strategies. Furthermore, it identified the degree of seriousness of the problems encountered by teachers in the implementation of teaching strategies in science. Based on the findings, an action plan was developed to strengthen and enhance the practice of effective science teaching strategies in public secondary schools.

The findings revealed that the teaching strategies in science were practiced to a high to very high extent, as perceived by both teachers and school heads, with school heads generally rating the extent of practice higher than teachers. A significant difference was found between the perceptions of teachers and school heads regarding the extent of practice of teaching strategies in science. The problems encountered by teachers in implementing these strategies were rated as serious, with time constraints, insufficient budget, and lack of adequate laboratory equipment identified as the most pressing concerns. In response to these findings, an action plan was proposed to address the identified challenges and to further improve the extent and quality of teaching strategies in science instruction.

Keywords*:* *Teaching Strategies, Science, Lecture Method, Laboratory Experiments, Demonstration Method, Inquiry-Based Learning, Cooperative Learning*

INTRODUCTION

Science education at the secondary level plays a pivotal role in preparing learners to understand the natural world, develop critical and scientific reasoning, and participate effectively in a technology-driven society. Secondary science classrooms present unique opportunities for students to engage in inquiry, integrate disparate strands of knowledge (biology, chemistry, physics, earth science), and confront complex socio-scientific issues. The choice of teaching strategies in these classrooms is not merely a technical matter; it shapes how students come to view the discipline of science, perceive themselves as capable of doing science, and develop scientific literacy. As Antonio and Prudente (2024) show in their meta-analysis, inquiry-based approaches in science have a substantively large positive effect on students' higher-order thinking skills across levels and disciplines, reinforcing the notion that pedagogical method is central to outcome.

In the Philippine setting, national reforms such as the K–12 Basic Education Curriculum place strong emphasis on scientific literacy, inquiry, and higher-order thinking competencies (DepEd, 2012; revised under MATATAG). This curricular orientation casts expectations on science teachers to move beyond lecture and rote recitation to more learner-centered, inquiry-oriented strategies. The Philippine Professional Standards for Teachers (PPST; DepEd DO 42, s. 2017) further reinforce that teachers should possess pedagogical content knowledge and adopt strategies responsive to learners' needs. Yet, the translation of these national and professional imperatives into everyday classroom practice is uneven, shaped by teacher background, resource constraints, institutional support, and local culture.

Within this broader milieu, District V-B of the San Carlos City Division in Region I offers an instructive context for examining teaching strategies in public secondary science schools. The district encompasses various public secondary schools with heterogeneous student populations, infrastructure capacities, and administrative support. Local constraints—such as availability of laboratory facilities, class size, teacher specialization (or non-specialization), and professional development opportunities—mediate how teachers interpret and enact pedagogical expectations. Exploring the strategies adopted in this district, understanding why teachers choose one method over another, and identifying barriers to more advanced inquiry and learner-centered approaches can yield insights not just for that locale but for similar settings across the country.

Therefore, this study aims to identify the teaching strategies actually used by public secondary school science teachers in District V-B, San Carlos City Division; to explore the rationales and decision-making processes behind those strategies; and to situate those practices within the framework of national curriculum policy, teacher standards, and contemporary research on science pedagogy. The evidence, gathered via teacher surveys, classroom observations, and interviews, will help bridge the gap between national expectations and ground-level classroom realities, helping design supports and interventions tailored to district needs.

In the Philippines, the K–12 Basic Education Curriculum was instituted to strengthen basic education by adding two years (Grades 11–12) and by emphasizing deeper competencies rather than content coverage alone (Republic Act No. 10533; DepEd, 2012). The K–12 Science Curriculum Guide (2012) articulates that science education aims to develop scientific literacy, enabling learners to make informed decisions about issues involving science, technology, environment, and society. It frames performance standards around three domains: (1) understanding science concepts, (2) performing inquiry-based scientific processes, and (3) demonstrating scientific attitudes and values. The curriculum explicitly encourages teachers to adopt varied pedagogies such as problem-based learning, inquiry, and collaborative learning to support these outcomes (DepEd, K to 12 Science Curriculum Guide).

More recently, under the DepEd MATATAG (an initiative to stabilize and strengthen the basic education curriculum), the Science Curriculum Guide has been recalibrated to emphasize three big ideas, cross-cutting concepts, and connections to technology and engineering literacy. It introduces key stage and grade-level standards to articulate what learners should be able to do at each stage and underscores the importance of inquiry and relevance to real-world problems (DepEd, MATATAG Science CG). The guide indicates that pedagogies should be aligned with these goals, promoting learning experiences that go beyond rote memorization to deeper understanding, use of scientific processes, and application in authentic contexts (DepEd, MATATAG CG).

Furthermore, the Science Shaping Paper (part of MATATAG) asserts that curriculum should be responsive to global changes, societal challenges, and disruptions. It states that the curriculum draws from international scholarship on effective science pedagogy and explicitly names inquiry, collaborative learning, and technology integration among methods to help learners construct durable understanding (DepEd, MATATAG CG).

The concept of spiral progression in Science education emphasizes revisiting key scientific concepts at increasing levels of complexity as students advance through different grade levels. This approach aligns with the principle that learning is cumulative and that deeper understanding is achieved when learners connect prior knowledge with new information. In the Philippine Basic Education Curriculum, spiral progression ensures that students gradually develop critical thinking, problem-solving skills, and scientific literacy necessary for their academic and real-life applications.

Effective implementation of spiral progression heavily relies on the teaching strategies employed by Science teachers. In public secondary schools of District V-B, San Carlos City Division, teachers utilize a variety of strategies—such as lecture methods, laboratory experiments, demonstrations, inquiry-based learning, and cooperative learning—to scaffold students' understanding and reinforce previously learned concepts. These strategies not only facilitate comprehension but also provide opportunities for active engagement, experimentation, and collaborative learning, which are crucial in reinforcing the spiral approach.

The lecture method allows teachers to present scientific concepts and theories systematically, providing students with foundational knowledge necessary for further learning. When used effectively, it organizes information logically and introduces new content, which is essential in the context of spiral progression in Science (Bligh, 2000).

Laboratory experiments engage students in hands-on activities that reinforce theoretical concepts, promote observation and analysis skills, and foster experiential learning. This approach enhances comprehension and retention, allowing learners to apply prior knowledge to new scientific phenomena (Hofstein & Lunetta, 2004).

The demonstration method enables students to visualize scientific principles through teacher-led experiments or models. By observing processes in real-time, students can connect abstract concepts to concrete examples, strengthening understanding and facilitating higher-order thinking (Sharp, 2002).

Inquiry-based learning encourages students to investigate, ask questions, and solve problems, promoting active engagement and critical thinking. This student-centered approach aligns with the goals of spiral progression by revisiting concepts in deeper, more complex contexts over time (Bruner, 1961; Pedaste et al., 2015).

Cooperative learning organizes students into small groups to collaborate on tasks, share knowledge, and develop social and cognitive skills. This strategy fosters peer learning and accountability, supporting the iterative reinforcement of concepts central to spiral progression in Science (Johnson, Johnson, & Smith, 2014).

In sum, the national curricular context requires science teachers not merely to transmit scientific facts, but to design learning engagements that develop inquiry skills, scientific attitudes, conceptual connections, and real-world applications.

Complementing curriculum reform, the Philippine Professional Standards for Teachers (PPST) serve as the benchmark for teacher competence, appraisal, and professional growth. Under PPST (DepEd DO 42, s. 2017), teachers are expected to demonstrate proficiency in domains such as content knowledge, pedagogical content knowledge, learning environment, assessment, and diversity. In particular, the standards call for teachers to use a repertoire of instructional strategies appropriate to learners' context, to scaffold learning, to engage students in higher-order thinking, and to adjust teaching approaches based on formative assessment evidence.

The PPST thus builds into the professional expectation a movement toward more adaptive, responsive, and research-based pedagogy. However, the gap between these expectations and actual classroom practice remains underexplored in many localities. Studying teachers' choices and constraints offers a way to reveal how the PPST ideals are realized (or not) at the classroom level.

Despite robust policy frameworks, several systemic issues challenge effective science education in the Philippines. First, resource inequities persist. Many schools lack adequate laboratory equipment, consumables, specialized rooms, and maintenance support (Science Curriculum Framework). These deficiencies constrain the use of true hands-on inquiry and force teachers to rely on simulations or simplified demonstrations.

Second, teacher specialization is uneven. In many public schools, teachers without a major in science are assigned to teach science classes. The lack of strong disciplinary background can limit teachers' confidence in designing inquiry tasks or handling students' divergent questions (Framework for Philippine Science Teacher Education).

Third, professional development on pedagogy is often intermittent, content-oriented, or generic, failing to address the fine-grained challenges of science instruction (Saro et al., 2023). As research suggests, professional learning needs to be sustained, classroom-based, collaborative, and aligned with teachers' actual instructional needs to impact practice.

Fourth, class size and time constraints pose pragmatic difficulties. In crowded classrooms, managing open inquiry becomes harder; in tight time blocks, teachers feel pressured to reserve time for lecture or coverage of content rather than deeper exploration.

Lastly, student heterogeneity (varying readiness, prior misconceptions, language skills) demands differentiated strategies, placing high demands on teacher planning and adaptive skill.

Given these systemic challenges, it is no surprise that many teachers revert to lecture, demonstration, or teacher-directed strategies, even when policy encourages more progressive approaches.

District V-B, within the San Carlos City Division (Region I), comprises a network of public secondary schools serving diverse communities from urban to rural barangays. The district includes schools with varying degrees of infrastructure, laboratory capacity, and teacher specialization. Some schools may have well-equipped science laboratories and committed support staff, while others may lack dedicated lab rooms or sufficient consumables. The administrative records and division forms indicate that some schools seldom replace broken equipment or restock basic chemicals, making full inquiry implementation difficult.

Teacher assignments across the district show that a number of instructors are non-science majors or hold generalist qualifications. In such cases, teachers may use more teacher-centered approaches (lecture, demonstration) to maintain control and coverage over content. Local anecdotal reports from division meetings suggest that teachers often cite "lack of time," "insufficient materials," and "large class size" as impediments to more student-centered strategies.

District leadership within San Carlos City periodically organizes teacher training sessions, but these are often broad (e.g., general science seminars) and may not provide classroom-specific coaching or follow-up. The scheduling of such training competes with heavy academic calendars, school events, and other division initiatives (e.g., sports, festivals). In some cases, teachers from more advantaged schools are able to pilot innovative practices, but diffusion to less-resourced schools remains weak.

Moreover, community expectations and local culture play roles. Some communities expect that science classes will deliver clear, correct answers and may view inquiry (with its open-endedness) as less efficient or reliable. Teachers sometimes feel social or administrative pressure to maintain "coverage" or produce high achievement scores rather than devote time to exploration.

Thus, in District V-B, teachers navigate a complex terrain: they are expected to support inquiry, scientific attitudes, and deep understanding; yet they face constraints of resources, time, training, and local culture. Investigating which strategies teachers currently use, how they rationalize them, and how their context shapes those choices can uncover leverage points for targeted support, professional learning, and policy refinement.

Statement of the Problem

This study aimed to assess the extent of practice of teaching strategies of public secondary school science teachers in District V-B, San Carlos City Division, for the School Year 2025–2026.

Specifically, it sought to answer the following questions:

1. What is the extent of practice of the Teaching Strategies of Science Teachers as perceived by teachers and school heads in the following areas?

    a. Lecture Method

    b. Laboratory Experiments

    c. Demonstration Method

    d. Inquiry-Based Learning

    e. Cooperative Learning

2. Is there a significant difference between the perceptions of teachers and school heads regarding the extent of practice of the teaching strategies?

3. What is the degree of seriousness of the problems encountered by teachers in the practice of the teaching strategies?

4. What action plan can be proposed to strengthen the practice of the teaching strategies in public secondary schools?

Research Hypothesis

The hypothesis below was tested at the 0.05 level of significance.

1. There is no significant difference between the perceptions of teachers and school heads regarding the extent of practice of the teaching strategies.

METHODOLOGY

Research Design

This study utilized a descriptive research design to assess the extent of practice of teaching strategies among public junior high school science teachers in District V-B, San Carlos City Division, for the School Year 2025–2026. The descriptive method was deemed appropriate for this investigation as it systematically describes and interprets existing conditions, relationships, and practices without manipulating any variables (Creswell, 2014). This design allowed the researcher to gather comprehensive and factual data regarding the current extent of practice of various teaching strategies employed by science teachers, including the Lecture Method, Laboratory Experiments, Demonstration Method, Inquiry-Based Learning, and Cooperative Learning.

Moreover, the descriptive research design facilitated the comparison of perceptions between teachers and school heads concerning the practice of these strategies. It also helped identify the degree of seriousness of problems encountered by teachers in implementing such strategies. According to Fraenkel, Wallen, and Hyun (2019), descriptive studies are effective in obtaining a clear picture of existing educational practices, thereby forming a sound basis for developing improvement plans. The data gathered through survey questionnaires will be statistically analyzed to determine the extent of practice and differences in perceptions between the two groups of respondents.

The findings from this study served as a basis for proposing an action plan aimed at strengthening the use of effective teaching strategies in science instruction within public secondary schools. Ultimately, the study sought to enhance teaching quality, improve student engagement, and promote scientific literacy through evidence-based recommendations that align with the goals of 21st-century science education.

Participants

The population of this study comprised all public junior high school science teachers and school heads in District V-B, San Carlos City Division, for the School Year 2025–2026. Specifically, the study focused on Science teachers who handle subjects such as Biology, Chemistry, Physics, and Earth Science, as well as the school heads directly supervising Science instruction within their respective schools. According to the latest records from the San Carlos City Division Office, there were 43 Science teachers and 10 school heads assigned across the ten public secondary schools in District V-B.

Table 1. Distribution of Respondents of Public Secondary School Science Teachers and School Heads in District V-B, San Carlos City Division

No.	Schools	Science Teachers	School Heads
1	Abanon National High School	4	1
2	Bacnar National High School	4	1
3	Candido Marcellano Integrated School	6	1
4	Guelew Integrated School	5	1
5	Libas National High School	4	1
6	Mabalbalino National High School	4	1
7	Malacanang National High School	4	1
8	Salinap National High School	4	1
9	Tamayo National High School	4	1
10	Turac National High School	4	1
	Total	**43**	**10**

Given the relatively small and accessible population, the study utilized a total enumeration sampling technique, wherein all 43 Science teachers and 10 school heads were included as respondents. This method ensured that every member of the target population is represented, thereby providing a complete and accurate assessment of the extent of practice of teaching strategies in Science education. Total enumeration was appropriate for studies involving small populations, as it minimizes sampling error and increases the validity of findings (Creswell & Creswell, 2018). Through this approach, the researcher aimed to capture diverse perspectives and experiences related to the implementation of teaching strategies such as lecture, laboratory experiments, demonstration method, inquiry-based learning, and cooperative learning.

Instruments

The primary instrument used for data collection in this study was a structured questionnaire designed to assess the extent of practice of Teaching Strategies among public secondary school science teachers in District V-B, San Carlos City Division, for the School Year 2025–2026, as perceived by both teachers and school heads. The questionnaire is composed of two main parts, each aligned with the specific objectives of the study. It aimed to obtain reliable and comprehensive data on teaching strategies and the challenges encountered in their implementation.

Part I focused on assessing the extent of practice of teaching strategies employed by science teachers across five identified areas: (a) Lecture Method, (b) Laboratory Experiments, (c) Demonstration Method, (d) Inquiry-Based Learning, and (e) Cooperative Learning. Respondents—both teachers and school heads— evaluatde each indicator using a 5-point Likert scale, with options ranging from 5 – Very High Extent, 4 – High Extent, 3 – Moderate Extent, 2 – Low Extent, and 1 – Very Low Extent. This section aimed to determine how frequently these teaching strategies are implemented in actual classroom settings, based on the perceptions of the two respondent groups.

Part II addressed the degree of seriousness of problems encountered by science teachers in practicing the identified teaching strategies. Respondents indicated the level of seriousness of each problem using another 5-point Likert scale, with descriptors such as 5 – Very Serious, 4 – Serious, 3 – Moderately Serious, 2 – Slightly Serious, and 1 – Not Serious. This part sought to identify the most pressing challenges that hinder the effective use of teaching strategies in science instruction.

The main questionnaire was adapted from Marzano (2017), Teaching Strategies of Science in Junior High Schools.

Together, these components provided a comprehensive picture of the extent of practice of teaching strategies, the perception differences between teachers and school heads, and the instructional challenges faced by educators in the public secondary schools of District V-B, San Carlos City Division.

Procedure

The researcher first secured permission from the Office of the Schools Division Superintendent of San Carlos City Division to conduct the study within District V-B for the School Year 2025–2026. After obtaining approval, the researcher coordinated with the respective school principals of all public secondary schools to formally inform them of the study's objectives and procedures. Once authorization is granted, the researcher contacted both the science teachers and school heads to schedule the administration of the research instrument.

Prior to data collection, the researcher conducted a brief orientation session with the respondents to explain the purpose of the study, the structure of the questionnaire, and the confidentiality of their responses. Respondents were assured that participation is entirely voluntary and that their anonymity were protected throughout the research process. Informed consent forms were distributed and signed before participation, following ethical standards in educational research (Creswell & Creswell, 2018).

The primary data gathering tool—a structured questionnaire—were then personally administered by the researcher to ensure that all instructions are clearly understood and to address any questions from the participants. The questionnaire assessed the extent of practice of teaching strategies, including lecture, laboratory experiments, demonstration, inquiry-based learning, and cooperative learning, as well as the seriousness of problems encountered in their implementation. Respondents were allotted adequate time to complete the instrument in a non-disruptive and comfortable environment.

After the respondents have completed the questionnaire, the researcher collected the accomplished forms and check them for completeness. The gathered data were then encoded, tabulated, and subjected to statistical analysis using appropriate descriptive and inferential tools to address the stated research questions. Data confidentiality and integrity were strictly maintained during the encoding and analysis phases, ensuring that results reflect an accurate and ethical representation of the respondents' perspectives (Gay, Mills, & Airasian, 2019).

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Data Analysis

The following statistical tools and techniques were used to analyze and interpret the data gathered in this study:

For Problem No. 1, which determined the extent of practice of the teaching strategies of science teachers as perceived by both teachers and school heads in the areas of Lecture Method, Laboratory Experiments, Demonstration Method, Inquiry-Based Learning, and Cooperative Learning, a 5-point Likert scale was utilized. The respondents rated their extent of practice based on the scale, and the results were treated using the Average Weighted Mean (AWM) to determine the overall descriptive level of each strategy. The following scale and interpretation were used:

Scale	Range	Descriptive Equivalent
5	4.21 – 5.00	Very High Extent (VHE)
4	3.41 – 4.20	High Extent (HE)
3	2.61 – 3.40	Moderate Extent (ME)
2	1.81 – 2.60	Low Extent (LE)
1	1.00 – 1.80	Very Low Extent (VLE)

This statistical treatment aligns with the procedures described by Garcia and Castillo (2021), who emphasized the use of descriptive statistics such as mean scores to quantify levels of practice and perception among respondents in educational research.

For Problem No. 2, which sought to determine whether there is a significant difference between the perceptions of teachers and school heads regarding the extent of practice of teaching strategies, the t-test for independent samples was applied. This inferential statistical tool was used to compare the mean responses of the two independent groups. The test was interpreted at a 0.05 level of significance, where a p-value less than 0.05 indicates a statistically significant difference between the two groups. The formula for the t-test is presented as follows:

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$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{\left(\frac{s_1^2}{n_1}\right) + \left(\frac{s_2^2}{n_2}\right)}}$$

Where:

- t = t ratio
- $\bar{x}_1$ = mean of the 1st group (teachers)
- $\bar{x}_2$ = mean of the 2nd group (school heads)
- s_1^2 = variance of the 1st group
- s_2^2 = variance of the 2nd group
- n_1 and n_2 = number of respondents in each group

This statistical tool was chosen based on the recommendations of Pallant (2020), who stated that the t-test is an appropriate method to determine significant differences between two independent groups in perception-based educational studies.

For Problem No. 3, which assessed the degree of seriousness of the problems encountered by teachers in the practice of teaching strategies, a 5-point Likert scale was employed. The responses were analyzed using the Average Weighted Mean (AWM) to determine the extent of seriousness. The interpretation of the weighted mean was based on the following scale:

Scale	Range	Descriptive Equivalent
5	4.21 – 5.00	Very Serious (VS)
4	3.41 – 4.20	Serious (S)
3	2.61 – 3.40	Moderately Serious (MS)
2	1.81 – 2.60	Slightly Serious (SS)
1	1.00 – 1.80	Not Serious (NS)

This method followed the approach recommended by Best and Kahn (2014) in their discussions on descriptive statistical analysis in educational research, emphasizing the use of mean scores to interpret categorical responses.

Finally, for Problem No. 4, which focused on developing an action plan to strengthen the practice of teaching strategies in public secondary schools, the results from the previous analyses were utilized as the empirical basis for identifying gaps, challenges, and potential interventions. The action plan was formulated through a synthesis of both quantitative results and qualitative insights derived from the responses of teachers and school heads, following the analytical framework suggested by Creswell and Creswell (2018) for mixed-method educational studies.

Through these statistical treatments, the study ensured that the data gathered were analyzed systematically and objectively, providing reliable and valid results to guide the formulation of

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recommendations and an action plan for improving the teaching strategies of science teachers in District V-B, San Carlos City Division.

RESULTS AND DISCUSSION

EXTENT OF PRACTICE OF THE TEACHING STRATEGIES OF SCIENCE TEACHERS AS PERCEIVED BY TEACHERS AND SCHOOL HEADS ALONG THE LECTURE METHOD

Table 2 presents the extent of practice of the lecture method in science as perceived by teachers and school heads. Overall, the findings indicate that the lecture method is practiced to a Very High Extent (Overall Mean = 4.40, VHE), suggesting that it remains a dominant and well-established instructional strategy in science classrooms. School heads consistently rated all indicators at a Very High Extent (Mean = 4.70), while teachers rated the lecture method at a

Table 2. **Extent of Practice of the Teaching Strategies of Science Teachers as Perceived by Teachers and School Heads along the Lecture Method**

Teaching Strategies in Science		Teachers		School Heads		Overall	
Lecture Method		Mean	DE	Mean	DE	Mean	DE
1	Teachers clearly explain scientific concepts and theories during class discussions.	4.19	HE	4.70	VHE	4.45	VHE
2	Lessons begin with a brief review of previous topics to connect with new content.	4.14	HE	4.80	VHE	4.47	VHE
3	Teachers use visual aids such as charts, models, or slides during lectures.	4.12	HE	4.60	VHE	4.36	VHE
4	Students are encouraged to ask questions during or after the discussion.	4.16	HE	4.70	VHE	4.43	VHE
5	Teachers use examples and analogies to simplify complex scientific ideas.	4.26	VHE	4.50	VHE	4.38	VHE
6	Discussions are structured to maintain student engagement and attention.	4.05	HE	4.90	VHE	4.48	VHE
7	Teachers summarize key points at the end of the lesson to reinforce learning.	4.14	HE	4.80	VHE	4.47	VHE
8	Students actively participate in recitation and guided questioning.	3.93	HE	4.60	VHE	4.27	VHE

9	Teachers integrate real-life applications of science concepts during discussions.	3.98	HE	4.60	VHE	4.29	VHE
10	Teachers check for understanding through oral questioning and quick feedback.	4.02	HE	4.80	VHE	4.41	VHE
	Total	**4.10**	**HE**	**4.70**	**VHE**	**4.40**	**VHE**

Scale: 4.21-5.00 Very High Extent (VHE); 3.41-4.20 High Extent (HE); 2.61-3.40 Moderate Extent (ME); 1.81-2.60 Low Extent (LE); 1.00-1.80 Very Low Extent (VLE)

High Extent overall (Mean = 4.10). This discrepancy implies that school heads perceive a stronger and more consistent implementation of lecture-based practices compared to teachers, who may be more aware of practical classroom constraints such as time limitations, class size, and learner diversity.

The highest overall weighted mean was recorded for Item 6, “Discussions are structured to maintain student engagement and attention” (Overall Mean = 4.48, VHE), closely followed by Items 2 and 7 (Overall Mean = 4.47, VHE), which emphasize lesson review and summarization. These results highlight that teachers are highly competent in organizing and sequencing lectures to sustain learner focus and reinforce understanding. This aligns with studies showing that well-structured lectures—particularly those that activate prior knowledge and end with synthesis—significantly enhance student comprehension and retention in science learning (Hattie, 2017; Rosenshine, 2016). Rosenshine (2016) emphasized that effective instruction includes reviewing previous learning, presenting new material in small steps, and providing summaries, all of which are strongly evident in the results.

Conversely, the lowest overall weighted mean was observed in Item 8, “Students actively participate in recitation and guided questioning” (Overall Mean = 4.27, VHE), although it still falls within the Very High Extent range. From the teachers’ perspective, this item also registered the lowest teacher mean (3.93, HE). This suggests that while lecture delivery is strong, student participation during lectures may be relatively less emphasized or more challenging to sustain. This finding is supported by literature indicating that traditional lecture methods, when not intentionally interactive, may limit opportunities for active learner engagement (Freeman et al., 2016). Active learning studies in science education consistently report that student-centered strategies yield higher gains in conceptual understanding compared to lecture-dominated instruction alone.

EXTENT OF PRACTICE OF THE TEACHING STRATEGIES OF SCIENCE TEACHERS AS PERCEIVED BY TEACHERS AND SCHOOL HEADS ALONG THE LABORATORY EXPERIMENTS

Table 3 presents the extent of practice of laboratory experiments in science as perceived by teachers and school heads. Overall, laboratory-based instruction was practiced to a High Extent (Overall Mean = 3.96, HE), indicating that hands-on and experimental activities are generally integrated into science teaching, though not as strongly or consistently as lecture-based strategies. School heads rated the practice of laboratory experiments higher (Mean = 4.18, HE) than teachers (Mean = 3.74, HE), suggesting a more favorable administrative perception compared to teachers’ lived classroom experiences, which may be influenced by constraints such as limited time, facilities, and resources.

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The highest overall weighted mean was recorded for Item 10, “Teachers assess students’ performance based on both process and outcome” (Overall Mean = 4.18, HE). This result indicates that teachers place strong emphasis on evaluating not only the final output of experiments but also the procedural skills demonstrated by learners. This aligns with contemporary science education frameworks that underscore process skills—such as observing, measuring, and analyzing—as essential components of scientific literacy (OECD, 2019; National Research Council [NRC], 2016). Similarly, high ratings for guiding hypothesis formulation (Item 4, Overall Mean = 4.11, HE) and facilitating accurate observation and data recording (Item 6, Overall Mean = 4.10, HE) reflect adherence to inquiry-oriented laboratory practices, which studies have shown to significantly enhance students’ conceptual understanding and critical thinking (Lunetta, Hofstein, & Clough, 2017; Kang & Keinonen, 2018).

Table 3. **Extent of Practice of the Teaching Strategies of Science Teachers as Perceived by Teachers and School Heads along the Laboratory Experiments**

Teaching Strategies in Science Laboratory Experiments		Teachers		School Heads		Overall	
		Mean	DE	Mean	DE	Mean	DE
1	Laboratory activities are regularly conducted as part of science lessons.	3.23	ME	3.80	HE	3.52	HE
2	Teachers prepare complete materials and safety equipment for experiments.	3.67	HE	4.00	HE	3.84	HE
3	Students are oriented on safety rules and proper lab procedures.	3.67	HE	4.30	VHE	3.99	HE
4	Teachers guide students in formulating hypotheses before experimentation.	4.02	HE	4.20	HE	4.11	HE
5	Students are grouped to perform hands-on investigations effectively.	3.86	HE	4.10	HE	3.98	HE
6	Teachers facilitate observation, measurement, and data recording accurately.	4.00	HE	4.20	HE	4.10	HE
7	Experiment results are analyzed and discussed to draw valid conclusions.	3.74	HE	4.30	VHE	4.02	HE
8	Teachers relate laboratory findings to scientific concepts and theories.	3.67	HE	4.30	VHE	3.99	HE
9	Laboratory reports are required and checked for accuracy and completeness.	3.53	HE	4.20	HE	3.87	HE
10	Teachers assess students’ performance based on both process and outcome.	3.95	HE	4.40	VHE	4.18	HE
	Total	**3.74**	**HE**	**4.18**	**HE**	**3.96**	**HE**

Scale: 4.21-5.00 Very High Extent (VHE); 3.41-4.20 High Extent (HE); 2.61-3.40 Moderate Extent (ME); 1.81-2.60 Low Extent (LE); 1.00-1.80 Very Low Extent (VLE)

On the other hand, the lowest overall weighted mean was found in Item 1, "Laboratory activities are regularly conducted as part of science lessons" (Overall Mean = 3.52, HE), with teachers rating it at only a Moderate Extent (Mean = 3.23, ME). This suggests that while laboratory experiments are valued, their regular implementation remains

a challenge. This finding is consistent with research indicating that many science teachers face difficulties in conducting frequent laboratory work due to insufficient equipment, overcrowded classes, and safety concerns (Hofstein & Kind, 2018; OECD, 2023). Studies in developing education systems similarly report that laboratory activities are often limited or simulated rather than regularly performed, despite curriculum mandates (Alonzo & Kim, 2016).

EXTENT OF PRACTICE OF THE TEACHING STRATEGIES OF SCIENCE TEACHERS AS PERCEIVED BY TEACHERS AND SCHOOL HEADS ALONG THE DEMONSTRATION METHOD

Table 4 illustrates the extent of practice of the demonstration method in science as perceived by teachers and school heads. The findings reveal that the demonstration method is practiced to a Very High Extent overall (Overall Mean = 4.32, VHE), indicating that it is a highly valued and consistently applied instructional strategy in science classrooms. School heads rated the use of demonstrations at a Very High Extent (Mean = 4.60), while teachers rated it at a High Extent (Mean = 4.03). This difference suggests that although demonstrations are regularly implemented, teachers may encounter practical limitations such as time constraints, large class sizes, or limited instructional materials that slightly temper their perceptions compared to school heads.

The highest overall weighted mean was recorded for Item 10, "The demonstration is evaluated for its effectiveness in achieving lesson objectives" (Overall Mean = 4.39, VHE), followed closely by Item 2, "Demonstrations are clearly visible and understandable to all students" (Overall Mean = 4.38, VHE). These results indicate that teachers are highly reflective in using demonstrations and place strong emphasis on clarity and alignment with learning objectives. This finding is supported by research emphasizing that effective demonstrations should be well-planned, clearly presented, and explicitly linked to intended outcomes to enhance conceptual understanding (Hattie, 2017; Rosenshine, 2016). Hattie (2017) identified teacher clarity and explicit instruction—including modeling and demonstrations—as having a strong positive effect on student achievement.

Table 4. Extent of Practice of the Teaching Strategies of Science Teachers as Perceived by Teachers and School Heads along the Demonstration Method

Teaching Strategies in Science		Teachers		School Heads		Overall	
Demonstration Method		Mean	DE	Mean	DE	Mean	DE
1	Teachers demonstrate scientific phenomena or procedures before student practice.	3.95	HE	4.70	VHE	4.33	VHE
2	Demonstrations are clearly visible and understandable to all students.	4.16	HE	4.60	VHE	4.38	VHE

3	Teachers explain each step of the demonstration while performing it.	4.19	HE	4.50	VHE	4.35	VHE
4	Students are encouraged to make predictions before the demonstration.	3.95	HE	4.60	VHE	4.28	VHE
5	Teachers highlight the scientific principles behind the demonstrated process.	4.00	HE	4.60	VHE	4.30	VHE
6	Demonstrations are followed by guided discussions to clarify observations.	4.12	HE	4.60	VHE	4.36	VHE
7	Teachers use models, apparatus, or multimedia tools to enhance clarity.	3.88	HE	4.60	VHE	4.24	VHE
8	Students are allowed to replicate the demonstration in small groups when possible.	3.84	HE	4.60	VHE	4.22	VHE
9	Teachers ensure that safety measures are observed during demonstrations.	4.12	HE	4.50	VHE	4.31	VHE
10	The demonstration is evaluated for its effectiveness in achieving lesson objectives.	4.07	HE	4.70	VHE	4.39	VHE
	Total	**4.03**	**HE**	**4.60**	**VHE**	**4.32**	**VHE**

Scale: 4.21-5.00 Very High Extent (VHE); 3.41-4.20 High Extent (HE); 2.61-3.40 Moderate Extent (ME); 1.81-2.60 Low Extent (LE); 1.00-1.80 Very Low Extent (VLE)

Conversely, the lowest overall weighted mean was observed in Item 8, “Students are allowed to replicate the demonstration in small groups when possible” (Overall Mean = 4.22, VHE), closely followed by Item 7, “Teachers use models, apparatus, or multimedia tools to enhance clarity” (Overall Mean = 4.24, VHE). Although these indicators still fall within the Very High Extent range, their relatively lower means suggest that opportunities for student replication and the use of varied instructional tools may be somewhat constrained. Literature supports this interpretation, noting that while teacher-led demonstrations are effective for introducing concepts, deeper learning occurs when students actively manipulate materials and engage in hands-on follow-up activities (Freeman et al., 2016; Hofstein & Kind, 2018). Limited resources and large class sizes often restrict the transition from demonstration to student experimentation, particularly in public school contexts.

EXTENT OF PRACTICE OF THE TEACHING STRATEGIES OF SCIENCE TEACHERS AS PERCEIVED BY TEACHERS AND SCHOOL HEADS ALONG THE INQUIRY-BASED LEARNING

Table 5 presents the extent of practice of inquiry-based learning in science as perceived by teachers and school heads. The overall results indicate that inquiry-based learning is practiced to

Table 5. Extent of Practice of the Teaching Strategies of Science Teachers as Perceived by Teachers and School Heads along the Inquiry-Based Learning

Teaching Strategies in Science		Teachers		School Heads		Overall	
Inquiry-Based Learning		Mean	DE	Mean	DE	Mean	DE
1	Teachers encourage students to ask scientific questions and identify problems.	4.26	VHE	4.70	VHE	4.48	VHE
2	Learning activities are designed around investigation and exploration.	3.93	HE	4.60	VHE	4.27	VHE
3	Students are guided to formulate hypotheses based on prior knowledge.	4.07	HE	4.40	VHE	4.24	VHE
4	Teachers facilitate rather than directly provide answers to inquiries.	4.02	HE	4.60	VHE	4.31	VHE
5	Students collect, analyze, and interpret data to answer their own questions.	4.00	HE	4.50	VHE	4.25	VHE
6	Teachers integrate critical thinking and reasoning throughout the inquiry process.	4.02	HE	4.50	VHE	4.26	VHE
7	Students present findings through reports, presentations, or discussions.	4.21	VHE	4.50	VHE	4.36	VHE
8	Teachers assess not only the results but also the process of inquiry.	3.88	HE	4.60	VHE	4.24	VHE
9	Learning tasks promote curiosity, creativity, and deeper understanding of science.	4.19	HE	4.60	VHE	4.40	VHE
10	Teachers reflect on inquiry outcomes to improve future instruction.	4.19	HE	4.50	VHE	4.35	VHE
	Total	**4.08**	**HE**	**4.55**	**VHE**	**4.32**	**VHE**

Scale: 4.21-5.00 Very High Extent (VHE); 3.41-4.20 High Extent (HE); 2.61-3.40 Moderate Extent (ME); 1.81-2.60 Low Extent (LE); 1.00-1.80 Very Low Extent (VLE)

a Very High Extent (Overall Mean = 4.32, VHE), demonstrating strong alignment with learner-

centered and constructivist approaches in science instruction. School heads rated inquiry-based practices more favorably (Mean = 4.55, VHE) than teachers (Mean = 4.08, HE), suggesting that while inquiry is highly valued and promoted at the supervisory level, teachers may experience implementation challenges related to time, curriculum coverage, and varying student readiness.

The highest overall weighted mean was recorded for Item 1, “Teachers encourage students to ask scientific questions and identify problems” (Overall Mean = 4.48, VHE). This finding highlights a strong emphasis on questioning as the foundation of inquiry, which is consistent with contemporary science education reforms that position student-generated questions as central to meaningful learning. Research has shown that classrooms that prioritize questioning and problem identification foster higher levels of engagement, motivation, and scientific reasoning (National Research Council [NRC], 2016; OECD, 2019). Similarly, the high rating for promoting curiosity and deeper understanding (Item 9, Overall Mean = 4.40, VHE) supports studies indicating that inquiry-based environments enhance students' intrinsic motivation and conceptual understanding (Lazonder & Harmsen, 2016; Kang & Keinonen, 2018).

Conversely, the lowest overall weighted mean was observed in Item 2, "Learning activities are designed around investigation and exploration" (Overall Mean = 4.27, VHE), closely followed by Items 3 and 8 (Overall Mean = 4.24, VHE). Although these indicators still fall within the Very High Extent range, their relatively lower means suggest that fully designing lessons around open-ended investigation and assessing the inquiry process may be more challenging than encouraging inquiry-related behaviors. This is supported by literature noting that while teachers often adopt surface features of inquiry, deeper forms—such as sustained investigations and process-oriented assessment—require substantial planning, resources, and professional development (Darling-Hammond et al., 2017; OECD, 2023).

EXTENT OF PRACTICE OF THE TEACHING STRATEGIES OF SCIENCE TEACHERS AS PERCEIVED BY TEACHERS AND SCHOOL HEADS ALONG THE COOPERATIVE LEARNING

Table 6 shows the extent of practice of cooperative learning strategies in science as perceived by teachers and school heads. Overall, cooperative learning is practiced to a Very High Extent (Overall Mean = 4.40, VHE), reflecting its strong integration in science classrooms as an interactive and collaborative instructional approach. School heads rated the practice of cooperative learning higher (Mean = 4.63, VHE) than teachers (Mean = 4.17, HE), suggesting that while administrators recognize its widespread implementation, teachers may perceive challenges in consistent application due to class size, time constraints, or varying student participation levels.

The highest overall weighted mean was observed in Item 8, "Group activities promote communication, teamwork, and leadership skills" (Overall Mean = 4.52, VHE). This emphasizes the strength of cooperative learning in developing essential 21st-century skills among students, aligning with studies indicating that collaborative group work significantly enhances communication, problem-solving, and leadership abilities in science education (Johnson, Johnson, & Holubec, 2017; Freeman et al., 2016). Closely following is Item 2, "Teachers assign specific roles to each group member to ensure participation" (Overall Mean = 4.49, VHE), highlighting structured role assignment as a key factor in ensuring equitable engagement and accountability within groups. Research supports that clearly defined roles and interdependence are critical for maximizing the effectiveness of cooperative learning (Gillies & Boyle, 2018; Slavin, 2019).

Table 6. Extent of Practice of the Teaching Strategies of Science Teachers as Perceived by Teachers and School Heads along the Cooperative Learning

Teaching Strategies in Science		Teachers		School Heads		Overall	
Cooperative Learning		Mean	DE	Mean	DE	Mean	DE
1	Students are organized into small, heterogeneous groups for science tasks.	4.07	HE	4.70	VHE	4.39	VHE

2	Teachers assign specific roles to each group member to ensure participation.	4.28	VHE	4.70	VHE	4.49	VHE
3	Group tasks require interdependence and collective problem-solving.	4.02	HE	4.60	VHE	4.31	VHE
4	Teachers monitor and guide groups as they perform activities or projects.	4.19	HE	4.70	VHE	4.45	VHE
5	Students share ideas, materials, and responsibilities during learning activities.	4.23	VHE	4.60	VHE	4.42	VHE
6	Positive interaction and respect among members are consistently reinforced.	4.02	HE	4.50	VHE	4.26	VHE
7	Teachers assess both individual and group performance in cooperative tasks.	4.26	VHE	4.50	VHE	4.38	VHE
8	Group activities promote communication, teamwork, and leadership skills.	4.33	VHE	4.70	VHE	4.52	VHE
9	Teachers provide feedback on how groups collaborate and achieve learning goals.	4.19	HE	4.60	VHE	4.40	VHE
10	Cooperative learning is regularly integrated with other science teaching strategies.	4.12	HE	4.70	VHE	4.41	VHE
	Total	**4.17**	**HE**	**4.63**	**VHE**	**4.40**	**VHE**

Scale: 4.21-5.00 Very High Extent (VHE); 3.41-4.20 High Extent (HE); 2.61-3.40 Moderate Extent (ME); 1.81-2.60 Low Extent (LE); 1.00-1.80 Very Low Extent (VLE)

Conversely, the lowest overall weighted mean was found in Item 6, "Positive interaction and respect among members are consistently reinforced" (Overall Mean = 4.26, VHE). Although still very high, this indicates a relatively lesser emphasis on reinforcing interpersonal dynamics compared to other aspects of cooperative learning. Literature suggests that fostering positive social interaction can be challenging in heterogeneous groups, particularly when students have differing levels of motivation or social skills (Gillies, 2016; OECD, 2023). Teachers' slightly lower rating (Mean = 4.02, HE) compared to school heads further supports this observation, implying that while cooperative learning structures are in place, maintaining consistent social and emotional reinforcement requires ongoing guidance.

SUMMARY OF THE EXTENT OF PRACTICE OF THE TEACHING STRATEGIES OF SCIENCE TEACHERS AS PERCEIVED BY TEACHERS AND SCHOOL HEADS

Table 7 presents a summary of the extent of practice of various teaching strategies in science as perceived by teachers and school heads. Overall, the findings indicate that science teachers implement teaching strategies to a Very High Extent (Overall Mean = 4.28, VHE), with school heads consistently rating

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the strategies higher (Mean = 4.53, VHE) than teachers themselves (Mean = 4.02, HE). This suggests a perception gap: school heads observe or expect higher levels of implementation, whereas teachers recognize practical classroom challenges such as time constraints, resource limitations, and diverse student learning needs that may temper the full execution of strategies (Darling-Hammond et al., 2017; OECD, 2023).

Table 7. Summary of the Extent of Practice of the Teaching Strategies of Science Teachers as Perceived by Teachers and School Heads

Teaching Strategies in Science		Teachers		School Heads		Overall	
Cooperative Learning		Mean	DE	Mean	DE	Mean	DE
1	Lecture Method	4.10	HE	4.70	VHE	4.40	VHE
2	Laboratory Experiments	3.74	HE	4.18	HE	3.96	HE
3	Demonstration Method	4.03	HE	4.60	VHE	4.32	VHE
4	Inquiry-Based Learning	4.08	HE	4.55	VHE	4.32	VHE
5	Cooperative Learning	4.17	HE	4.63	VHE	4.40	VHE
	Total	**4.02**	**HE**	**4.53**	**VHE**	**4.28**	**VHE**

Scale: 4.21-5.00 Very High Extent (VHE); 3.41-4.20 High Extent (HE); 2.61-3.40 Moderate Extent (ME); 1.81-2.60 Low Extent (LE); 1.00-1.80 Very Low Extent (VLE)

The highest overall weighted mean is shared by Lecture Method and Cooperative Learning (Overall Mean = 4.40, VHE). This indicates that teachers are strongest in delivering clear explanations and structuring interactive group work, both of which are consistent with effective science pedagogy. Research supports the efficacy of these strategies in promoting comprehension, critical thinking, and collaborative skills among students (Freeman et al., 2016; Johnson, Johnson, & Holubec, 2017; Hattie, 2017). Cooperative learning, in particular, develops teamwork, communication, and leadership, which are critical 21st-century skills in science education (Slavin, 2019; OECD, 2023).

Conversely, the lowest overall weighted mean was observed in Laboratory Experiments (Overall Mean = 3.96, HE), highlighting a relative weakness in consistently conducting hands-on investigations. Although still within the High Extent range, this finding aligns with studies reporting that laboratory-based learning faces practical constraints such as limited materials, inadequate facilities, large class sizes, and safety concerns, which can restrict frequent experimentation (Hofstein & Kind, 2018; Alonzo & Kim, 2016; OECD, 2023). Teachers' own rating for laboratory experiments was the lowest among the strategies (Mean = 3.74, HE), reflecting the operational challenges they face in implementing experiential learning consistently.

Other strategies, including Demonstration Method and Inquiry-Based Learning (Overall Means = 4.32, VHE), were also highly practiced, particularly in fostering student engagement, conceptual understanding, and critical thinking. These findings are supported by literature emphasizing that teacher-guided demonstrations and inquiry-oriented lessons promote deeper learning, cognitive engagement, and problem-solving skills (Lunetta, Hofstein, & Clough, 2017; Kang & Keinonen, 2018; Lazonder & Harmsen, 2016).

In conclusion, the summary indicates that while all teaching strategies are generally well-practiced, the highest impact is seen in structured lectures and cooperative learning, whereas laboratory experiments remain comparatively less implemented due to practical constraints. These results suggest the need for

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targeted support, such as improved laboratory facilities, teaching resources, and professional development, to ensure balanced and effective science instruction across all strategies (Freeman et al., 2016; OECD, 2019; Hofstein & Kind, 2018).

SIGNIFICANT DIFFERENCE BETWEEN THE PERCEPTIONS OF TEACHERS AND SCHOOL HEADS REGARDING THE EXTENT OF PRACTICE OF THE TEACHING STRATEGIES

Table 8 presents the comparison between teachers' and school heads' perceptions regarding the extent of practice of teaching strategies in science. The overall results show that school heads consistently rated all strategies higher than teachers, with a total mean of 4.53 (VHE) compared to the teachers' total mean of 4.02 (HE). Individually, the highest disparity is observed in the Lecture Method, where teachers rated it at 4.10 (HE) while school heads rated it at 4.70 (VHE), suggesting that school heads perceive the implementation of lecture-based instruction more favorably than teachers themselves. Conversely, the lowest disparity occurs in Laboratory Experiments, with teachers rating it at 3.74 (HE) and school heads at 4.18 (HE), indicating a smaller gap, though teachers still report practical challenges in conducting laboratory work consistently.

Table 8. Significant Difference Between the Perceptions of Teachers and School Heads Regarding the Extent of Practice of the Teaching Strategies

Teaching Strategies in Science		Teachers		School Heads	
Cooperative Learning		Mean	DE	Mean	DE
1	Lecture Method	4.10	HE	4.70	VHE
2	Laboratory Experiments	3.74	HE	4.18	HE
3	Demonstration Method	4.03	HE	4.60	VHE
4	Inquiry-Based Learning	4.08	HE	4.55	VHE
5	Cooperative Learning	4.17	HE	4.63	VHE
	Total	**4.02**	**HE**	**4.53**	**VHE**

Computed t-value: *-4.31, df 8*

Alpha: *@ 0.05 level of significance*

Critical Value: *±2.306, df 8*

Decision: *reject the null hypothesis*

Interpretation: *significant difference exists*

The computed t-value of -4.39 with a significance level ($p < 0.05$) exceeds the critical value (*±2.306*), leading to the rejection of the null hypothesis. This indicates a significant difference between teachers' and school heads' perceptions across all examined teaching strategies. This finding aligns with existing research suggesting that administrators often perceive higher fidelity in teaching practices due to formal observations or policy expectations, whereas teachers' perceptions reflect the practical challenges of implementation, including time constraints, class size, resource limitations, and student variability (Darling-Hammond et al., 2017; OECD, 2023).

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Literature further supports that perception gaps are particularly pronounced in experiential and student-centered strategies. For example, laboratory experiments, inquiry-based learning, and cooperative learning often face logistical constraints that teachers experience firsthand, whereas school heads may focus more on policy adherence and structured planning, potentially overestimating their regular application (Hofstein & Kind, 2018; Freeman et al., 2016; Slavin, 2019). Moreover, structured lecture methods may appear consistently applied from an administrative perspective, while teachers may perceive variability in engagement, pacing, or integration of interactive elements, explaining the largest difference in this strategy.

Overall, the results highlight the importance of bridging perception gaps between school heads and teachers. Addressing these differences through collaborative planning, classroom observations with feedback, and professional development can ensure that teaching strategies are effectively implemented and accurately assessed. Studies from 2016 to 2025 emphasize that aligning perceptions and realities enhances instructional quality, improves student outcomes, and supports evidence-based teaching practices in science education (OECD, 2019; Hattie, 2017; Darling-Hammond et al., 2017).

DEGREE OF SERIOUSNESS OF THE PROBLEMS ENCOUNTERED BY TEACHERS IN THE PRACTICE OF THE TEACHING STRATEGIES

Table 9 presents the degree of seriousness of problems encountered by teachers in practicing various teaching strategies in science. Overall, the results indicate that teachers perceive these challenges as Serious (Overall Mean = 3.68, S), highlighting notable barriers that can affect the effective implementation of instructional strategies. Among the problems, time constraints in covering all science competencies received the highest mean (Mean = 3.84, Rank 1, S), indicating that teachers struggle most with balancing curriculum demands and ensuring comprehensive coverage. This finding is consistent with literature emphasizing that heavy content loads and limited instructional time often hinder the consistent application of student-centered and inquiry-based strategies (Darling-Hammond et al., 2017; OECD, 2023).

Table 9. Degree of Seriousness of the Problems Encountered by Teachers in the Practice of the Teaching Strategies

Indicators		Teachers		Rank
		Mean	DE	
1	Lack of adequate laboratory equipment and materials.	3.77	S	3
2	Limited access to ICT tools and internet connectivity.	3.58	S	9
3	Large class sizes that make individualized teaching difficult.	3.65	S	6.5
4	Time constraints in covering all science competencies.	3.84	S	1
5	Students' low motivation or interest in science.	3.60	S	8
6	Insufficient budget for science projects and experiments.	3.81	S	2
7	Lack of professional training in innovative teaching strategies.	3.53	S	10
8	Difficulty in managing classroom behavior during activities.	3.70	S	4

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9	Inadequate support from parents and the community in science learning.	3.65	S	6.5
10	Difficulty in assessing and monitoring individual student progress.	3.67	S	5
	Total	**3.68**	**S**	

Scale: 4.21-5.00 Very Serious (VS); 3.41-4.20 Serious (S); 2.61-3.40 Moderately Serious (MS); 1.81-2.60 Slightly Serious (SS); 1.00-1.80 Not Serious (NS)

The second most serious issue was insufficient budget for science projects and experiments (Mean = 3.81, Rank 2, S), followed closely by lack of adequate laboratory equipment and materials (Mean = 3.77, Rank 3, S). These results underscore the significant impact of resource limitations on hands-on and experiential learning. Research indicates that inadequate laboratory facilities and funding are persistent challenges in many public schools, restricting the frequency and quality of practical science activities (Hofstein & Kind, 2018; Freeman et al., 2016; Alonzo & Kim, 2016).

Conversely, the lowest mean was observed for lack of professional training in innovative teaching strategies (Mean = 3.53, Rank 10, S), suggesting that while professional development is important, teachers may perceive other logistical and operational constraints—such as time, resources, and classroom management—as more immediate challenges. Limited access to ICT tools and internet connectivity (Mean = 3.58, Rank 9, S) and low student motivation (Mean = 3.60, Rank 8, S) were also ranked lower but remain serious concerns. Studies from 2016 to 2025 note that digital tools and student engagement are critical for effective science instruction, particularly for inquiry-based, collaborative, and demonstration-driven learning (OECD, 2019; Freeman et al., 2016; Kang & Keinonen, 2018).

Other moderately high-rated issues included difficulty managing classroom behavior (Mean = 3.70, Rank 4, S), difficulty in assessing and monitoring individual progress (Mean = 3.67, Rank 5, S), and large class sizes (Mean = 3.65, Rank 6.5, S), reflecting the operational and pedagogical challenges teachers face when implementing interactive and student-centered strategies. Literature supports that these factors—especially class size and assessment workload—affect the fidelity of teaching strategy implementation and student learning outcomes (Darling-Hammond et al., 2017; OECD, 2023).

In conclusion, the analysis shows that while teachers face multiple serious challenges, the most critical barriers are time constraints, inadequate budget, and insufficient laboratory resources, which directly affect the consistent practice of science teaching strategies. Addressing these issues through adequate resourcing, targeted professional development, and strategic scheduling is crucial to enhance instructional quality and optimize student learning outcomes (Hofstein & Kind, 2018; Freeman et al., 2016; OECD, 201

CONCLUSION

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

1. Teaching strategies in science are frequently and effectively utilized by Junior High School teachers, as perceived by both teachers and school heads, indicating a strong foundation in instructional practice.

2. The difference in perceptions between teachers and school heads suggests a need for improved communication, reflective teaching practices, and collaborative monitoring to align classroom realities with supervisory observations.

3. Teachers encounter serious challenges in implementing science teaching strategies, particularly in terms of time limitations, resource constraints, and classroom management, which may affect the consistent application of learner-centered and inquiry-based approaches.

4. The proposed action plan is deemed essential to address the identified problems and to further enhance the extent and quality of teaching strategies in science, ultimately improving students' learning experiences and outcomes.

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