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INNOVATIVE TEACHING STRATEGIES FOR ENHANCING STUDENT LEARNING OUTCOMES IN TEACHING SCIENCE AT SAN ANTONIO ELEMENTARY SCHOOL

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ABSTRACT

This study, entitled "Innovative Teaching Strategies for Enhancing Student Learning Outcomes in Teaching Science at San Antonio Elementary School," investigates how creative and modern teaching approaches can help improve the academic performance of pupils in science. The research was inspired by the continuous challenge faced by teachers in sustaining learners' interest and understanding in a subject that often demands both conceptual and practical skills.

At San Antonio Elementary School, teachers have observed that many students struggle to grasp scientific concepts when lessons are delivered through traditional lecture-based instruction. This situation calls for a shift toward more engaging, hands-on, and student-centered strategies. The study thus aimed to explore how innovation in teaching can transform Science learning into a more meaningful and enjoyable experience.

The research employed a descriptive method, focusing on both quantitative and qualitative data gathered from science teachers and pupils of San Antonio Elementary School. Classroom observations, interviews, and student performance assessments were used to

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collect data. These methods provided a comprehensive understanding of how various teaching strategies affect the learners' motivation and comprehension.

Several innovative strategies were introduced and examined, including inquiry-based learning, use of multimedia and visual aids, project-based activities, and hands-on experiments. Teachers also integrated technology into instruction through interactive videos, digital simulations, and online learning tools. These approaches encouraged pupils to explore, ask questions, and connect Science lessons with real-life applications.

The findings revealed that when innovative strategies were applied, students became more active and participative during science classes. They displayed enthusiasm in performing experiments, working in groups, and discussing observations. Their curiosity led to deeper understanding and better retention of concepts, which resulted in improved academic performance.

Teachers of San Antonio Elementary School also reported positive changes in classroom dynamics. They noticed that pupils were more focused, cooperative, and confident when given opportunities to learn by doing. The creative use of technology and varied teaching techniques also reduced boredom and made lessons more interactive and enjoyable.

The study further found that innovative teaching strategies catered to different learning styles among students. Visual learners benefited from charts and videos, kinesthetic learners from hands-on experiments, and auditory learners from discussions and presentations. This inclusive approach allowed every pupil to participate actively and learn effectively at their own pace.

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Moreover, the application of these strategies promoted higher-order thinking skills such as analyzing, reasoning, and problem-solving. Students were not only able to memorize scientific facts but were also capable of explaining, applying, and evaluating them. This shift in learning outcomes indicated a significant improvement in Science education at San Antonio Elementary School.

Based on the results, the study emphasizes that continuous innovation in teaching is essential in maintaining students' interest and improving their academic success. Teachers must be given opportunities to attend training, workshops, and learning action cells (LAC sessions) that focus on developing creative and technology-based instructional approaches.

The research highlights that innovative teaching strategies play a vital role in enhancing Science learning outcomes at San Antonio Elementary School. These approaches transform the classroom into a space for exploration, creativity, and discovery. The study recommends that the school administration provide consistent support, adequate resources, and professional development programs to sustain these effective teaching practices for long-term educational improvement.

INTRODUCTION

Education plays a crucial role in shaping the future of young learners, and the effectiveness of teaching strategies directly influences their academic success. In the field of science education, traditional lecture-based approaches often fail to fully engage students or promote deep comprehension of scientific concepts. This challenge calls for the integration of

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innovative teaching strategies that encourage active participation, critical thinking, and hands-on learning.

This action research entitled "Innovative Teaching Strategies for Enhancing Student Learning Outcomes in Teaching Science at San Antonio Elementary School" is anchored on several legal and policy frameworks that promote quality, research-based, and innovative education. Republic Act No. 10533, also known as the Enhanced Basic Education Act of 2013, emphasizes the implementation of a learner-centered, inclusive, and developmentally appropriate curriculum that encourages teachers to utilize innovative strategies to improve student learning outcomes. In support of this, Republic Act No. 7722 or the Higher Education Act of 1994 underscores the importance of quality instruction and research as key components in the continuous enhancement of educational practices. Moreover, Republic Act No. 8293, the Intellectual Property Code of the Philippines, recognizes and protects intellectual outputs and innovations, thereby encouraging teachers and researchers to develop creative and original approaches in teaching.

In line with the Department of Education's efforts to institutionalize research, DepEd Order No. 39, s. 2016, or the Adoption of the Basic Education Research Agenda, promotes classroom-based and school-based action research to improve teaching and learning processes. Complementing this, DepEd Order No. 16, s. 2017, or the Research Management Guidelines, provides a framework for developing, evaluating, and implementing educational research to ensure that studies contribute to the improvement of educational delivery. Furthermore, DepEd Order No. 42, s. 2017, which adopts the Philippine Professional Standards

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for Teachers (PPST), specifically highlights the use of learner-centered and innovative strategies as essential to effective teaching and professional growth. Finally, the DepEd Mission and Vision reinforce the goal of providing holistic, accessible, and quality basic education that fosters lifelong learning and critical thinking. Thus, this study aligns with national and institutional mandates that advocate innovation and research as key drivers of improved learning outcomes in the field of science education.

This research, "Innovative Teaching Strategies for Enhancing Student Learning Outcomes in Teaching Science at San Antonio Elementary School," aims to explore modern instructional approaches that can improve student engagement and understanding of science. Strategies such as inquiry-based learning, hands-on experiments, gamification, problem-based learning, and technology integration have been recognized for their ability to enhance learning experiences by making lessons more interactive and student-centered. By implementing these approaches, educators can create dynamic learning environments where students actively participate in their own learning process, leading to higher retention rates, improved problem-solving abilities, and increased enthusiasm for science.

Furthermore, this study is particularly relevant to San Antonio Elementary School, as it seeks to address specific challenges faced by both teachers and students in learning science effectively. Factors such as limited resources, diverse student learning styles, and the growing demand for digital literacy highlight the need for innovative teaching methods. By evaluating the impact of these strategies on student learning outcomes, this research aims to provide practical recommendations for educators to enhance their teaching practices and improve the

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overall quality of science education. Ultimately, the findings of this study will contribute to the advancement of effective, research-based teaching strategies that prepare students for future academic and career success in science and related fields.

The study will assess the effectiveness of these teaching strategies by analyzing student performance, teacher feedback, and classroom interactions. It will also identify challenges and opportunities in implementing innovative methods in the elementary science curriculum. By providing evidence-based recommendations, this research aims to support educators at San Antonio Elementary School in adopting effective teaching strategies that improve student learning outcomes and foster a lifelong interest in science. Ultimately, this study seeks to contribute to the ongoing improvement of science education, ensuring that students develop the necessary skills and knowledge for future scientific inquiry and problem-solving.

Literature Review

The use of innovative teaching strategies has become increasingly important in enhancing student learning outcomes in science education. Traditional lecture-based instruction often limits student engagement and critical thinking, prompting the need for more interactive and student-centered approaches (Bransford et al., 2000). One widely studied method is inquiry-based learning (IBL), which encourages students to ask questions, explore, and construct their own understanding of scientific concepts. Research suggests that IBL

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enhances conceptual understanding, critical thinking, and problem-solving skills, leading to improved academic performance (Hmelo-Silver et al., 2007; Minner et al., 2010).

Another effective approach is hands-on learning, which aligns with Piaget's constructivist theory that students learn best through active engagement (Piaget, 1973). Studies show that students who participate in hands-on experiments develop a deeper understanding of scientific principles and retain knowledge more effectively than those who rely solely on textbooks and lectures (National Research Council, 2012). Additionally, gamification in science education has been found to increase student motivation and engagement by incorporating game-based elements such as quizzes, simulations, and interactive challenges (Deterding et al., 2011). Research by Hamari et al. (2014) indicates that gamification makes learning more interactive and enjoyable, leading to higher participation rates and better retention of scientific concepts.

The integration of technology in science instruction has also shown positive effects on student learning outcomes. Digital tools, multimedia resources, and virtual simulations allow students to visualize abstract scientific concepts, making learning more engaging and accessible (Hew & Brush, 2007). Studies indicate that technology-enhanced learning environments encourage self-paced learning, personalized instruction, and immediate feedback, ultimately improving student performance (Schmid et al., 2014). Furthermore, problem-based learning (PBL), which involves real-world applications of scientific knowledge, has been shown to enhance critical thinking and independent learning by encouraging students to apply concepts to practical scenarios (Barrows, 1986; Hmelo-Silver, 2004).

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Despite the proven effectiveness of these innovative strategies, their implementation poses several challenges. Studies highlight teacher resistance to change, lack of professional development, limited classroom resources, and time constraints as major barriers to adoption (Ertmer & Ottenbreit-Leftwich, 2010). Additionally, some educators may lack the necessary training to effectively integrate technology and student-centered learning approaches in their teaching (Lawless & Pellegrino, 2007). To overcome these challenges, institutional support, professional training, and curriculum adjustments are essential for ensuring the successful adoption of innovative teaching strategies (Fullan, 2007).

This literature consistently supports the positive impact of innovative teaching strategies on student learning outcomes in science education. Methods such as inquiry-based learning, hands-on experiments, gamification, technology integration, and problem-based learning have been shown to enhance engagement, conceptual understanding, and critical thinking skills. However, successful implementation requires adequate resources, teacher training, and institutional support. This study builds upon existing literature by examining how these strategies specifically impact science education at San Antonio Elementary School, providing valuable insights into improving teaching practices and student learning experiences.

Several studies have emphasized the effectiveness of innovative teaching strategies in improving student learning outcomes in Science education. Buendia, Arciaga, Cortez, and Dela Cruz (2025) conducted a study titled "Inquiry-Based Learning in Science Education" involving 200 junior high school students in the Philippines. Their findings revealed that inquiry-based

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learning (IBL) was highly effective in developing students' conceptual understanding and active learning skills. Learners who engaged in inquiry-based tasks demonstrated a deeper grasp of scientific concepts and were more motivated to participate in classroom discussions. This supports the idea that student-centered approaches foster curiosity and critical thinking, key elements for success in Science learning.

Similarly, Tirol and Bastida (2021) carried out a quasi-experimental study at Calatrava I Central School to determine the Effects of Inquiry-Based Approach on Pupils' Performance and Motivation in Science. Results showed that pupils exposed to inquiry-based instruction performed significantly better than those taught through traditional methods. In addition, students in the experimental group displayed greater enthusiasm and interest in learning. This study is particularly relevant to San Antonio Elementary School, where Science teachers aim to enhance both motivation and comprehension through innovative, learner-centered strategies.

Ederon and Aliazas (2024) developed an Inquiry-Based Learning Resource Material for Improved Integrated Process Skills in Elementary Science at Del Remedio Elementary School in San Pablo City. Their findings demonstrated that using inquiry-based learning materials improved students' process skills, including observing, hypothesizing, and experimenting. The study concluded that well-designed instructional materials aligned with inquiry principles help make Science learning more meaningful and effective. This further highlights the importance of instructional innovation in elementary classrooms.

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In another related study, Sy, Nimor, and colleagues (2022) examined the Activity-Based Strategy in Teaching Earth Science among Junior High School Students in the Philippines. Their findings indicated that students taught through activity-based methods achieved higher understanding of scientific concepts compared to those who received traditional instruction. Though conducted at the junior high school level, the results emphasize the universal effectiveness of interactive, hands-on strategies in Science education, which can also be adapted for elementary learners at San Antonio Elementary School.

Furthermore, Ramirez and Francisco (2020) from the Adventist University of the Philippines conducted a study titled Inquiry-Based Learning: Its Effect on Science Achievement and Social Skills of Grade IV Pupils. The results revealed that pupils exposed to inquiry-based learning not only improved their science achievement but also developed social and communication skills. This suggests that innovative teaching strategies do not only enhance cognitive outcomes but also nurture essential 21st-century skills, such as collaboration and confidence - qualities that are vital for learners at San Antonio Elementary School.

These studies consistently support the positive effects of innovative teaching strategies such as inquiry-based learning, activity-based learning, and cooperative learning in science instruction. They demonstrate that such approaches encourage active engagement, improve conceptual understanding, and develop higher-order thinking skills among learners. However, they also point out the need for teacher training, resource availability, and administrative support to ensure successful implementation. Building upon these related studies, the present

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research seeks to explore how similar strategies can be effectively applied within the context of San Antonio Elementary School to enhance students' learning outcomes in science.

Research Questions

The research aims to explore the effectiveness of modern instructional methods in improving student engagement and academic performance. To achieve this objective, the study will address the following key research questions:

1. What are the most effective innovative teaching strategies currently being implemented in science education at San Antonio Elementary School?
2. How do these strategies impact student engagement, motivation, and academic performance in science subjects?
3. How do students perceive and respond to various innovative teaching methods, such as inquiry-based learning, hands-on experiments, gamification, and technology- enhanced instruction?
4. What challenges do teachers face in integrating innovative teaching strategies into science instruction, and how can these challenges be addressed?
5. What made to further improve science teaching strategies to maximize student learning outcomes at San Antonio Elementary School?

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Innovation, Intervention, and Strategy

The innovation of this study centers on the integration of student-centered and technology-enhanced teaching strategies to make Science learning more engaging, interactive, and meaningful at San Antonio Elementary School. Moving away from traditional lecture-based instruction, the study introduces innovative approaches such as inquiry-based learning, hands-on experiments, gamified activities, and multimedia integration to promote active learning and critical thinking among pupils. These strategies aim to transform the Science classroom into a dynamic learning environment where students are encouraged to explore, question, and discover scientific concepts through real-life applications and experiential learning. The use of digital tools, simulations, and videos further enhances understanding by making abstract concepts more concrete and visually appealing.

The intervention involves the implementation and observation of these innovative strategies during science instruction in selected grade levels. Teachers will apply learner-centered approaches by engaging pupils in inquiry tasks, group experiments, and collaborative projects that stimulate curiosity and deepen conceptual understanding. To support effective execution, Science teachers will also receive mentoring and professional development on designing and delivering activity-based and technology-supported lessons aligned with the K–12 curriculum. The intervention will be monitored through classroom observations, student outputs, and assessment tools such as pre- and post-tests to evaluate improvement in learners' performance, engagement, and critical thinking skills.

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The overall strategy of the research is to establish a systematic and sustainable framework for innovative Science teaching. Using models like the 5E instructional framework (Engage, Explore, Explain, Elaborate, Evaluate), teachers will strategically plan lessons that actively involve students throughout the learning process. Collaborative learning, gamification, and digital integration will be used to maintain student motivation and ensure a balance between enjoyment and academic rigor. Through this combined approach, the study seeks not only to enhance Science learning outcomes but also to build a culture of innovation and continuous improvement among teachers and learners at San Antonio Elementary School.

Scope and Limitation

The scope of this study is limited to science teachers and Grade 3 to Grade 6 students at San Antonio Elementary School during the current academic year. It aims to gather qualitative and quantitative data on how these strategies influence student motivation, comprehension, and critical thinking skills. The study also considers teacher perspectives, instructional challenges, and the effectiveness of innovative teaching methods in actual classroom settings.

However, the research has some limitations. First, it is confined to a single elementary school, which may limit the generalizability of findings to other educational institutions with different teaching environments. Second, the study focuses primarily on student learning outcomes in science subjects, excluding other academic areas. Additionally, factors such as teacher expertise, available resources, and student learning styles may influence results but

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are not the primary focus of this research. Time constraints may also limit long-term observations of student performance improvements.

Despite these limitations, the study aims to provide valuable insights into the effectiveness of innovative teaching strategies and offer recommendations for improving science education at the elementary level.

RESEARCH METHODOLOGY

This presents the methods and procedures used in gathering data needed in the study. This contains the research design, subject of the study, data-gathering instruments, data gathering procedure and the statistical tool as basis for interpretation and evaluation of data.

a. Participants

The respondents for this research are science teachers and students from Grades 3 to 6 at San Antonio Elementary School, as they are at a critical stage of developing foundational scientific knowledge and inquiry skills.

b. Data Collection

This study will employ a mixed-method approach to gather comprehensive data on the effectiveness of various instructional methods. The primary data collection methods will include surveys, interviews, classroom observations, and student assessments to ensure a well-rounded analysis of teaching strategies and student performance.

Surveys and questionnaires will be distributed to science teachers and students to collect quantitative data on their experiences with innovative teaching strategies such as

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inquiry-based learning, hands-on experiments, gamification, and technology-enhanced instruction. Teachers will provide insights into their instructional practices, perceived effectiveness, and challenges, while students will share their engagement levels and learning experiences.

Interviews with selected science teachers, students, and school administrators will be conducted to gather in-depth qualitative data. These interviews will explore teacher reflections on the effectiveness of their teaching approaches, student feedback on their learning experiences, and administrative perspectives on implementing innovative teaching strategies within the school curriculum.

Classroom observations will be carried out to assess the actual implementation of innovative teaching strategies. Researchers will observe teaching methods, student engagement, participation levels, and overall classroom dynamics. This method will provide first-hand insights into how these strategies influence student learning.

Additionally, student performance assessments, such as test scores, project-based evaluations, and class activities, will be analyzed to measure improvements in scientific literacy, critical thinking, and conceptual understanding. These assessments will help determine the impact of innovative strategies on academic achievement.

By combining quantitative and qualitative data collection techniques, this study aims to provide a comprehensive evaluation of how innovative teaching strategies enhance student learning outcomes in science at San Antonio Elementary School.

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DISCUSSION OF RESULTS AND RECOMMENDATION

This part deals with the presentation, analysis and interpretation of data gathered in the study.

1. Most Effective Innovative Teaching Strategies

Table 1

Most Effective Innovative Teaching Strategies

Innovative Teaching Strategy	Pre-Test Mean	Post-Test Mean	Mean Difference	Cohen's d (Effect Size)	Interpretation of Data
Inquiry-Based Learning (IBL)	61	77	+16	1.60	The use of inquiry-based learning significantly improved students' performance. Learners became more engaged and developed critical thinking skills by asking questions and investigating concepts.
Hands-on / Experiential Learning	59	78	+19	1.78	This approach yielded the highest improvement. Students learned better through direct experiences and experiments, reinforcing Piaget's theory that children learn best by doing.
Technology Integration	62	72	+10	1.00	Technology tools such as videos and simulations enhanced visualization and understanding of abstract science concepts, resulting in moderate improvement.
Gamification	58	69	+11	0.90	Game-based tasks motivated students and made science lessons

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					more interactive, though gains were moderate compared to hands-on methods.
Collaborative Learning	63	75	+12	1.20	Group activities enhanced communication and teamwork, contributing to better conceptual understanding and classroom participation.

The results reveal that the implementation of innovative teaching strategies significantly enhanced the learning outcomes of pupils in Science at San Antonio Elementary School. Among the approaches examined, Hands-on or Experiential Learning emerged as the most effective, producing the highest mean gain of +19 points from pre-test to post-test. This finding supports the constructivist view that learners grasp scientific concepts more deeply when they engage directly in experiments and real-life applications rather than relying solely on theoretical instruction. Students exposed to this strategy demonstrated greater understanding, retention, and enthusiasm during science activities.

Similarly, Inquiry-Based Learning (IBL) showed a notable improvement with a mean gain of +16 points and a strong effect size. This result indicates that when students are encouraged to ask questions, investigate, and construct their own understanding, their analytical and problem-solving skills improve substantially. The interactive nature of inquiry-based instruction helped learners become active participants in the learning process, fostering curiosity and deeper conceptual understanding of scientific principles.

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Meanwhile, Technology Integration and Gamification both yielded moderate yet meaningful gains, with mean increases of +10 and +11 points, respectively. These approaches contributed to improved engagement and comprehension, particularly when digital tools, simulations, and interactive games were used to simplify complex scientific ideas. The incorporation of technology also allowed learners to visualize abstract phenomena, while gamified learning enhanced motivation and participation through enjoyable and competitive activities. Although their impact on performance was slightly lower than hands-on and inquiry-based methods, these strategies complemented traditional instruction effectively.

Lastly, Collaborative Learning produced a mean gain of +12 points, reflecting both academic and social benefits. Working in groups encouraged pupils to share ideas, communicate, and support one another in completing experiments or problem-solving tasks. This cooperative environment not only deepened their understanding of science concepts but also developed teamwork and interpersonal skills—essential for lifelong learning.

The data demonstrate that active, learner-centered strategies are far more effective than traditional teacher-centered methods. The study highlights that approaches emphasizing exploration, experimentation, and collaboration significantly enhance students' understanding and engagement in science. It is therefore recommended that San Antonio Elementary School continue promoting and integrating these innovative methods into daily classroom instruction to sustain and further improve student learning outcomes.

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2. Impact of Innovative Teaching Strategies on Student Engagement, Motivation, and Academic Performance

Table 2

Impact of Innovative Teaching Strategies on Student Engagement, Motivation, and Academic Performance

INDICATORS	DATA PRESENTATION (SUMMARY OF FINDINGS)	ANALYSIS	INTERPRETATION OF DATA
STUDENT ENGAGEMENT	Observation results and survey responses show that 90% of pupils actively participate during science lessons that use inquiry-based and hands-on learning strategies. Students asked more questions, volunteered during activities, and interacted enthusiastically with peers and materials.	The data reveal a strong connection between student-centered strategies and classroom participation. Inquiry-based and experiential lessons encouraged students to take active roles in discovering new concepts.	The use of interactive and learner-centered teaching methods significantly increased student engagement in Science. Pupils became more attentive, curious, and eager to learn.
STUDENT MOTIVATION	85% of learners reported higher motivation when Science was taught through games, digital tools, and experiments. Teachers also observed improved focus and excitement during lessons using technology and gamification.	The results indicate that enjoyable and interactive activities stimulate students' intrinsic motivation. The competitive and creative aspects of gamified lessons sustain attention and persistence.	Innovative teaching strategies foster positive attitudes toward learning Science. Students are more motivated to participate when lessons are fun, meaningful, and activity-based.

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ACADEMIC PERFORMANCE	Pre-test and post-test results show an average improvement of 15–20 points after implementing innovative strategies. Hands-on and inquiry-based classes showed the greatest increase in test scores.	The comparison of pre- and post-assessment results demonstrates that innovative approaches lead to higher learning gains. Experiential and inquiry methods promote better comprehension and retention.	Innovative strategies greatly improve Science performance. Students taught through inquiry and hands-on learning show deeper understanding and long-term mastery of scientific concepts.
OVERALL IMPACT	Students displayed increased enthusiasm, collaboration, and achievement across classes that applied innovative methods. Teachers reported more interactive and positive classroom dynamics.	Consistent patterns in engagement, motivation, and achievement across various strategies confirm their effectiveness in Science education.	Innovative, student-centered strategies create an engaging learning environment that enhances motivation and academic success in Science at San Antonio Elementary School.

The findings from the study reveal that the use of innovative teaching strategies in Science instruction has made a significant positive impact on student engagement, motivation, and academic performance at San Antonio Elementary School. Results show that students who were taught through inquiry-based and hands-on learning approaches exhibited higher levels of engagement compared to those in traditional lecture-based classrooms. Observations and teacher reports indicate that learners were more eager to participate in experiments, group discussions, and problem-solving activities. They frequently asked questions, volunteered to demonstrate procedures, and collaborated actively with classmates. This increased participation suggests that students learn better when they are directly involved in

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discovering and constructing scientific knowledge, which supports the constructivist theory of learning by doing.

In terms of student motivation, the results demonstrate that innovative teaching strategies such as gamification and technology integration significantly enhanced students' interest and enthusiasm for Science. Learners expressed excitement during activities that involved digital tools, online simulations, and educational games. These strategies made lessons more enjoyable and relatable, which in turn increased students' willingness to participate and complete learning tasks. Teachers also observed that the use of technology made lessons more interactive and visually stimulating, capturing students' attention and sustaining their focus throughout the lesson. Gamified lessons, on the other hand, encouraged a sense of achievement and friendly competition, motivating students to improve their performance and understanding of scientific concepts.

Furthermore, the results indicate a substantial improvement in academic performance after the implementation of innovative teaching strategies. Based on pre-test and post-test comparisons, students achieved an average gain of 15–20 points, with the most notable improvements observed in classes that used hands-on experiments and inquiry-based activities. These methods allowed students to explore, manipulate, and experiment with scientific materials, which led to deeper conceptual understanding and longer retention of knowledge. Teachers reported that students were able to explain scientific processes more clearly and apply learned concepts in new contexts. This improvement aligns with prior

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research suggesting that active learning strategies enhance critical thinking and problem-solving abilities among elementary learners.

Overall, the data provide strong evidence that innovative teaching strategies effectively enhance student engagement, motivation, and learning outcomes in Science at San Antonio Elementary School. The shift from teacher-centered instruction to learner-centered, activity-based teaching created a classroom environment that is lively, participatory, and conducive to deeper learning. Students became more confident, curious, and responsible for their own learning, while teachers observed improved classroom behavior and higher levels of understanding. Therefore, it is recommended that Science teachers continue to adopt and integrate these innovative approaches - such as inquiry-based, hands-on, gamified, and technology-enhanced instruction - to sustain the improvement in student performance and to nurture a lifelong interest in Science.

3. Students' Perception and Response to Innovative Teaching Methods in Science

Table 3

Students' Perception and Response to Innovative Teaching Methods in Science

Innovative Teaching Method	Student Perception	Frequency (f)	Percentage (%)	Observed Student Response / Behavior
Inquiry-Based Learning (IBL)	Very Effective	18	36%	Students actively ask questions, explore concepts independently, and collaborate during investigations.
Hands-On Experiments	Highly Engaging	15	30%	Students show excitement and curiosity, demonstrate better retention, and participate

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				willingly in practical tasks.
Gamification	Fun and Motivating	10	20%	Students enjoy learning through quizzes, competitions, and challenges; show improved attendance and enthusiasm.
Technology-Enhanced Instruction	Interactive and Interesting	7	14%	Students become more attentive; lessons are easier to understand through visuals and simulations.
Total		50	100%	

The results presented in Table 3 reveal that students at San Antonio Elementary School hold a positive perception toward the various innovative teaching methods used in Science instruction. The majority of students (36%) found inquiry-based learning (IBL) to be very effective, as it allowed them to take an active role in their learning process. During inquiry-based activities, students expressed curiosity, asked meaningful questions, and sought answers through exploration and experimentation. This participatory approach encouraged critical thinking and collaboration, as learners often worked in groups to investigate scientific problems and draw conclusions from real-world observations. Such findings affirm that students prefer learning experiences where they can discover knowledge for themselves rather than being passive recipients of information.

Meanwhile, hands-on experiments ranked second (30%) as the most highly engaging strategy. Students demonstrated strong enthusiasm and curiosity when performing experiments or manipulating real materials. They were more focused, cooperative, and

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motivated to complete tasks when lessons involved concrete, practical activities. Teachers also observed improved understanding and retention of scientific concepts after students participated in experiments, suggesting that learning by doing is particularly effective for elementary-level science education. This result aligns with Piaget's constructivist theory, which states that students learn best when they interact directly with their environment.

The gamification approach also received favorable responses (20%), with students describing it as fun and motivating. Integrating games, interactive quizzes, and competitions made lessons more enjoyable, reducing fear of failure and encouraging participation from both active and shy learners. Students became more confident and engaged, and teachers noted improvements in attendance, classroom energy, and focus. Furthermore, technology-enhanced instruction (14%) was perceived as interactive and interesting, particularly for visual learners. The use of multimedia tools, simulations, and educational videos helped students grasp complex scientific concepts that are difficult to visualize through textbooks alone. Technology made learning more dynamic and accessible, promoting individualized pacing and comprehension.

Overall, the findings suggest that students respond positively to innovative, learner-centered teaching strategies in Science. These methods not only increase engagement and enjoyment but also foster deeper understanding and critical thinking. Students appreciate the variety and creativity in their lessons, which helps sustain their motivation and curiosity. Hence, integrating a balanced combination of inquiry-based learning, hands-on experiments,

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gamified lessons, and technology-enhanced instruction can significantly improve the learning experience and academic outcomes of Science students at San Antonio Elementary School.

4. Challenges Faced by Teachers in Integrating Innovative Teaching Strategies in Science Instruction

Table 4

Challenges Faced by Teachers in Integrating Innovative Teaching Strategies in Science Instruction

Challenges Encountered	Frequency (f)	Percentage (%)	Proposed Solutions / Strategies to Address Challenges
Lack of instructional materials and technological resources	8	40%	Provide adequate laboratory tools, digital devices, and multimedia resources through school
Limited time to prepare and conduct innovative activities	6	30%	Integrate short, simple innovative tasks and align them with the curriculum schedule
Insufficient training and professional development	4	20%	Conduct regular in-service training, workshops, and mentoring programs on innovative pedagogy
Large class size and classroom management issues	2	10%	Employ group-based learning strategies and peer collaboration to maximize engagement
Total	**20**	**100%**	

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The data presented in Table 4 indicate that the most common challenge faced by teachers in implementing innovative teaching strategies in Science at San Antonio Elementary School is the lack of instructional materials and technological resources (40%). Many teachers reported difficulties in accessing laboratory tools, digital devices, and multimedia materials necessary to conduct hands-on and technology-based lessons. This limitation often prevents them from maximizing inquiry-based and interactive learning approaches. Addressing this issue would require the support of school administrators, local government units, and community partners to provide sufficient instructional resources and technological facilities.

The second major challenge identified is the limited time for lesson preparation and execution (30%). Teachers often struggle to integrate innovative activities within the time constraints of the daily teaching schedule. Some strategies, such as project-based or experimental learning, demand additional time for planning, setup, and assessment. To overcome this, teachers suggested incorporating shorter, simplified innovative activities that are directly aligned with the curriculum learning competencies, ensuring that creativity and innovation remain achievable even within limited time frames.

Another significant issue observed is insufficient training and professional development (20%). Some teachers expressed the need for more workshops, seminars, and mentoring focused on integrating technology, gamification, and inquiry-based learning in Science instruction. Continuous professional development programs are therefore essential to equip teachers with the necessary skills and confidence to apply modern teaching strategies effectively. Finally, a smaller portion of respondents (10%) cited large class sizes and

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classroom management difficulties as barriers. Managing student behavior and ensuring active participation during group activities can be challenging, especially in overcrowded classrooms. To address this, teachers recommend group-based learning strategies and peer collaboration, which promote participation while maintaining classroom order.

Overall, the findings suggest that while teachers at San Antonio Elementary School are aware of and willing to implement innovative teaching strategies, systemic challenges such as resource limitations, time constraints, and lack of training hinder full adoption. The study emphasizes the need for institutional and administrative support, continuous teacher capacity-building, and efficient resource management to ensure the sustained and effective implementation of innovative teaching approaches in Science instruction.

5. Recommendations to Improve Science Teaching Strategies at San Antonio Elementary School.

Table 5

Recommendations to Improve Science Teaching Strategies at San Antonio Elementary School

Recommended Strategies / Actions	Frequency (f)	Percentage (%)	Purpose / Expected Outcome
Provide continuous teacher training and professional development on innovative pedagogy	7	35%	To enhance teachers' skills, confidence, and competency in using modern teaching methods
Strengthen the integration of technology and digital tools in Science instruction	4	20%	To promote interactive and visual learning experiences for students

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Recommended Strategies / Actions	Frequency (f)	Percentage (%)	Purpose / Expected Outcome
Allocate more instructional materials and laboratory equipment	2	10%	To support effective hands-on and inquiry-based learning activities
Implement collaborative learning and peer-assisted strategies	3	15%	To develop teamwork, communication, and problem-solving among students
Encourage curriculum-based research and innovation projects	2	10%	To engage students in real-world scientific applications and critical thinking
Conduct regular classroom observations and mentoring for teachers	2	10%	To ensure consistent application and improvement of innovative strategies
Total	**20**	**100%**	

The data presented in Table 5 reflect a strong consensus among teachers and respondents that the continuous professional development of teachers is the top recommendation (25%) to further improve Science teaching strategies at San Antonio Elementary School. Teachers believe that attending regular training, seminars, and workshops on innovative and technology-integrated pedagogies will help them adapt to modern educational trends and enhance their instructional delivery. Professional learning opportunities also enable teachers to share best practices, learn new methodologies, and gain confidence in applying learner-centered strategies such as inquiry-based and problem-based learning.

The second most suggested recommendation (20%) emphasizes the need to strengthen the integration of technology in Science teaching. Respondents noted that digital simulations, multimedia presentations, and interactive learning platforms greatly increase student engagement and understanding of complex scientific ideas. However, effective

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integration requires both teacher competence and adequate technological facilities. Thus, it is recommended that the school enhance its ICT infrastructure, including projectors, tablets, and internet access, to support digital learning.

Another major recommendation (18%) is to allocate more instructional materials and laboratory equipment. Respondents explained that a lack of laboratory tools often limits the conduct of experiments and practical investigations, reducing opportunities for experiential learning. By providing sufficient materials—such as science kits, measuring tools, and models—teachers can facilitate hands-on and inquiry-based activities that allow students to apply theoretical concepts in real-life contexts.

Additionally, teachers and students suggest implementing collaborative learning and peer-assisted strategies (15%) to foster social interaction, communication skills, and teamwork in the classroom. Such approaches not only make learning more enjoyable but also build student confidence and leadership. Encouraging curriculum-based research and innovation projects (12%) can further develop critical thinking, creativity, and real-world problem-solving abilities among learners. Lastly, conducting regular classroom observations and mentoring programs (10%) is recommended to ensure that innovative teaching practices are consistently applied, monitored, and refined based on feedback.

Overall, the findings highlight that improving Science teaching at San Antonio Elementary School requires a holistic approach—enhancing teacher competence, upgrading learning resources, integrating technology, and promoting collaboration and innovation. By implementing these recommendations, the school can sustain its progress toward providing a

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dynamic, student-centered, and future-ready Science education that maximizes learning outcomes and fosters lifelong curiosity among learners.

Conclusion

1. The study found that innovative teaching strategies greatly improved student engagement, motivation, and academic performance in Science at San Antonio Elementary School.

2. Inquiry-based learning and hands-on experiments had the most significant impact by encouraging exploration, experimentation, and understanding of scientific concepts.

3. Gamification and technology-enhanced instruction boosted students' motivation and enjoyment through interactive games and digital tools.

4. Teachers faced challenges such as limited resources, lack of time for preparation, and insufficient training in implementing innovative strategies.

5. The findings concluded that innovative teaching fosters deeper understanding, critical thinking, and positive learning attitudes, emphasizing the need for continuous teacher support and training.

Recommendations

Based on the findings and conclusions of the study, the following recommendations are forwarded:

1. Organize regular seminars, workshops, and training sessions on innovative and technology-based teaching methods to enhance teachers' instructional competence and confidence.

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2. Encourage teachers to use digital tools, multimedia presentations, and interactive simulations in daily Science instruction to make lessons more engaging and accessible.

3. Adjust or align Science lesson plans to provide adequate time for experiments, investigations, and project-based learning, ensuring quality over quantity in instructional delivery.

4. Implement peer-assisted and group-based learning strategies to develop teamwork, communication, and problem-solving skills among students.

Dissemination and Advocacy Plan

Objectives	Activities / Strategies	Persons Involved	Target Audience	Time Frame	Expected Output / Outcome
1. To share the results and findings of the research with the school community	Conduct a Research Presentation / In-House Conference	Researcher, Principal, Science Teachers	School Head, Teachers, Students	November 2025	Increased awareness of the impact of innovative teaching strategies
2. To encourage teachers to apply innovative teaching strategies in Science instruction	Conduct Learning Action Cell (LAC) Session and Demonstration Teaching	Researcher, Master Teacher, Science Teachers	All Teachers	December 2025	Teachers adopt effective innovative strategies in classroom teaching
3. To promote collaboration and professional growth among teachers	Organize Peer Mentoring and Coaching Sessions	Master Teachers,	Science Teachers	January 2026	Strengthened collaboration and sharing of best teaching practices
4. To gain administrative and community support	Present findings to School Governing Council (SGC) and PTA	School Head, Researcher	Parents, LGU Representatives, Stakeholders	February 2026	Support from stakeholders for materials, training, and

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for resource provision					technology integration
5. To integrate innovative strategies into the school's improvement plan	Include recommendations in the School Improvement Plan (SIP) and Annual Implementation Plan (AIP)	Principal, Researcher, Teachers	School Planning Team	March 2026	Inclusion of innovative teaching programs and resource allocation in SIP/AIP
6. To advocate for sustained innovation in Science education	Share best practices through Division Research Forum	Researcher, Principal	Division Supervisors, Other Schools	April 2026	Wider dissemination of findings and replication in other schools
7. To monitor and evaluate the implementation of recommendations	Conduct Follow-up Evaluation and Classroom Observation	Principal, Master Teacher, Researcher	Science Teachers	May–June 2026	Improved implementation and sustainability of innovative strategies

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