INTERNATIONAL JOURNAL OF ADVANCED MULTIDISCIPLINARY STUDIES
Volume VI, Issue 6 June 2026, eISSN: 2799-0664

Extent Of Utilization of the Instructional Strategies among Secondary Science Teachers

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Abstract — This study aimed to determine the extent of instructional strategy use among secondary science teachers. Specifically, it identified the commonly utilized teaching strategies in science instruction and examined their effectiveness in enhancing student engagement and learning. The study also determined whether significant differences existed in the use of instructional strategies when grouped by selected profile variables.

The study utilized a descriptive-comparative research design involving secondary science teachers from selected schools. Data were collected through a structured questionnaire and analyzed using appropriate statistical tools such as frequency, percentage, weighted mean, and inferential statistics.

Findings showed that secondary science teachers utilized various instructional strategies to a moderate to high extent, particularly learner-centered and collaborative approaches. The study concluded that effective instructional strategies enhance science teaching and student engagement. Continuous professional development and training are recommended to further improve instructional practices.

Keywords: Instructional Strategies, Science Education, Comparative Analysis, Teaching Methods, Learner-Centered Approaches, Pedagogy

I. INTRODUCTION

Science education plays a vital role in developing students' critical thinking, problem-solving, and inquiry skills—competencies that are essential for success in the 21st century. It

fosters scientific literacy, creativity, and innovation, preparing learners to understand and respond to global challenges such as climate change, public health, and technological advancement. However, the effectiveness of science education depends not only on curriculum content but also on the instructional strategies employed by teachers. As such, examining and comparing instructional strategies across science subjects is essential to ensure that teaching methods address students' diverse learning needs.

Instructional strategies are the methods, techniques, and approaches teachers use to facilitate learning and achieve specific educational outcomes. These include lecture-discussion, inquiry-based learning, cooperative learning, laboratory experiments, problem-based learning, and technology-integrated instruction. The choice of strategy often depends on the subject matter, students' abilities, available resources, and teachers' pedagogical beliefs. According to Çelik and Pulur (2021), instructional strategies have a significant impact on students' academic performance and engagement, particularly in science education, where active participation and experimentation are crucial.

Each science subject—Biology, Chemistry, and Physics — requires distinct teaching methods due to differences in content, cognitive demand, and the nature of inquiry. For instance, Biology often emphasizes observation and classification, while Physics involves conceptual reasoning, computation, and experimentation. Chemistry integrates both theoretical understanding and laboratory work. As Tomlinson (2021) and Brookhart (2020) noted, effective teachers adapt their instructional approaches to suit the learning requirements of their subject area, enabling students to meaningfully construct knowledge.

Recent studies highlight those student-centered approaches—such as inquiry-based learning and collaborative problem-solving—enhance conceptual understanding and motivation among science learners (Wang, Li, & Zhang, 2021). These methods encourage students to explore, question, and apply scientific principles rather than passively receive information. Moreover, technology-enhanced strategies, such as simulations and digital labs, have emerged as powerful tools in supporting visualization and experimentation in science (Gonzales & Rivera, 2023). However, not all teachers have equal access to training or resources that allow them to implement

these strategies effectively, leading to variations in teaching practices across science subjects and schools.

In the Philippine educational context, the K–12 Science Curriculum emphasizes inquiry-based learning, performance tasks, and authentic assessment to promote a deeper understanding of scientific concepts. Yet, studies show that many teachers still rely on traditional lecture-based instruction due to large class sizes, limited laboratory facilities, and time constraints (Cruz, 2022). Basilio and Tan (2020) further observed that teachers' instructional strategies often vary depending on contextual factors such as school location, resource availability, and student readiness. These disparities underscore the need for comparative research to identify which strategies are most effective under specific conditions.

The COVID-19 pandemic also brought about significant changes in teaching modalities. The shift to online and blended learning forced science teachers to modify their instructional strategies to maintain engagement and ensure continuity of learning (Santos & Dela Cruz, 2021). This transformation revealed both the adaptability and the limitations of teachers' instructional practices, particularly in conducting laboratory-based or experiential learning activities. As schools return to in-person classes, there is a renewed need to assess which instructional strategies remain effective and how they differ across science subjects.

A comparative analysis of instructional strategies provides valuable insights into how science teachers design and implement their lessons, manage learning activities, and engage students. It allows educators, administrators, and policymakers to determine best practices, address challenges, and promote professional development opportunities tailored to specific subject needs. López and Javier (2023) emphasize that identifying effective strategies enhances not only academic outcomes but also students' motivation, scientific curiosity, and self-regulation.

In light of these considerations, this study, entitled "Extent of utilization of the Instructional Strategies among Secondary Science Teachers." seeks to examine and Compare the instructional approaches used by Junior High School science teachers. By exploring similarities, differences, and effectiveness among these strategies, the study aims to contribute to the improvement of science instruction, curriculum implementation, and teacher development

programs. Ultimately, the research aspires to support the creation of learning environments that are engaging, equitable, and responsive to the diverse demands of science education.

Literature Review

To support this research study, the following three theories are considered particularly relevant: Constructivism, Social Learning Theory, and Cognitive Development Theory.

Constructivism asserts that learners actively construct their understanding and knowledge of the world through experience and reflection on those experiences (Fosnot, 1996). This aligns well with the study on student engagement and experiential learning, which applies to classroom management strategies that encourage participation and exploration in science classrooms. This directly informs the study's focus on student engagement and experiential learning in science classrooms. Effective classroom management, therefore, should prioritize active participation and exploration. The research will examine how constructivist-aligned strategies (inquiry-based learning, student-led discussions) impact learning outcomes compared to teacher-centered approaches, considering, for example, students' differing levels of understanding of concepts like the concept of photosynthesis in biology or balancing chemical equations in chemistry.

The study will investigate how teachers adapt instruction and classroom management to accommodate individual differences within various science subjects. This includes analyzing how classroom management supports knowledge construction for all learners, regardless of background or learning preferences.

The social aspect of constructivism emphasizes collaborative learning. The study will explore how classroom management practices facilitate or hinder collaboration, examining the role of classroom management in promoting positive peer interactions and fostering a sense of community to optimize knowledge construction through social interaction. The aim is to identify best practices for creating a classroom environment that fosters both individual and collaborative knowledge building in junior high science.

Social Learning Theory states that the processes of observing, imitating, and having social interaction become the means of knowledge and behavior acquisition by learners (Bandura, 1977). This is pertinent to being concerned about collaboration and group work; strategies for effective classroom management should encourage positive social interactions and act as models for acceptable behavior. This framework is highly relevant to this study's focus on collaboration and group work within the science classroom. Effective classroom management strategies, from this perspective, should not only maintain order but also actively foster positive social interactions and model appropriate behaviors. The research will investigate how different classroom management techniques influence students' collaborative learning experiences, examining whether strategies that explicitly promote peer interaction and teamwork lead to better outcomes in terms of student engagement and academic achievement. This will involve analyzing how teachers use classroom management to create a supportive and inclusive learning environment where students feel comfortable sharing ideas, collaborating on tasks, and learning from each other. For example, the study will examine whether teachers who use group work strategies that encourage active listening and respectful communication have students who are more likely to participate in discussions and contribute to group projects.

Social Learning Theory emphasizes the importance of role modeling in the learning process. Teachers, as key figures in the classroom, serve as significant role models for students' behavior and learning approaches. The study will explore how teachers' classroom management styles influence students' behavior and attitudes toward collaboration. This analysis will include examining whether teachers who model respectful communication, active listening, and effective conflict resolution techniques have students who demonstrate more positive social interactions and better collaborative skills. The research will also investigate whether the effectiveness of collaborative learning is impacted by the level of teacher support and guidance provided during group activities, such as providing clear instructions, monitoring group progress, and offering constructive feedback. For instance, the study will examine whether teachers who provide clear guidelines for group work and actively facilitate discussions within groups have students who are more likely to work together effectively and achieve positive outcomes.

The study will consider the impact of social dynamics within the classroom. Social Learning Theory recognizes that learning is not solely an individual process; it's deeply influenced

by the social context and interactions within the group. The research will analyze how different classroom management approaches affect the social dynamics within groups, examining factors such as peer pressure, group cohesion, and the distribution of power within collaborative learning activities. For example, the study will observe whether students who are perceived as "popular" or "high-achieving" have a disproportionate influence on group discussions and decision-making under different management styles. The study will also examine whether teachers who use strategies to encourage equal participation and prevent dominant personalities from monopolizing group activities have students who are more likely to feel comfortable sharing their ideas and contributing to the group's success. By understanding how classroom management influences the social dynamics of collaborative learning, the study aims to identify strategies that optimize both academic achievement and the development of positive social skills, such as effective communication and conflict resolution, within the junior high science classroom.

Cognitive Development Theory implies that learning unfolds through distinct stages characterized by different cognitive abilities (Piaget, 1952). This is crucial for understanding the effectiveness of classroom management strategies across different science subjects and age groups within the junior high setting. The study will investigate how teachers adapt their classroom management techniques to match the cognitive developmental stages of their students. For instance, strategies suitable for younger students in early adolescence might differ significantly from those appropriate for older students nearing high school. This involves analyzing how teachers adjust their expectations, communication styles, and disciplinary approaches to account for the varying cognitive capacities and learning styles present in a diverse classroom. The research will explore whether tailoring classroom management to specific cognitive developmental levels leads to improved student engagement, behavior, and academic outcomes.

Furthermore, the study will examine how the specific demands of different science subjects (biology, chemistry, physics) necessitate different classroom management approaches. The abstract reasoning required for physics, for example, may demand different management techniques than the more hands-on, observational learning often found in biology. The research will investigate whether teachers adjust their classroom management to accommodate the unique cognitive demands of each subject. This might involve analyzing the types of activities and assignments used in each subject, the level of teacher guidance and support provided, and the

methods used to assess student understanding. The goal is to determine if aligning classroom management with the specific cognitive challenges of each subject improves student learning and reduces behavioral issues.

Statement of the Problem

This study aims to analyze and compare classroom management strategies used across science subjects, such as Biology, Chemistry, and Physics, to determine their effectiveness in maintaining discipline, enhancing student engagement, and improving learning outcomes. Specifically, this study seeks to answer the following questions:

1. What is the demographic profile of the participants in terms of:
    a. Age
    b. Sex
    c. Highest Educational Attainment
    d. Number of Years Teaching Science Subjects
    e. Number of Trainings/Seminars Attended on Management Strategies in Science Subjects (Local and International)
2. What is the extent of the utilization of the Instructional Strategies of Junior High School Teachers in Science Education in the following:
    a. Inquiry-Based Learning
    b. Hands-On Learning Activities
    c. Multimedia and Visual Aids

3. Is there a significant difference in the extent of utilization of instructional strategies among Junior High School Science teachers when grouped according to their profile variables?

a. Is there a significant relationship between the extent of utilization of the instructional strategies among secondary science teachers and their profile variables?

b. What pedagogical framework can be proposed based on the salient findings of the study?

II. METHODOLOGY

Research Design and Strategy

This study utilized a descriptive-comparative research design to analyze the instructional strategies used across different science subjects. This design is appropriate as it allows the researcher to describe existing conditions and compare variations in teaching strategies among respondents.

The present study is anchored on various related literature and studies that support the variables indicated in the Statement of the Problem. Specifically, instructional strategies such as the lecture method, inquiry-based learning, and collaborative learning have been widely examined in science education. According to recent studies, these strategies significantly influence students' academic performance and engagement across science subjects. Thus, the inclusion of these variables in the study is supported by both theoretical and empirical evidence, establishing a strong foundation for the investigation.

A descriptive quantitative research design will be used to offer a comprehensive evaluation of the Comparative Analysis of Instructional Strategies across Science subjects. The primary goal of the study will be to evaluate how these varied instructional strategies engage students and provide positive learning outcomes in different branches of science.

The study design will generally include a validated survey assessment, through which quantitative data will be obtained from a sample of junior high science teachers. The survey will collect information about the demographic profile of the respondents, specifically regarding age, gender, highest educational attainment, years of teaching experience, and the number of training/seminars attended on the application of classroom management strategies in science subjects at local and international levels. These demographic factors will be fundamental in understanding the potential backgrounds and influences on the implementation and efficacy of management strategies within the classroom.

The main focus of the research will then be on the instructional strategies used by teachers in Biology, Chemistry, and Physics. Three strategies will be evaluated: student-led classroom management, engaging and hands-on learning experiences, and collaboration/group work. Each of these strategies is believed to distinctly influence classroom environments, student involvement, and overall learning outcomes. The study will thus provide insights into teachers' perceptions of the effectiveness of these strategies by examining their application in real classroom settings.

Furthermore, this study will seek to measure the effectiveness of these strategies in stimulating student engagement in the scientific subjects of interest. Engaging students will remain crucial in science education, as it fosters better comprehension of complex scientific concepts. Therefore, the survey will aim to collect data on the degree to which instructional strategies influence student involvement, motivation, and active learning in Biology, Chemistry, and Physics.

Statistical tools will be used to analyze the data and establish whether there are any correlations between the participants' demographic profiles and the effectiveness of classroom management strategies. This analysis will be particularly important, as it may reveal that the success of strategy implementation is related to certain factors, such as years of teaching experience or attendance at related training sessions. For example, a finding that teachers with more experience or who have attended more seminars are better able to implement these strategies would have significant implications for professional development programs in the school system.

Eventually, this research is expected to contribute to the adoption of proven instructional strategies, potentially leading to improved student outcomes in junior high school science education.

Population and Locale of the Study

The population of this study will be composed of science teachers from junior high schools in Urdaneta City Division. Specifically, these are science teachers teaching Biology, Chemistry, and Physics at the junior secondary level. From the City Division of Urdaneta, the selection of science teachers presently involved in teaching Biology, Chemistry, and Physics will be drawn from public and private junior high schools, allowing for representation of diverse teaching experiences and backgrounds. The teachers included in this study will be selected based on their engagement in teaching these science subjects during the current academic year.

The setting of the study lies within the City Division of Urdaneta in the province of Pangasinan, Philippines. The division has several junior high schools, both in National HS and Barrios HS settings, which provide ample geography and demographic scope for the study. Focusing on science teachers from this locale guarantees that findings must be relevant to the local context and educational practices in the city's junior high schools. Data collection will be done within these schools during the academic year 2025-2026, thus contributing information on the classroom management strategies being employed and their effectiveness in the engagement of students in science subjects in the local region.

Data Gathering Tool

To assess the comparative analysis of instructional strategies across science subjects, a well-structured data gathering tool will be used. The primary tool for this study will be a validated survey questionnaire designed specifically for science teachers in the City Division of Urdaneta.

Data Gathering Procedure

The systematic method for data gathering in this study will ensure the collection of credible and valid data pertaining to the analysis of instructional strategies across science subjects. The steps follow the process, such as preparation and approval.

To demonstrate the reliability of the questionnaires, a pilot test was conducted at a secondary school in Pangasinan II. This involved administering the questionnaire to a diverse group of students, who provided valuable feedback on clarity and structure. It analyzed the responses for consistency, using reliability coefficients to measure internal consistency. While some sections showed high reliability, others revealed ambiguities, prompting necessary revisions. By addressing these issues, it enhanced the questionnaire's effectiveness, ensuring it would yield valid data for our study. This pilot test reinforced the importance of thorough preparation in educational research methodologies.

The study mainly involves all the necessary permissions of educational authorities as possible from the school division office of Urdaneta City. This is to ensure all the research activity will be within the framework of institutional ethical guidelines. A letter of request for participation will be sent to the administrators of the participating schools in the City Division of Urdaneta. The letter will detail the purpose of the study, the procedures involved, and the voluntary nature of participation. After receiving approval, teachers will be informed about the study, and consent will be collected from them to make them a part of it. The survey design and validation will request to collect the demographic profile of respondents, classroom management strategies, and their perceived effectiveness. The survey will undergo a validation process, which includes reviewing the content and structure for clarity, relevance, and reliability. This validation process will be done by experts in the field of education and classroom management. of survey will be distributed to the selected sample of junior high school science teachers in the City Division of Urdaneta. The survey will be administered in both hard copy and digital formats, depending on the preference of the respondents. Teachers will be asked to complete the survey during a designated period, which will be arranged with school administrators to avoid interfering with regular teaching schedules. Data collection timeline will occur from academic year 2025 to 2026, since that is the most appropriate time for getting relevant responses from a representative sample of science teachers

within three subjects: Biology, Chemistry, and Physics. Compilation of data will be done after the completion of the surveys; data will be compiled into a spreadsheet and/or database for ease of access and analysis. Each response will be validated in terms of completeness and consistency. The incompletely or invalidly obtained responses will be excluded from analysis.

III. RESULTS AND DISCUSSION

This chapter presents, analyzes, and interprets data to answer the research problems. Data were presented using tables to facilitate understanding of the discussion of the problem in Chapter 1.

The results of the pilot testing conducted to determine the internal consistency reliability of the research instrument using Cronbach's Alpha for three sets of variables, each composed of ten items. The findings indicate that the first set shows acceptable internal consistency, suggesting that the items are generally reliable but may still benefit from minor refinement. The second set demonstrates excellent reliability, indicating strong consistency among items and effective measurement of the intended construct. The third set reflects good reliability, approaching an excellent level, with only slight improvements needed. All the instruments are considered reliable for full implementation.

TABLE 1
DEMOGRAPHIC PROFILE OF THE RESPONDENTS IN URDANETA CITY DIVISION, SCIENCE JUNIOR TEACHERS.
N=70

Variables	Variables Categories	Frequency	Percentage
Age	20-29 Years old	18	25.8
	30-39 Years old	26	37.1
	40 and above	26	37.1
Sex	Male	27	38.6
	Female	43	61.4
Highest Educational Attainment	Bachelor's Degree	40	57.1
	Master's Degree	29	41.4
	Doctorate Degree	1	1.4
	Others (please specify): ___	0	0
Number of years teaching science subjects			
	1-5 years	35	50.0
	6-10 years	20	28.6
	11-15 years	9	12.9
	16 years and above	6	8.6
Number of trainings/seminars attended on classroom management strategies in science subjects:	None	2	2.9
	1-3 trainings (local)	40	57.1
	4-6 trainings(local)	23	32.9
	1-3 trainings(int'l)	4	5.7
	4 or more trainings(int'l)	1	1.4

Demographic Profile of Science Teachers from Junior High Schools in Urdaneta City Division

The demographic profile includes age, sex, Highest Educational Attainment, Number of years teaching science subjects, and Number of trainings/seminars attended on classroom management strategies in science subjects, with the corresponding frequency count (f) and percentage (%) of each bracket. Each variable has its interpretation and analysis. Seventy respondents were asked, which means that each variable's total frequency count is 70.

Age. Shows that the age profile of science teachers in Urdaneta City Division, out of 70 respondents, 18 teachers (25.8%) were between 20–29 years old, 26 teachers (37.1%) were between 30–39 years old, and another 26 teachers (37.1%) were 40 years old and above. This means that most science teachers are in their early middle age (30–39 years old) or older. The data suggest that science teaching is often preferred by teachers who are already experienced and settled in their careers. Having many teachers in their middle age also shows stability and maturity in the teaching workforce, which can contribute to effective classroom management and better teaching quality (Forrosuelo, 2020; Department of Education, 2023).

Sex. It presents the sex profile of science teachers in Urdaneta City Division. Out of 70 respondents, 27 teachers (38.6%) were male, while 43 teachers (61.4%) were female. This shows that the majority of science teachers are women. The higher percentage of female teachers reflects a common trend in the Philippines, where the teaching profession is often female-dominated, especially in basic education (Philippine Statistics Authority, 2025). Research also suggests that gender can influence teaching approaches and classroom management styles, with female teachers often associated with nurturing and supportive teaching practices (Miranda et al., 2025). These findings emphasize the importance of recognizing gender dynamics in education, as they may affect both teaching strategies and student learning experiences.

Highest Educational Attainment. Shows the educational attainment of science teachers in Urdaneta City Division. Out of 70 respondents, 40 teachers (57.1%) hold a bachelor's degree, 29 teachers (41.4%) have a master's degree, and only 1 teacher (1.4%) has earned a doctorate.

TABLE 3
EXTENT OF UTILIZATION OF INSTRUCTIONAL STRATEGIES IN SCIENCE EDUCATION IN TERMS OF INQUIRY-BASED LEARNING

Indicators: As a science teacher…	WM	DE	Transmuted Rating
I encourage students to ask questions and explore scientific concepts independently.	3.65	A	VE
I design learning activities that allow students to investigate and discover answers on their own.	3.50	O	E
I guide students in formulating hypotheses and testing them through experiments.	3.43	O	E
4. I provide opportunities for students to collect, analyze, and interpret data.	3.49	O	E
5. I use open-ended questions to stimulate students' critical and creative thinking.	3.59	O	E
6. I facilitate classroom discussions that lead students to construct their own understanding of scientific ideas.	3.57	O	E
7. I integrate real-world problems in science lessons to promote inquiry and exploration.	3.59	O	E
8. I assess students based on their inquiry process rather than just the final answers.	3.54	O	E
9. I provide feedback that helps students refine their questions and methods of investigation.	3.50	O	E
10. I create a supportive environment were students feel confident exploring and sharing them findings.	3.62	O	E
Total Weighted Mean	3.55	O	E

Weighted Mean Score Range	Descriptive Rating	Transmuted Rating
3.65-4.00	Always (A)	Very Extensive (VE)
2.90-3.64	Often (O)	Extensive (E)
1.75-2.89	Sometimes (S)	Moderately Extensive (ME)
1.00-1.74	Never (N)	Not Extensive (NE)

The results reveal that teachers highly utilize inquiry-based instructional strategies, with a weighted mean of 3.55 ("Often"). The strongest practice is encouraging students to ask questions and explore concepts independently (WM = 3.65), fostering curiosity and active learning aligned with Constructivist theories of Piaget and Vygotsky. Other strategies, such as facilitating discussions (WM = 3.57), using real-world problems (WM = 3.59), and applying inquiry-based assessments (WM = 3.54), are also consistently practiced, promoting higher-order thinking skills.

Lower but still positive results include guiding hypothesis formulation and experimentation (WM = 3.43) and data analysis (WM = 3.49), rated "Often." These complex skills demand more time, resources, and guidance, making them harder to implement regularly. The National Research Council emphasizes that effective inquiry should include such deeper processes, though they remain challenging in classroom settings.

TABLE 3
DIFFERENCE IN THE EXTENT OF UTILIZATION AMONG INSTRUCTIONAL STRATEGIES WHEN GROUPED ACCORDING TO AGE
$\propto$=0.05

Variables	f-value	df	p-value	Interpretation
Inquiry-Based Learning		3		Not Significant
	1.631		0.191	
Hands-On Learning Activities		3		Not Significant
	2.434		0.073	
Multimedia and Visual Aids		3		Not Significant
	0.911		0.441	
Overall Weighted Mean	1.803	3	0.155	Not Significant

Table 3 shows the significant difference in the extent of utilization of instructional strategies (Inquiry-Based Learning, Hands-On Learning Activities, Multimedia and Visual Aids, and Overall Weighted Mean) across the teachers' profile variables—age, sex, highest educational attainment, number of years teaching science subjects, and number of trainings/seminars attended—using One-way Analysis of Variance (ANOVA). The test is set at the 0.05 level of significance, where an F-value with Sig. ≤ 0.05 indicates a statistically significant difference, while Sig. > 0.05 indicates no significant difference.

The result shows that most of the F-values have a Sig. (p-value) greater than 0.05, which means that there is no significant difference in the extent of utilization of instructional strategies across the profile variables of age, sex, highest educational attainment, and number of trainings/seminars attended. In other words, whether the teacher is young or older, male or female, bachelor's-, master's-, or doctorate-level holder, or has attended many or few trainings, the way they use inquiry-based, hands-on, and multimedia strategies is not statistically different.

IV. CONCLUSIONS AND RECOMMENDATIONS

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

The teaching workforce in the Urdaneta City Division comprises a balanced mix of early-career and experienced teachers, with a majority of female educators and individuals holding at least a bachelor's degree, indicating a stable and qualified group of science teachers.

Junior High School Science teachers demonstrate a high level of use of instructional strategies, particularly inquiry-based and hands-on approaches, which support active, student-centered, and meaningful learning experiences. While instructional strategies are consistently applied, there is a need to further strengthen higher-order inquiry skills such as hypothesis testing and data analysis, as well as to enhance student participation in multimedia-based learning. Teaching experience significantly influences the use of hands-on and multimedia instructional strategies, while other demographic variables, such as age, sex, educational attainment, and training exposure do not significantly affect instructional practices.

The lack of significant relationships between profile variables and instructional strategies suggests that effective teaching practices are shaped more by contextual and professional factors rather than personal characteristics. There is a need to develop and implement an enhanced pedagogical framework that integrates inquiry-based learning, hands-on activities, and multimedia tools to further improve science instruction. In light of the findings and conclusions of the study, the following recommendations are proposed:

Based on the findings of the study, several recommendations are proposed to improve the teaching and learning of science. Teachers are encouraged to use more inquiry-based learning strategies where students learn by asking questions, doing experiments, and analyzing data. They should also give students more opportunities to use multimedia tools when presenting their work to help improve their communication, creativity, critical thinking, and collaboration skills. School leaders, the Department of Education, curriculum developers, and future researchers are also encouraged to support these improvements by providing training, guidance, resources, and further studies to strengthen classroom instruction. To guide these improvements, a proposed pedagogical framework is recommended that focuses on inquiry-based learning as the main teaching approach, supported by hands-on activities and multimedia integration to enhance student engagement and understanding. Along with this, a training program is suggested for teachers to enhance their science teaching strategies. This program includes workshops, mentoring, and classroom demonstrations that focus on lesson planning, conducting experiments, and using technology in teaching Science.

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