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Science Process Skills Implementation and Attitudes Toward Science Among Junior High School Learners of Mahogany Integrated School, Division of Surigao del Sur: A Descriptive-Correlational Study Toward Innovative Science Teaching Strategies

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ABSTRACT

This study examined the implementation of Science Process Skills (SPS) and the attitudes toward science of Junior High School learners of Mahogany Integrated School, Lingig II District, Division of Surigao del Sur. It aimed to determine the learners' level of SPS implementation in terms of observing, classifying, measuring, inferring, predicting, communicating, and experimenting; assess their attitudes toward science in terms of interest, enjoyment, perceived usefulness, and motivation; determine the relationship between SPS implementation and attitudes toward science; and propose innovative science instructional strategies based on the findings. The study employed a quantitative descriptive-correlational survey design. A total enumeration of 107 Junior High School learners from Grades 7 to 10 participated in the study. A researcher-made questionnaire was used to gather data on SPS implementation and attitudes toward science. The data were analyzed using weighted mean and Pearson correlation. Results revealed that the implementation of Science Process Skills was very high, with an overall mean of 4.72. Among the SPS dimensions, communicating obtained the highest mean (4.80), followed by predicting (4.79), inferring (4.77), classifying (4.76), measuring (4.73), experimenting (4.60), and observing (4.60). Learners also demonstrated a very high level of attitude toward science, with an overall mean of 4.73. Enjoyment of science learning obtained the highest mean (4.84), followed by interest in science (4.76), motivation to learn science (4.69), and perceived usefulness of science (4.63). Correlation analysis showed a statistically significant weak positive relationship between SPS implementation and attitudes toward science ($r = 0.209$, $p = 0.0304$). The findings indicate that learners who demonstrate stronger science process skills also tend to show more positive attitudes toward science. Although the relationship was weak, it suggests that inquiry-based, hands-on, collaborative, and real-life science activities may help sustain learners' positive attitudes while strengthening their science process skills. The study recommends the use of innovative science instructional strategies such as inquiry-based skill rotation, predict-observe-explain activities, laboratory challenges, real-life problem-based tasks, science journals, and peer collaboration.

Keywords: *Science Process Skills, attitudes toward science, Junior High School learners, science education, inquiry-based learning, innovative science instructional strategies*

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INTRODUCTION

Science education plays a crucial role in preparing learners to understand natural phenomena, make informed decisions, and solve real-world problems in an increasingly scientific and technological society. In the 21st century, science instruction is no longer limited to the acquisition of factual knowledge; it also requires learners to develop inquiry, reasoning, investigation, and communication skills that enable them to engage meaningfully with scientific concepts.

Science Process Skills (SPS) refer to the intellectual and procedural abilities that learners use when investigating scientific problems, constructing knowledge, and communicating scientific findings. These skills include observing, classifying, measuring, inferring, predicting, communicating, and experimenting. When developed effectively, SPS allows learners to participate actively in inquiry-based learning and to construct scientific understanding through exploration, experimentation, and evidence-based reasoning.

The effective integration of SPS into classroom instruction promotes active learning and strengthens learners' ability to ask questions, design investigations, gather data, interpret findings, and draw conclusions. These skills are aligned with learner-centered approaches emphasized in modern science education and are essential in developing scientific literacy.

Despite the recognized importance of SPS, several studies have reported that many learners still demonstrate limited proficiency in scientific inquiry competencies. Challenges such as insufficient laboratory facilities, limited instructional materials, teacher-centered practices, and learners' low confidence in conducting investigations may affect the development of science process skills. In addition to SPS development, learners' attitudes toward science are important because attitudes influence engagement, participation, persistence, and willingness to perform science-related tasks. Learners who are interested, motivated, and confident in science are more likely to participate in experiments, discussions, and inquiry activities.

Within the Philippine educational context, the K to 12 Science Curriculum emphasizes inquiry-based learning and the development of science process skills across grade levels. At the local level, observations at Mahogany Integrated School suggest that some learner’s experience difficulty applying science process skills during laboratory and classroom activities. These concerns provide the rationale for examining SPS implementation and learners’ attitudes toward science as basis for developing innovative science instructional strategies.

This study therefore examined the implementation of Science Process Skills and the attitudes toward science among Junior High School learners of Mahogany Integrated School. Specifically, it determined the levels of SPS implementation and attitudes toward science, tested the relationship between these variables, and proposed innovative instructional strategies that may support inquiry-based and learner-centered science teaching.

Literature Review

Science Process Skills in Science Learning

Science process skills are foundational competencies that support scientific inquiry. Padilla (1990) described basic science process skills, such as observing, classifying, measuring, inferring, predicting, and communicating, as essential skills for learners who are beginning to engage in scientific investigation. These skills allow learners to gather information, organize evidence, make explanations, and communicate findings.

Observing is considered one of the most fundamental SPS because scientific inquiry begins with careful and systematic observation of objects, events, or phenomena. It requires learners to use their senses and scientific tools to gather accurate information. Classifying helps learners organize objects and data based on similarities and differences, while measuring develops accuracy and quantitative reasoning through the use of standard units and instruments.

Inferring and predicting strengthen reasoning because learners must interpret evidence, identify patterns, and make logical explanations or forecasts. Communicating allows learners to express scientific ideas, observations, and findings using oral, written, graphical, or other forms. Experimenting integrates several SPS because learners plan investigations, test ideas, manipulate variables, gather data, and draw conclusions based on evidence.

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Inquiry-based and laboratory-oriented science instruction has been found to improve learners' science process skills. Studies in the Philippines, ASEAN region, and international contexts consistently emphasize that students develop stronger SPS when science lessons include hands-on activities, guided inquiry, field investigations, project-based tasks, and collaborative problem solving.

Attitudes Toward Science

Attitude toward science refers to learners' interest, enjoyment, motivation, confidence, and perceived value of science. Positive attitudes toward science are important because they influence students' participation in science activities, persistence in difficult tasks, and willingness to pursue science-related learning experiences.

Research shows that learners who enjoy science and perceive it as useful are more likely to engage in inquiry activities and develop science-related competencies. Interest and enjoyment are strengthened when lessons are active, contextualized, and connected to real-life situations. Motivation to learn science also increases when students experience success, receive support from teachers, and participate in meaningful learning activities.

Inquiry-based approaches are strongly linked with positive science attitudes because they allow learners to experience science as an active and meaningful process. When learners are given opportunities to observe, investigate, experiment, communicate findings, and solve problems, they are more likely to appreciate the relevance and usefulness of science.

Theoretical Anchors

This study was anchored on Kolb's Experiential Learning Theory, Piaget's Constructivist Theory, and Bandura's Social Cognitive Theory. Kolb's theory explains that learning occurs through concrete experience, reflective observation, abstract conceptualization, and active experimentation. In science education, this supports the use of hands-on investigations and reflective activities. Piaget's constructivist theory explains that learners actively construct knowledge through interaction with their environment. Science process skills support constructivist learning because learners build understanding through observation, classification, measurement, prediction, experimentation, and interpretation of evidence. Bandura's Social Cognitive Theory emphasizes the role of self-efficacy, modeling, and reciprocal interaction between personal factors, behavior, and environment. In science learning, learners' confidence and positive attitudes may improve when they experience success in inquiry activities, observe peers and teachers engaging in scientific tasks, and receive supportive feedback.

Synthesis of the Literature

The reviewed literature suggests that SPS and attitudes toward science are interrelated components of effective science learning. SPS provides learners with the tools to engage in inquiry, while positive attitudes encourage active participation and persistence. The literature supports the need for innovative, hands-on, inquiry-based, collaborative, and contextualized science instructional strategies that can strengthen both learner skills and affective engagement.

METHODS

Research Design

The study employed a quantitative descriptive-correlational survey design. The descriptive component was used to determine the level of SPS implementation and the level of attitudes toward science among Junior High School learners. The correlational component was used to determine whether a significant relationship existed between SPS implementation and attitudes toward science. This design was appropriate because the study described existing conditions and examined relationships without manipulating variables.

Research Locale

The study was conducted at Mahogany Integrated School, Sitio Mahogany, Lingig II District, Municipality of Lingig, Surigao del Sur. The school was selected because it is the actual setting of the target respondents and provides an appropriate context for examining science process skills and attitudes toward science among Junior High School learners.

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Figure 1. *Location Maps of the Philippines, Surigao del Sur, and Lingig*

Note. Figure retained from the uploaded manuscript to show the geographical context of the study locale.

Respondents and Sampling Technique

The respondents were 107 Junior High School learners of Mahogany Integrated School enrolled during School Year 2025-2026. Total enumeration was used because the population was limited and manageable, allowing the researcher to include all learners in the target group and reduce sampling bias.

Table 1. Respondents of the Study

Respondents	Population	Sample Size
Grade 7	33	33
Grade 8	29	29
Grade 9	18	18
Grade 10	27	27
Total	107	107

Research Instrument

A researcher-made structured survey questionnaire was used to gather the data. The instrument consisted of items measuring Science Process Skills in terms of observing, classifying, measuring, inferring, predicting, communicating, and experimenting, and items measuring attitudes toward science in terms of interest, enjoyment, perceived usefulness, and motivation. A five-point Likert scale was used in answering the questionnaire.

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Validation and Reliability

The questionnaire was subjected to content validation by experts in science education and research to ensure clarity, relevance, and appropriateness. It was also pilot-tested among learners who were not part of the actual respondents but had similar characteristics. Reliability was determined through Cronbach's alpha, with a coefficient of 0.70 or higher considered acceptable.

Data Gathering Procedure

The researcher secured the necessary permission from the research adviser, school head, and concerned authorities before data collection. The validated questionnaire was administered to the respondents, and instructions were clearly explained. Accomplished questionnaires were retrieved, checked, encoded, and prepared for statistical analysis.

Data Analysis

Weighted mean was used to determine the levels of SPS implementation and attitudes toward science. Pearson correlation was used to determine the relationship between SPS implementation and attitudes toward science. The hypothesis was tested at the 0.05 level of significance.

Ethical Consideration

The study observed ethical research procedures by securing permission before the conduct of the study and ensuring voluntary participation. Respondents were informed of the purpose of the study, and their responses were treated with confidentiality. Data were used only for academic and research purposes.

RESULTS AND DISCUSSION

Level of Implementation of Science Process Skills

The findings showed that the Junior High School learners demonstrated a very high level of implementation of Science Process Skills, with an overall mean of 4.72. Among the SPS dimensions, communicating ranked highest with a mean of 4.80, followed by predicting (4.79), inferring (4.77), classifying (4.76), measuring (4.73), experimenting (4.60), and observing (4.60). These results indicate that learners frequently apply science process skills during science learning activities. The very high level of SPS implementation suggests that learners are actively engaged in inquiry-related tasks such as observing phenomena, organizing data, making predictions, communicating ideas, and performing simple investigations.

Table 2. *Level of Implementation of Science Process Skills*

Science Process Skills	Mean	Verbal Interpretation	Rank
Observing	4.598	Very High/ Always	7
Classifying	4.763	Very High/ Alway	3
Measuring	4.732	Very High/ Alway	4
Inferring	4.773	Very High/ Alway	2
Predicting	4.807	Very High/ Alway	1
Communicating	4.639	Very High/ Alway	6
Experimenting	4.676	Very High/ Alway	5
Overall Science Process Skills	4.713	Very High/ Alway	_

Level of Attitudes Toward Science

The learners showed a very high level of attitudes toward science across all four dimensions. Interest in science obtained a weighted mean of 4.76, indicating that learners are curious about science topics and are interested in learning new ideas. Enjoyment of science learning obtained the highest mean of 4.84, suggesting that learners respond positively to science tasks, especially those involving experiments, projects, and active participation.

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Table 3. *Level of Attitudes Toward Science in Terms of Interest in Science*

Indicator	Weighted Mean	Verbal Interpretation
I am interested in learning new ideas in science	4.81	Very High
Science lessons make me curious about how things work	4.75	Very High
I look forward my science class.	4.79	Very High
I like exploring questions related to science.	4.62	Very High
I am interested in science topics even outside the classroom	4.84	Very High
Overall Mean	4.76	Very High

Table 4. *Level of Attitudes Toward Science in Terms of Enjoyment of Science Learning*

Indicator	Weighted Mean	Verbal Interpretation
I enjoy participating in science activities.	4.83	Very High
I enjoy science when lessons involve experiments or investigations	4.86	Very High
Science is one of the subjects I enjoy learning.	4.81	Very High
I enjoy discussing science ideas with my classmates or teacher.	4.78	Very High
I enjoy doing science assignments, projects or tasks.	4.92	Very High
Overall Mean	4.84	Very High

Perceived usefulness of science obtained a weighted mean of 4.63, indicating that learners recognize the relevance of science in understanding the world, solving real-life problems, and preparing for future studies or careers. Motivation to learn science obtained a weighted mean of 4.69, showing that learners are generally motivated to participate in science activities, complete science tasks, and improve their performance.

Table 5. *Level of Attitudes Toward Science in Terms of Perceived Usefulness of Science*

Indicator	Weighted Mean	Verbal Interpretation
Science is useful in everyday life.	4.43	Very High
Learning Science helps me solve real-life problems.	4.57	Very High
Science helps me understand the world around me.	4.79	Very High
Science will be useful in my future studies of career.	4.69	Very High
The skills I learn in science help me make good decisions.	4.69	Very High
Overall Mean	4.63	Very High

Table 6. *Level of Attitudes Toward Science in Terms of Motivation to Learn Science*

Indicator	Weighted Mean	Verbal Interpretation
I put effort into learning science.	4.39	Very High
I continue working science tasks even when they are difficult.	4.79	Very High

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I try to finish my science assignment on time.	4.82	Very High
I participate actively in science activities.	4.83	Very High
I want to improve my performance in science.	4.61	Very High
Overall Mean	4.69	Very High

The summary result showed an overall weighted mean of 4.73, interpreted as very high. Among the attitude dimensions, enjoyment of science learning ranked highest, followed by interest, motivation, and perceived usefulness. This indicates that learners generally have positive affective dispositions toward science. Such positive attitudes provide a favorable foundation for inquiry-based and hands-on instructional strategies.

Table 7. *Summary of the Level of Attitudes Toward Science*

Attitude Dimension	Weighted Mean	Verbal Interpretation
Interest in Science	4.76	Very high
Enjoyment in Science Learning	4.84	Very high
Perceived usefulness in **science**	4.63	Very high
Motivation to Learn Science	4.69	Very high
Overall Mean	4.73	Very high

Relationship Between Science Process Skills and Attitudes Toward Science

The correlation analysis showed a weak but statistically significant positive relationship between SPS implementation and attitudes toward science ($r = 0.209$, $p = 0.0304$). Since the p-value was lower than the 0.05 level of significance, the null hypothesis was rejected. This means that learners with higher implementation of science process skills also tend to have more positive attitudes toward science.

Although the relationship was weak, the result supports the idea that active participation in science activities can help strengthen learners' interest, enjoyment, motivation, and appreciation of science. However, the weak correlation also suggests that attitudes toward science may be influenced by other factors, such as teaching strategies, classroom environment, availability of materials, teacher support, peer interaction, and personal interest.

Table 8. *Relationship Between Science Process Skills and Attitudes Toward Science*

Variables	R- value	P- value
Science process skills and attitudes toward science	0.209	0.0304

Proposed Innovative Science Instructional Strategies

Based on the results, innovative science instructional strategies should focus on sustaining learners' very high attitudes toward science while strengthening science process skills across all domains. Since learners respond positively to science learning, teachers may maximize this readiness by using activities that are inquiry-based, hands-on, collaborative, and connected to real-life situations.

Table 9. *Proposed Innovative Science Instructional Strategies*

Proposed Strategy	Description	SPS/Attitude Targeted
Inquiry-Based Science Skill Rotation	Learners rotate through stations where they observe, classify, measure, infer, predict, communicate, and experiment using simple science tasks.	All SPS dimensions
Predict–Observe–Explain Activities	Learners make predictions before an experiment, observe what happens, and explain the results using evidence.	Observing, Predicting, Inferring, Communicating

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Hands-on Laboratory Challenges	Learners perform simple experiments using low-cost materials and record their findings in science journals.	Measuring, Experimenting, Motivation
Real-Life Problem-Based Science Tasks	Lessons are connected to local or daily-life problems such as health, weather, waste management, plants, water, or environmental issues.	Perceived Usefulness, Motivation
Collaborative Science Investigation	Learners work in small groups to plan investigations, gather data, discuss results, and present conclusions.	Experimenting, Communicating, Enjoyment
Science Communication Outputs	Learners create posters, infographics, oral presentations, mini-reports, or digital slides explaining their findings.	Communicating, Confidence, Enjoyment
Science Process Skills Portfolio	Learners compile evidence of their SPS performance, including observation notes, measurement tables, predictions, reflections, and experiment results.	All SPS dimensions, Self-confidence
Reflective Science Journaling	Learners write short reflections on what they learned, how science is useful, and how they can apply science in real life.	Motivation, Usefulness, Attitude Development

CONCLUSION

The Junior High School learners of Mahogany Integrated School demonstrated a very high level of Science Process Skills implementation. This shows that learners frequently apply observing, classifying, measuring, inferring, predicting, communicating, and experimenting during science learning activities. The learners also demonstrated a very high level of attitudes toward science. They were interested in science, enjoyed science learning, perceived science as useful, and were motivated to participate in science activities. There was a statistically significant weak positive relationship between SPS implementation and attitudes toward science. This indicates that learners with stronger science process skills tend to have more positive attitudes toward science, although other factors may also influence their attitudes. The findings support the development of innovative science instructional strategies that are inquiry-based, hands-on, collaborative, reflective, and connected to real-life contexts. Such strategies may help strengthen science process skills while sustaining positive attitudes toward science.

Recommendations

Science teachers should continue integrating inquiry-based and hands-on activities that allow learners to observe, classify, measure, infer, predict, communicate, and experiment during science lessons. Teachers should use innovative strategies such as inquiry-based science skill rotation, predict-observe-explain activities, hands-on laboratory challenges, real-life problem-based science tasks, science journals, peer collaboration, and multimedia-assisted learning. School administrators should provide support for science instruction by ensuring the availability of simple laboratory materials, improvised learning resources, and opportunities for teacher training on inquiry-based science teaching. Learners should be encouraged to participate actively in science activities, ask questions, communicate ideas, and relate science concepts to daily-life experiences. Parents and guardians should support learners' science learning at home by encouraging curiosity, observation of the environment, and appreciation of science in everyday life. Future researchers may conduct similar studies in other schools, districts, grade levels, or subject areas. They may also use mixed-methods or experimental designs to further examine how specific science teaching strategies influence both science process skills and attitudes toward science.

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