

The Utilization of the Problem-Based Learning (PBL) Approach in Teaching Science in the Public Junior High Schools in Sagñay District, Division of Camarines Sur

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ARTICLE INFORMATION	ABSTRACT
Article history: Published: October 2026 Keywords: Problem-Based Learning (PBL) Teaching Science Public Junior High Schools Sagñay District	This study determined the utilization of Problem-Based Learning (PBL) in teaching Science in the Public Junior High Schools of Sagñay District, Division of Camarines Sur, during School Year 2025–2026. Specifically, it assessed the extent of PBL utilization, determined the agreement on the rank orders of its indicators and identified the constraints encountered in its implementation. It also formulated policy recommendations based on the findings. The study employed the descriptive-evaluative-correlational method involving forty-nine (49) respondents. Data were analyzed using frequency count, weighted mean, percentage, rank, and Kendall's Coefficient of Concordance (W). Findings revealed that PBL was Much Utilized, particularly in teacher roles as facilitator and guide (4.31), lesson planning and design (4.24), integration of real-world problems (4.00), facilitation of inquiry and critical thinking (3.86), learner collaboration and group work (3.86), and assessment strategies aligned with PBL (3.79). Significant agreement on the rank orders was established across all indicators. The constraints encountered were rated Much Serious, including availability of resources and materials, time constraints, classroom management and group dynamics, learners' readiness and motivation, assessment and evaluation, and teachers' competence and facilitation skills. Significant agreement on the rank orders of constraints was found, except for time constraints and classroom management and group dynamics. The study concluded that PBL is widely utilized but is accompanied by serious implementation constraints. It recommended sustaining PBL practices, strengthening LAC sessions, peer mentoring, and collaborative lesson planning, improving access to instructional resources, laboratories, and technology, and adopting structured time and classroom management strategies. Future studies may develop interventions addressing identified constraints and examine PBL implementation across varied school contexts.

1. Introduction

Education is universally recognized as a cornerstone of national development because it equips individuals with the knowledge, skills, and values necessary for active participation in society. Science education, in particular, develops critical thinking, innovation, and problem-solving skills essential in addressing 21st-century challenges such as climate change, technological advancement, and health crises.

The 1987 Philippine Constitution, Article XIV, Section 1, mandates that the State shall protect and promote the right of all citizens to quality education at all levels and take appropriate steps to make education accessible to all. This mandate supports the provision of meaningful learning experiences that develop scientifically literate, resilient, and globally competitive Filipino learners. It is further reinforced by international commitments such as the Sustainable Development Goals (SDGs) and Education for All (EFA), which emphasize inclusive, equitable, and quality education.

At the national level, Republic Act No. 10533, or the Enhanced Basic Education Act of 2013, institutionalized the K to 12 curriculum and emphasized learner-centered approaches that develop critical thinking, problem-solving, and lifelong learning skills. Likewise, Republic Act No. 9155, or the Governance of Basic Education Act of 2001, promotes school-based management and empowers teachers and schools to adapt strategies responsive to learners' needs. Related initiatives, including the **Basic Education Sector Reform Agenda (BESRA), Continuous Improvement Program (CIP),

School First Initiative, and School-Based Management (SBM), further emphasize data-driven decision-making, shared accountability, teacher development, and continuous improvement of learning outcomes.

The Department of Education (DepEd) likewise promotes foundational learning, curriculum enhancement, professional development, and learner resilience. In the Bicol Region, the initiative “6B: Bawat Batang Bicolano Bihasang Bumasa at Bumilang” and DepEd Order No. 10, s. 2025, concerning regional remediation programs, highlight the need to address learning gaps in essential areas, including science. Similarly, the Academic Recovery and Accessible Learning (ARAL) Program, mandated by Republic Act No. 12028, seeks to address learning gaps and support struggling learners in reading, mathematics, and science.

The Philippine Professional Standards for Teachers (PPST) under DepEd Order No. 42, s. 2017 provides standards for teachers in implementing learner-centered and innovative instructional strategies. Complementary DepEd policies on strengthening science education, including DepEd Orders No. 55 and No. 51, s. 2010, emphasize inquiry, critical thinking, and meaningful engagement in science learning. These policies provide a strong basis for adopting pedagogical approaches such as Problem-Based Learning (PBL).

In Sagñay District, Division of Camarines Sur, public secondary schools have demonstrated accomplishments in academic, co-curricular, and sports activities. Teachers actively engage in professional development, remediation, enrichment, and innovative teaching practices aligned with the K to 12 Curriculum and the MATATAG Education Agenda. Learners likewise participate in journalism, cultural activities, skills competitions, and sports, earning recognition at the division and regional levels.

Despite these accomplishments, the district continues to face challenges in improving learners' conceptual understanding of science, as reflected in classroom performance and national assessment results. This situation underscores the need for instructional approaches that move learners beyond memorization toward meaningful understanding, inquiry, and application of scientific concepts.

One approach that addresses these needs is Problem-Based Learning (PBL). Rooted in constructivist principles, PBL engages learners in authentic and ill-structured problems that require inquiry, collaboration, critical thinking, and self-directed learning. Instead of passively receiving information, learners construct knowledge through exploration and problem-solving. In science education, PBL can connect abstract concepts with real-world situations and promote the application of scientific knowledge.

Previous studies support the potential of PBL in science education. Pantao (2025) found that PBL, together with technology-based and contextualized learning approaches, enhanced students' conceptual understanding of Earth Science. Valdez and Bungihan (2019) reported that PBL improved problem-solving skills and conceptual mastery in Chemistry among Grade 9 learners. Similarly, Fausto (2023) found significantly greater learning gains among students exposed to PBL compared with conventional instruction. Pozuelo-Muñoz et al. (2023) further reported that PBL promoted inquiry, experimentation, and hypothesis testing among secondary students. Meanwhile, Bagay et al. (2023) found that science teachers generally perceived PBL as effective in promoting engagement, active participation, and self-directed learning, although learner readiness and teacher preparedness influenced its applicability.

Given these policy directions, local challenges, and findings from previous studies, the present study was conducted to determine the utilization of the Problem-Based Learning (PBL) approach in teaching Science in the Public Junior High Schools of Sagñay District, Division of Camarines Sur. The study aims to provide evidence on the extent of PBL utilization, identify implementation constraints, and contribute to the development of effective and responsive science teaching practices that support learners' conceptual understanding, critical thinking, and problem-solving skills.

1.1 Statement of the Problem

This study determined the utilization of the Problem-Based Learning (PBL) approach in teaching Science in the Public Junior High Schools in Sagñay District, Division of Camarines Sur for School Year 2025-2026. Specifically, it sought answers to the following questions:

1. To what extent is the Problem-Based Learning (PBL) approach utilized in teaching Science along:

- 1.1 Use of Assessment Strategies Aligned with PBL,
- 1.2 Teacher Roles as Facilitator and Guide,
- 1.3 Facilitation of Inquiry and Critical Thinking,

- 1.4 Integration of Real-World Problems,
- 1.5 Lesson Planning and Design, and
- 1.6 Learner Collaboration and Group Work?

2. How significant is the agreement on the rank orders of the extent of the Problem-Based Learning (PBL) approach utilized in teaching Science along the aforementioned aspects?

3. What constraints were encountered in the utilization of the Problem-Based Learning (PBL) approach in teaching Science in terms of:

- 3.1 Learners' Readiness and Motivation,
- 3.2 Teachers' Competence and Facilitation Skills,
- 3.3 Availability of Resources and Materials,
- 3.4 Time Constraints,
- 3.5 Assessment and Evaluation, and
- 3.6 Classroom Management and Group Dynamics?
4. How significant is the agreement on the rank orders of the constraints encountered in the utilization of the Problem-Based Learning (PBL) approach in teaching Science among the different groups of respondents?
5. What policy recommendations can be formulated based from the findings of the study?

1.2 Assumptions

1. The extent of the Problem-Based Learning (PBL) approach utilized in teaching Science along Lesson Planning and Design, Integration of Real-World Problems, Student Collaboration and Group Work, Facilitation of Inquiry and Critical Thinking, Use of Assessment Strategies Aligned with PBL, and Teacher Roles as Facilitator and Guide can be assessed.
2. The constraints encountered in the utilization of the Problem-Based Learning (PBL) strategies in teaching Science in terms of Learners' Readiness and Motivation, Teachers' Competence and Facilitation Skills, Availability of Resources and Materials, Time Constraints, Assessment and Evaluation, and Classroom Management and Group Dynamics can be identified.
3. The policy recommendations can be formulated based from the findings of the study.

1.3 Hypotheses of the Study

This study tested these hypotheses:

There is a significant agreement on the rank orders of the extent of the Problem-Based Learning (PBL) approach utilized in teaching Science.

There is a significant agreement on the rank orders of the constraints encountered in the utilization of the Problem-Based Learning (PBL) approach in teaching Science among the different groups of respondents.

2. Literature Review

The review of related literature and studies provided essential insights for the conduct of the research. The discussion focuses on three major areas: Problem-Based Learning (PBL) Approach, Constraints, and Policy Recommendations. It also presents the synthesis of the state-of-the-art and the research gap addressed by the study, together with the theoretical and conceptual frameworks and their respective paradigms.

2.1 Problem-Based Learning (PBL) Approach

Macapayad (2025) assessed the efficacy of PBL and the mathematics problem-solving performance of Grade 9 students in a boarding school in Talisay City, Cebu. The findings showed that authentic, developmental, collaborative, and authentic assessment elements of PBL were evident in mathematics instruction. A significant relationship was also found between PBL efficacy and students' problem-solving performance. The study concluded that PBL helps learners analyze problems, develop solutions, and apply knowledge in practical contexts. Similar to the present study, it examined PBL as an instructional approach in secondary education. However, Macapayad focused on mathematics problem-solving, while the present study focuses on conceptual understanding in science.

Amistoso (2024) evaluated contextualized PBL in improving the mathematics performance of Grade 6 learners in San Roque Elementary School, Leyte. After a four-week intervention, learners showed statistically significant improvement. Both studies emphasize active engagement and meaningful problem-solving; however, Amistoso focused on elementary mathematics, whereas the present study examines science learning among secondary learners.

Bautista (2023) investigated the utilization of PBL in teaching science in selected schools in Quirino and Isabela. Findings indicated improved learner engagement, inquiry skills, and understanding of scientific concepts. The study supports the potential of PBL in science education. Unlike the broader elementary and secondary scope of Bautista's study, the present research focuses specifically on public secondary schools in Sagñay District.

Gerona (2021) examined PBL and mathematics achievement among Grade 11 students at Calamba Integrated School using a quasi-experimental design. Students exposed to PBL significantly outperformed those taught through traditional instruction. Similarly, Adriano (2021) found that Grade 8 students taught through PBL achieved significantly higher results in solving rational algebraic expression problems than those taught traditionally. Both studies demonstrate the value of PBL in developing higher-order thinking and academic performance, although they focused on mathematics rather than science conceptual understanding.

2.2 Constraints

Arbo and Ching (2022) examined PBL and mathematical skills among Grade 9 students at Calamba City Science High School. Although students had positive perceptions of PBL, no significant relationship was found between their perceptions and problem-solving performance. This differs from the present study, which examines PBL utilization and the constraints affecting its implementation in science.

Sator et al. (2021) investigated challenges in using PBL in science among Grade 4 learners in Cebu. The study identified limited teacher preparation, inadequate resources, and diverse learner backgrounds as barriers to implementation, while also recognizing PBL's potential to promote participation and collaboration. The present study similarly examines PBL-related constraints but focuses on secondary learners.

Mamon (2021) implemented PBL in Grade 11 Earth and Life Science through community-based hazard identification and assessment. The approach strengthened learners' application of scientific concepts, collaboration, and analytical thinking. While both studies connect science learning with real-world contexts, Mamon focused on hazard assessment, whereas the present study addresses science conceptual understanding more broadly.

Rivera (2021) examined PBL in developing critical-thinking skills among Grade 10 mathematics learners at Sta. Rosa Science and Technology High School. Results showed significantly higher performance among learners exposed to PBL. Similarly, Castillo (2021) found that PBL improved motivation, conceptual understanding, and assessment performance among Grade 7 Integrated Science learners in a public secondary school in Bulacan. These studies support the value of PBL in developing higher-order thinking and science understanding, while the present study extends the inquiry to public secondary schools across Sagñay District.

2.3 Policy Recommendations

Mendoza (2021) examined PBL in developing scientific literacy among Grade 9 learners in Quezon City National High School. Through environmental problem-solving activities, learners developed higher scientific literacy than those exposed to traditional instruction. Dela Cruz (2022) likewise found that contextualized PBL improved problem-solving skills and comprehension among Grade 8 mathematics learners in Pampanga.

In science education, Santos (2021) implemented PBL in Grade 10 Chemistry classes and found improved conceptual understanding and higher-order thinking through real-world chemical and environmental problems. Villanueva (2021) reported increased intrinsic motivation and positive attitudes toward mathematics among Grade 7 learners exposed to real-life PBL activities. Similarly, Lopez (2023) found that PBL improved conceptual mastery, critical thinking, and collaboration among Grade 9 Biology learners through contextualized health and environmental problems.

These studies demonstrate that PBL can enhance conceptual understanding, scientific literacy, problem-solving, motivation, collaboration, and higher-order thinking. They also reveal recurring implementation concerns related to teacher preparation, resources, learner readiness, classroom conditions, and assessment. These findings provide a basis for formulating policy recommendations responsive to the actual conditions of PBL implementation.

2.4 Synthesis of the State-of-the-Art

The reviewed literature and studies consistently establish PBL as a learner-centered approach that promotes active engagement, problem-solving, inquiry, collaboration, critical thinking, and application of knowledge. Studies by Macapayad (2025), Amistoso (2024), Bautista (2023), Gerona (2021), and Adriano (2021) demonstrated its application and effectiveness in mathematics and science across different educational levels.

Studies by Arbo and Ching (2022), Sator et al. (2021), Mamon (2021), Rivera (2021), and Castillo (2021) further highlighted learner outcomes and implementation concerns, including teacher preparedness, resources, learner diversity, and instructional conditions. Meanwhile, Mendoza (2021), Dela Cruz (2022), Santos (2021), Villanueva (2021), and Lopez (2023) provided evidence supporting contextualized PBL and its implications for instructional improvement and policy development.

Despite these studies, limited research has specifically examined the extent of PBL utilization, the constraints encountered, the agreement on the rank orders of these indicators, and policy recommendations for public junior high schools in Sagñay District, Division of Camarines Sur. Most existing studies focused on a particular subject, grade level, intervention, or single school. The present study addresses this gap by examining PBL utilization in the local context and providing evidence-based recommendations to strengthen its implementation in Science.

2.5 Gap Bridged of the Study

Although several local and international studies have already examined the effectiveness of Problem-Based Learning (PBL) in enhancing academic performance, most of them have been limited to mathematics and specific topics in science at the elementary or senior high school levels. Existing literature also tends to emphasize general achievement, problem-solving skills, or engagement, but few focus particularly on conceptual understanding in science among public secondary school learners in the Sagñay District. This gap highlights the need to determine how PBL, when applied within the

context of junior high school science education, can foster deeper comprehension of scientific concepts rather than just procedural knowledge or test performance. The present study seeks to bridge this gap by investigating the utilization of PBL in improving the conceptual understanding of secondary science learners, thereby extending the body of knowledge on PBL effectiveness across grade levels and subject areas. In doing so, the study contributes a more localized and context-specific perspective that can guide educators, curriculum developers, and policymakers in promoting meaningful learning through innovative strategies in Philippine public schools.

2.6 Theoretical Framework of the Study

This study was anchored on Constructivist Learning Theory (Piaget, 1952), Experiential Learning Theory (Kolb, 1984), Discovery Learning Theory (Bruner, 1961), Cognitive Apprenticeship Theory (Collins, Brown, & Newman, 1989), and Situated Learning Theory (Lave & Wenger, 1991). These theories provide a foundation for understanding how Problem-Based Learning (PBL) supports meaningful and contextualized science learning. Constructivist Learning Theory (Piaget, 1952) emphasizes that learners actively construct knowledge through experiences and interactions. PBL reflects this principle by engaging learners in authentic problems and inquiry that develop their understanding of science concepts. Experiential Learning Theory (Kolb, 1984) explains learning as a cycle of concrete experience, reflection, conceptualization, and active experimentation. PBL follows this cycle as learners encounter real-world problems, analyze them, develop scientific concepts, and apply solutions. Discovery Learning Theory (Bruner, 1961) emphasizes learning through discovery and guided inquiry. PBL provides opportunities for learners to explore problems, discover concepts, and develop higher-order thinking rather than rely on rote memorization. Cognitive Apprenticeship Theory (Collins, Brown, & Newman, 1989) highlights modeling, guidance, scaffolding, and collaboration. In PBL, teachers act as facilitators while learners collaborate and gradually develop competence in solving scientific problems. Situated Learning Theory (Lave & Wenger, 1991) emphasizes learning through authentic contexts and social interaction. PBL applies this by engaging learners in real-life problems relevant to their experiences, making science concepts more meaningful and applicable. Researcher's Theory, anchored on these theories, the researcher proposes that ****analyzing the utilization of PBL in teaching Science can provide evidence for formulating appropriate policy recommendations that may contribute to quality education and improved science learning.**

3. Methodology

This section presents the research methods employed in the study. It describes research design, sampling procedure, and respondents, as well as the data-gathering instruments and procedures. It also explains the statistical tools used to analyze and interpret the data gathered.

3.1 Research Design

This study utilized the descriptive-evaluative-correlational method. The descriptive method was used in assessing the extent of the Problem-Based Learning (PBL) approach utilized in teaching Science along Lesson Planning and Design, Integration of Real-World Problems, Student Collaboration and Group Work, Facilitation of Inquiry and Critical Thinking, Use of Assessment Strategies Aligned with PBL, and Teacher Roles as Facilitator and Guide and, identifying the constraints encountered in the utilization of the Problem-Based Learning (PBL) approach in teaching in Science in terms of Learners' Readiness and Motivation, Teachers' Competence and Facilitation Skills, Availability of Resources and Materials, Time Constraints, Assessment and Evaluation, and Classroom Management and Group Dynamics. The evaluative method was used to evaluate the respondent's assessment. On the other hand, the correlational method was used to test the significant agreement on the rank orders of the extent of the Problem-Based Learning (PBL) approach utilized in teaching Science along the aforementioned aspects, and measure the significant agreement on the rank orders of the constraints encountered in the utilization of the Problem-Based Learning (PBL) approach in teaching Science among the different groups of respondents.

3.2 Sampling Design

Purposive sampling was applied in selecting the Public Junior High Schools in Sagñay District, Division of Camarines Sur for School Year 2025–2026, as these schools were deemed most appropriate to provide the needed data for the study. However, in determining the respondents, no specific sampling technique was used since the researcher involved the entire population of science teachers from these schools. This ensured that all relevant perspectives were considered, providing a more comprehensive understanding of the utilization of the Problem-Based Learning (PBL) approach in improving conceptual understanding in science.

3.3 Respondents of the Study

There were eleven (11) respondents from the Central area, fifteen (15) from the Mountain area, and twenty-three (49) from the Seacoast area, making a total of forty-nine (49) respondents. The distribution shows that the respondents are fairly represented across the three geographical areas in Sagñay.

3.4 Research Instruments

The study employed a researcher-made survey questionnaire as the primary research instrument to gather data on the utilization of Problem-Based Learning (PBL) approach in teaching science. This tool was specifically designed to suit the context of the Public Junior High Schools in Sagñay District, Division of Camarines Sur for School Year 2025–2026. The research instrument was composed of two (2) parts. The first was used to assess the extent of the Problem-Based Learning (PBL) approach utilized in teaching Science and the last part was used to identify the constraints encountered in the utilization of the Problem-Based Learning (PBL) approach.

3.5 Statistical Tools

In the interpretation and analysis of data, the following statistical tools were utilized: Frequency Count, Weighted Mean, Percentage, Rank, and Kendall's Coefficient of Concordance W were employed.

In assessing the extent of the Problem-Based Learning (PBL) approach utilized in teaching Science along Lesson Planning and Design, Integration of Real-World Problems, Student Collaboration and Group Work, Facilitation of Inquiry and Critical Thinking, Use of Assessment Strategies Aligned with PBL, and Teacher Roles as Facilitator and Guide and, identifying the constraints encountered in the utilization of the Problem-Based Learning (PBL) approach in teaching science in terms of Learners' Readiness and Motivation, Teachers' Competence and Facilitation Skills, Availability of Resources and Materials, Time Constraints, Assessment and Evaluation, and Classroom Management and Group Dynamics, the weighted mean, frequency count, and rank were used.

To test the significant agreement on the rank orders of the extent of the Problem-Based Learning (PBL) approach utilized in teaching Science along the aforementioned aspects, and measure the significant agreement on the rank orders of the constraints encountered in the utilization of the Problem-Based Learning (PBL) approach in teaching Science among the different groups of respondents, Kendall's Coefficient of Concordance W was utilized with the following formula (Siegel, 1988). The corresponding chi-square (χ^2) formula was used to determine the significance of agreement (Siegel, 1988).

4. Findings

This section presents the findings of the study on the utilization of the Problem-Based Learning (PBL) approach in teaching science in the public junior high schools in Sagñay District, Division of Camarines Sur for School Year 2025–2026.

4.1 The Extent of the Problem-Based Learning (PBL) Approach Utilized in Teaching Science

Problem-based learning (PBL) is a learner-centered pedagogy based on the constructivist learning theory through collaboration and self-directed learning. The utilization of the Problem-Based Learning (PBL) in teaching Science is strongly supported by existing educational policies and frameworks. RA No. 10533 mandates the implementation of a learner-centered and developmentally appropriate curriculum, which emphasizes active participation and meaningful learning. In line with this, DO No. 21, s. 2019 further reinforces the adoption of constructivist and inquiry-based approaches, encouraging strategies that promote critical thinking and real-world application of knowledge. Moreover, the K to 12 Science Curriculum Guide highlights the importance of scientific inquiry and problem-solving skills, which are core elements of PBL. In this study, the extent of the Problem-Based Learning (PBL) approach utilized in teaching Science is determined along the Use of Assessment Strategies Aligned with PBL, Teacher Roles as Facilitator and Guide, Facilitation of Inquiry and Critical Thinking, Integration of Real-World Problems, Lesson Planning and Design, and Learner Collaboration and Group Work.

4.2 The Extent of the Problem-Based Learning (PBL) Approach Utilized in Teaching Science along Use of Assessment Strategies Aligned with PBL

The table presents data on the extent of the Problem-Based Learning (PBL) approach utilized in teaching Science along Use of Assessment Strategies Aligned with PBL. Based on the data, out of the nine (9) indicators, eight (8) were rated Much Utilized, and one (1) was rated Utilized. The weighted mean ranges from 3.49 to 4.28 which means Utilized to Much Utilized. The indicator rated Much Utilized (MU) was assessment criteria were clearly explained to learners before the activities, (4.28); Peer assessment was encouraged within groups, (4.10); learners were evaluated on collaboration and teamwork, (3.90); rubrics were used to grade problem-based tasks fairly, (3.74); learners self-assessed their learning, (3.72); assessment tasks measured learners' problem-solving and critical thinking skills, (3.64); and tasks included

formative checks during activities, (3.65). Meanwhile, learners received timely and constructive feedback and was rated Utilized (U) with a mean of 3.49.

The highest-ranked indicator, assessment criteria were clearly explained to learners before the activities, (4.28, Much Utilized), show that teachers place a strong emphasis on clarity and guidance in implementing Problem-Based Learning (PBL). By clearly communicating what is expected, learners can approach tasks with confidence, stay focused, and actively engage in problem-solving. This practice supports self-directed learning and helps students monitor their own progress, which is at the core of PBL.

Table 1: The Extent of the Problem-Based Learning (PBL) Approach Utilized in Teaching Science along Use of Assessment Strategies Aligned with PBL

INDICATORS	CENTRAL SECTOR			MOUNTAIN SECTOR			SEACOAST SECTOR			AVERAGE		
	Wx	I	R	Wx	I	R	Wx	I	R	Wx	I	R
1. Learners were evaluated on collaboration and teamwork.	4.04	MU	3	3.88	MU	3	3.79	MU	3	3.90	MU	3
2. Tasks included formative checks during activities.	3.77	MU	6	3.66	MU	5	3.53	MU	8	3.65	MU	6
3. Assessments reflected real-world applications.	3.55	MU	8	3.56	MU	7	3.78	MU	4	3.63	MU	8
4. Learners received timely and constructive feedback.	3.45	U	9	3.50	MU	9	3.52	MU	9	3.49	U	9
5. Rubrics were used to grade problem-based tasks fairly.	4.02	MU	4	3.67	MU	4	3.54	MU	7	3.74	MU	4
6. Learners self-assessed their learning.	3.78	MU	5	3.65	MU	6	3.72	MU	5	3.72	MU	5
7. Peer assessment was encouraged within groups.	4.12	MU	1	4.05	MU	2	4.12	MU	2	4.10	MU	2
8. Assessment tasks measured learners' problem-solving and critical thinking skills.	3.67	MU	7	3.55	MU	8	3.69	MU	6	3.64	MU	7
9. Assessment criteria were clearly explained to learners before the activities.	4.05	MU	2	4.45		1	4.34	MU	1	4.28	MU	1
Average Wx	3.83	ME		3.77	MU		3.78	MU		3.79	MU	

When learners understand the criteria from the beginning, they are better able to plan, collaborate, and apply critical thinking skills effectively. Conversely, the lowest-ranked indicator, learners received timely and constructive feedback, (3.49, Utilized), suggests that there is room for improvement in providing immediate and actionable guidance. In PBL, feedback is essential because it allows learners to reflect on their strategies, correct mistakes, and enhance their learning as they work on real-world problems. The lower rating may be due to challenges such as large class sizes, limited instructional time, or the difficulty of monitoring each group closely during collaborative tasks. As a result, some learners may not receive feedback quickly enough to adjust their approach or fully understand their learning gaps.

These findings carry important implications for teaching practice. According to Macapayad, G. L. (2025), the strong use of clear assessment criteria indicates that learners benefit from structured guidance and identify what is expected of them, which promotes accountability and engagement. However, the lower rating in timely feedback highlights the need for strategies that ensure learners receive more immediate and meaningful support. Also, Amistoso, A. C. (2024) cited that teachers might consider incorporating peer feedback, self-reflection activities, or digital tools to provide quicker responses. By addressing this gap, the effectiveness of PBL in developing critical thinking, problem-solving, and collaborative skills can be significantly enhanced, ultimately improving learners' scientific understanding and overall academic performance.

4.3 The Extent of the Problem-Based Learning (PBL) Strategy Utilized in Teaching Science along Teacher Roles as Facilitator and Guide

Table 2 present the data on the extent of the Problem-Based Learning (PBL) approach utilized in teaching Science along Teacher Roles as Facilitator and Guide. Based on the data, all of the eight (8) indicators were rated Much Utilized. The weighted mean ranges from 4.09 to 4.43.

The indicators rated Much Utilized (MU) were: teacher fostered a positive and safe learning environment, (4.43); teacher asked probing questions to deepen understanding, (4.42); and the teacher guided learners instead of giving answers, (4.42); teacher encouraged learners to explore solutions, (4.35); teacher provided timely support when needed, (4.34); the teacher modeled problem-solving strategies, (4.29); teacher encouraged independent thinking (4.12); and teacher helped learners reflect on their learning, (4.09).

Table 2: The Extent of the Problem-Based Learning (PBL) Strategy Utilized in Teaching Science along Teacher Roles as Facilitator and Guide

INDICATORS	CENTRAL SECTOR			MOUNTAIN SECTOR			SEACOAST SECTOR			AVERAGE		
	Wx	I	R	Wx	I	R	Wx	I	R	Wx	I	R
1. Teacher fostered a positive and safe learning environment.	4.25	MU	6	4.55	VMU	1	4.49	MU	1	4.43	MU	1
2. Teacher encouraged independent thinking.	4.11	MU	8	4.04	MU	8	4.22	MU	7	4.12	MU	7
3. Teacher asked probing questions to deepen understanding.	4.45	MU	1	4.36	MU	4	4.44	MU	2	4.42	MU	3
4. Teacher provided timely support when needed.	4.44	MU	2	4.35	MU	5	4.23	MU	6	4.34	MU	5
5. Teacher helped learners reflect on their learning.	4.12	MU	7	4.05	MU	7	4.11	MU	8	4.09	MU	8
6. The teacher modeled problem-solving strategies.	4.34	MU	5	4.22	MU	6	4.31	MU	4	4.29	MU	6
7. Teacher encouraged learners to explore solutions.	4.35	MU	4	4.43	MU	3	4.28	MU	5	4.35	MU	4
8. The teacher guided learners instead of giving answers.	4.43	MU	3	4.46	MU	2	4.38	MU	3	4.42	MU	2
Average Wx	4.31	MU		4.31	MU		4.31	MU		4.31	MU	

The highest-rated indicators, teacher fostered a positive and safe learning environment, (4.43), along with teacher asked probing questions to deepen understanding and teacher guided learners instead of giving answers, (both 4.42), highlight the teacher's strong facilitative role in the learning process. These practices reflect the essence of Problem-Based Learning (PBL), where the teacher acts not as the sole source of knowledge but as a guide who supports inquiry and exploration. According to Arbo, J. B., and Ching, D. A. (2022), a positive and safe classroom environment encourages learners to express ideas freely without fear of mistakes, while probing questions stimulate deeper thinking and analysis. By guiding rather than directly giving answers, the teacher empowers learners to take ownership of their learning and develop confidence in solving problems independently.

In contrast, the lowest-rated indicator, teacher helped learners reflect on their learning, (4.09), although still within the Much Utilized range, suggests that reflective practices may not be as consistently emphasized as other strategies. Reflection is a crucial component of PBL because it allows learners to evaluate their thought processes, recognize their strengths and weaknesses, and make meaningful connections from their experiences. The slightly lower rating may indicate that reflection activities are sometimes overlooked due to time constraints or the focus on task completion, which can limit opportunities for learners to fully internalize their learning.

These findings imply that while teachers are highly effective in creating a supportive and inquiry-driven classroom environment, there is still a need to strengthen reflective practices to maximize learning outcomes. Encouraging more structured reflection—such as journals, group discussions, or guided questioning—can help learners better process their experiences and deepen their understanding.

4.4 The Extent of the Problem-Based Learning (PBL) Approach Utilized in Teaching Science along Facilitation of Inquiry and Critical Thinking

On the extent of the Problem-Based Learning (PBL) approach utilized in teaching Science along Facilitation of Inquiry and Critical Thinking. Based on the data, out of the nine (9) indicators, seven (7) were rated Much Utilized, and two (2) were rated Utilized. The weighted mean ranges from 3.32 to 4.23 which means from Utilized to Much Utilized. The indicators rated Much Utilized (MU) were: learners were encouraged to ask questions, (4.23); lessons promoted investigation and exploration, (4.19); learners analyzed problems critically, (4.14); activities required reasoning and logical thinking, (4.06); learners evaluated evidence before concluding, (4.03); learners reflected on their learning process, (3.65); and learners connected concepts to real-life situations, (3.64). The indicators rated Utilized (U) were: the teacher guided rather than gave answers, (3.48); and learners proposed multiple solutions to problems, (3.32).

Table 3: The Extent of the Problem-Based Learning (PBL) Approach Utilized in Teaching Science along Facilitation of Inquiry and Critical Thinking

INDICATORS	CENTRAL SECTOR			MOUNTAIN SECTOR			SEACOAST SECTOR			AVERAGE		
	Wx	I	R	Wx	I	R	Wx	I	R	Wx	I	R
1. Learners analyzed problems critically.	4.21	MU	2	4.01	MU	5	4.20	MU	2	4.14	MU	3
2. Learners were encouraged to ask questions.	4.25	MU	1	4.20	MU	2	4.24	MU	1	4.23	MU	1
3. Learners proposed multiple solutions to problems.	3.25	U	9	3.46	U	8	3.26	U	9	3.32	U	9
4. Learners evaluated evidence before concluding.	4.00	MU	5	4.06	MU	3	4.02	MU	4	4.03	MU	5
5. The teacher guided rather than gave answers.	3.51	MU	8	3.42	U	9	3.50	MU	8	3.48	U	8
6. Activities required reasoning and logical thinking.	4.10	MU	4	4.03	MU	4	4.06	MU	3	4.06	MU	4
7. Lessons promoted investigation and exploration.	4.11	MU	3	4.45	MU	1	4.01	MU	5	4.19	MU	2
8. Learners reflected on their learning process.	3.59	MU	6	3.69	MU	6	3.67	MU	6	3.65	MU	6
9. Learners connected concepts to real-life situations.	3.58	MU	7	3.68	MU	7	3.66	MU	7	3.64	MU	7
Average Wx	3.84	MU		3.89	MU		3.85	MU		3.86	MU	

The highest-ranked indicator, learners were encouraged to ask questions, (4.23, Much Utilized), highlights a classroom environment that values curiosity and active participation. When learners are encouraged to ask questions, they become more engaged and take a more active role in their own learning process. This also reflects a shift from passive learning to inquiry-based learning, where students are not just receiving information but are exploring, challenging ideas, and deepening their understanding. According to Castillo, A. F. (2021), such a practice is essential in Problem-Based Learning (PBL), as it promotes critical thinking and allows learners to investigate problems more meaningfully.

On the other hand, the lowest-ranked indicator, learners proposed multiple solutions to problems, (3.32, Utilized), suggests that learners may still be developing confidence or skills in exploring diverse approaches to problem-solving. In PBL, generating multiple solutions is important because it encourages flexibility in thinking and helps learners understand that problems can have more than one possible answer. The lower rating may indicate that learners are more accustomed to finding a single correct answer rather than exploring various possibilities. Additionally, the indicator, the teacher guided rather than gave answers, (3.48, Utilized) supports this observation, implying that there may still be instances where learners rely on direct instruction rather than independent exploration.

These findings imply that while learners are actively engaged in questioning, analyzing, and investigating, there is still a need to strengthen their ability to think divergently and explore multiple solutions. Teachers may consider providing more open-ended tasks, encouraging brainstorming sessions, and creating opportunities where different answers are accepted and discussed. By doing so, learners can develop greater confidence in expressing ideas and enhance their problem-solving skills.

4.5 The Extent of the Problem-Based Learning (PBL) Approach Utilized in Teaching Science along Integration of Real-World Problems

On the extent of the Problem-Based Learning (PBL) approach utilized in teaching Science along Integration of Real-World Problems. Based on the data, out of the ten (10) indicators, nine (9) were rated Much Utilized, and one (1) was rated Utilized. The weighted mean ranges from 3.47 to 4.42 which means from Utilized to Much Utilized. The indicators rated Much Utilized (MU) were: activities related to learners' experiences, (4.42); problems promoted decision-making and problem-solving, (4.41); lessons included problems from everyday life, (4.33); learners were encouraged to investigate real-life scenarios, (4.17); lessons connected science concepts to real-world applications, (4.11); problems required practical solutions, (3.92); lesson materials reflected authentic situations, (3.85); problems reflected current scientific issues, (3.71); and learners collaborated to solve real-life problems, (3.63). The indicator rated Utilized (U) was: lessons encouraged learners to propose solutions that can be applied in daily life, (3.47).

Table 4: The Extent of the Problem-Based Learning (PBL) Approach Utilized in Teaching Science along Integration of Real-World Problems

INDICATORS	CENTRAL SECTOR			MOUNTAIN SECTOR			SEACOAST SECTOR			AVERAGE		
	Wx	I	R	Wx	I	R	Wx	I	R	Wx	I	R
1. Lessons encouraged learners to propose solutions that can be applied in daily life.	3.57	MU	9	3.39	U	10	3.45	U	9	3.47	U	10
2. Problems reflected current scientific issues.	3.56	MU	10	4.00	MU	8	3.57	MU	8	3.71	MU	8
3. Learners collaborated to solve real-life problems.	3.87	MU	7	3.89	MU	9	3.12	MU	10	3.63	MU	9
4. Problems required practical solutions.	4.05	MU	6	4.06	MU	6	3.65	MU	7	3.92	MU	6
5. Lessons connected science concepts to real-world applications.	4.23	MU	4	4.11	MU	5	3.98	MU	5	4.11	MU	5
6. Learners were encouraged to investigate real-life scenarios.	4.12	MU	5	4.36	MU	3	4.02	MU	4	4.17	MU	4
7. Problems promoted decision-making and problem-solving.	4.52	MU	1	4.22	MU	4	4.50	VMU	1	4.41	MU	2
8. Lesson materials reflected authentic situations.	3.59	MU	8	4.01	MU	7	3.96	MU	6	3.85	MU	7
9. Activities related to learners' experiences.	4.32	MU	3	4.50	MU	1	4.44	MU	2	4.42	MU	1
10. Lessons included problems from everyday life.	4.44	MU	2	4.44	MU	2	4.12	MU	3	4.33	MU	3
Average Wx	4.03	MU		4.10	MU		3.88	MU		4.00	MU	

The highest-ranked indicator, “activities related to learners’ experiences” (4.42, Much Utilized), reveals that teaching practices are strongly anchored in learners’ real-life contexts. When lessons are connected to students’ own experiences, learning becomes more meaningful and engaging, as learners can easily relate concepts to situations they encounter in their daily lives. This approach enhances understanding and retention, while also motivating learners to actively participate. In the context of Problem-Based Learning (PBL), this indicates that teachers are effectively bridging the gap between theory and practice, allowing learners to see the relevance of science beyond the classroom.

In contrast, the lowest-ranked indicator, “lessons encouraged learners to propose solutions that can be applied in daily life” (3.47, Utilized), suggests that while real-life contexts are presented, learners may not always be given enough opportunities to actively generate and apply their own solutions. This may indicate that learners are more exposed to identifying or understanding problems rather than fully engaging in the process of creating practical solutions. It could also reflect a tendency to guide learners toward expected answers instead of encouraging independent and creative problem-solving, which is a key component of PBL.

These findings imply that while teachers are successful in contextualizing lessons and making them relevant to learners’ lives, there is still a need to strengthen opportunities for learners to apply their knowledge in more active and solution-oriented ways. According to Dela Cruz, M. T. (2022), providing more open-ended tasks, project-based activities, and real-life problem scenarios where learners can design and test their own solutions may further enhance their critical thinking and decision-making skills.

4.6 The Extent of the Problem-Based Learning (PBL) Approach Utilized in Teaching Science along Lesson Planning and Design

The data on the extent of the Problem-Based Learning (PBL) approach utilized in teaching Science along Lesson Planning and Design. Based on the data, out of eleven (11) indicators, three (3) were rated Very Much Utilized, seven (7) were rated Utilized, and one (1) was rated Utilized. The weighted mean ranges from 3.38 to 4.59 which means from Utilized to Very Much Utilized.

The indicators rated Very Much Utilized (VMU) were: lesson plans emphasized learner-centered activities, (4.59); lessons were planned around real-life problems, (4.56); and problems encouraged critical and scientific thinking, (4.53). The other indicators were rated Much Utilized (MU): activities followed a logical problem-solving sequence, (4.37); objectives were aligned with the identified problem, (4.36); materials were selected to support problem-solving, (4.24); learners explored concepts before formal explanations, (4.22); lesson plans included collaborative learning tasks, (4.21); assessments were designed to measure problem-solving skills, (4.12); and lessons incorporated opportunities for learners to propose multiple solutions, (4.04). Meanwhile, time allotment supported problem analysis and reflection was rated Utilized (U) with a mean of 3.38.

Table 5: The Extent of the Problem-Based Learning (PBL) Approach Utilized in Teaching Science along Lesson Planning and Design

INDICATORS	CENTRAL SECTOR			MOUNTAIN SECTOR			SEACOAST SECTOR			AVERAGE		
	Wx	I	R	Wx	I	R	Wx	I	R	Wx	I	R
1. Lessons were planned around real-life problems.	4.56	VMU	2	4.50	VMU	3	4.63	VMU	1	4.56	VMU	2
2. Objectives were aligned with the identified problem.	4.46	MU	9	4.11	MU	6	4.50	VMU	4	4.36	MU	5
3. Problems encouraged critical and scientific thinking.	4.51	VMU	6	4.56	VMU	2	4.51	VMU	3	4.53	VMU	3
4. Lesson plans emphasized learner-centered activities.	4.54	VMU	4	4.69	VMU	1	4.53	VMU	2	4.59	VMU	1
5. Learners explored concepts before formal explanations.	4.50	VMU	7	4.12	MU	5	4.03	MU	8	4.22	MU	7
6. Activities followed a logical problem-solving sequence.	4.44	MU	10	4.23	MU	4	4.44	MU	5	4.37	MU	4
7. Lesson plans included collaborative learning tasks.	4.53	VMU	5	4.00	MU	8	4.11	MU	7	4.21	MU	8
8. Assessments were designed to measure problem-solving skills.	4.49	MU	8	3.86	MU	9	4.02	MU	9	4.12	MU	9
9. Lessons incorporated opportunities for learners to propose multiple solutions.	4.55	VMU	3	3.69	MU	10	3.89	MU	10	4.04	MU	10
10. Time allotment supported problem analysis and reflection.	3.69	MU	11	3.12	U	11	3.32	U	11	3.38	U	11
11. Materials were selected to support problem-solving.	4.57	VMU	1	4.03	MU	7	4.12	MU	6	4.24	MU	6
Average Wx	4.44	MU		4.08	MU		4.19	MU		4.24	MU	

The highest-ranked indicator, “lesson plans emphasized learner-centered activities” (4.59, Very Much Utilized), highlights a strong commitment to placing learners at the center of the teaching-learning process. This suggests that teachers are intentionally designing lessons where students actively engage, explore, and construct their own understanding rather than passively receiving information. Alongside this, the high ratings of planning lessons around real-life problems and encouraging critical and scientific thinking further reinforce the effective integration of Problem-Based Learning (PBL). These practices create a dynamic learning environment where learners are challenged to think deeply, collaborate, and apply concepts in meaningful ways.

In contrast, the lowest-ranked indicator, “time allotment supported problem analysis and reflection” (3.38, Utilized), indicates a limitation in providing sufficient time for learners to fully process and reflect on their learning. While activities and lesson structures are well-designed, the available time may not always be enough for in-depth discussion, analysis, and reflection—key components of PBL. This could be influenced by tight class schedules, curriculum demands, or the need to cover multiple competencies within limited periods, which may result in reflection being shortened or overlooked.

These findings suggest that while lesson planning in PBL is highly effective and well-structured, there is a need to improve time management to maximize learning outcomes. As cited by Lopez, C. D. (2023), allocating more time for reflection, discussion, and deeper analysis can enhance learners’ understanding and allow them to internalize concepts more effectively. Teachers may consider adjusting pacing, integrating reflection within activities, or using flexible strategies to ensure that learners are not only engaged in solving problems but are also given ample opportunity to think about and learn from the process.

4.7 The Extent of the Problem-Based Learning (PBL) Approach Utilized in Teaching Science along Learner Collaboration and Group Work

Table 6 presents the data on the extent of the Problem-Based Learning (PBL) approach utilized in teaching Science along Learner Collaboration and Group Work. Based on the data, out of nine (9) indicators, eight (8) were rated Much Utilized, and one (1) was rated Utilized. The weighted mean ranges from 3.32 to 4.23 which means from Utilized to Much Utilized.

The indicators rated Much Utilized (MU) were: learners shared ideas and opinions during activities, (4.23); conflicts in groups were managed constructively, (4.19); learners worked in small groups or teams, (4.14); groups planned and solved problems together, (4.06); group tasks encouraged mutual support and cooperation, (4.03); learners provided constructive feedback to peers within the group, (3.65); and group outcomes were shared and discussed with the whole

class, (3.64) and learners listened respectfully to each other, (3.48). Meanwhile, the indicator rated Utilized (U) was: roles and responsibilities were clearly assigned within groups, (3.32).

Table 6: The Extent of the Problem-Based Learning (PBL) Approach Utilized in Teaching Science along Learner Collaboration and Group Work

INDICATORS	CENTRAL SECTOR			MOUNTAIN SECTOR			SEACOAST SECTOR			AVERAGE		
	<u>Wx</u>	I	R	<u>Wx</u>	I	R	<u>Wx</u>	I	R	<u>Wx</u>	I	R
1. Learners worked in small groups or teams.	4.21	MU	2	4.01	MU	5	4.20	MU	2	4.14	MU	3
2. Learners shared ideas and opinions during activities.	4.25	MU	1	4.20	MU	2	4.24	MU	1	4.23	MU	1
3. Roles and responsibilities were clearly assigned within groups.	3.25	U	9	3.46	U	8	3.26	MU	9	3.32	U	9
4. Group tasks encouraged mutual support and cooperation.	4.00	MU	5	4.06	MU	3	4.02	MU	4	4.03	MU	5
5. Learners listened respectfully to each other.	3.51	MU	8	3.42	U	9	3.50	MU	8	3.48	MU	8
6. Groups planned and solved problems together.	4.10	MU	4	4.03	MU	4	4.06	MU	3	4.06	MU	4
7. Conflicts in groups were managed constructively.	4.11	MU	3	4.45	MU	1	4.01	MU	5	4.19	MU	2
8. Learners provided constructive feedback to peers within the group.	3.59	MU	6	3.69	MU	6	3.67	MU	6	3.65	MU	6
9. Group outcomes were shared and discussed with the whole class.	3.58	MU	7	3.68	MU	7	3.66	MU	7	3.64	MU	7
Average <u>Wx</u>	3.84	MU		3.89	MU		3.85	MU		3.86	MU	

The highest-ranked indicator, “learners shared ideas and opinions during activities” (4.23, Much Utilized), reflects an active and participative learning environment where students feel comfortable expressing their thoughts. This suggests that collaboration is effectively promoted, allowing learners to contribute meaningfully to group discussions and problem-solving tasks. When learners are encouraged to share ideas, they not only deepen their own understanding but also learn from the perspectives of others. This kind of interaction is essential in Problem-Based Learning (PBL), as it strengthens communication skills and fosters collective knowledge-building.

On the other hand, the lowest-ranked indicator, “roles and responsibilities were clearly assigned within groups” (3.32, Utilized), indicates that group structure may not always be well-defined. Without clearly assigned roles, some learners may dominate tasks while others may participate less, leading to unequal contribution within the group. This can affect the overall effectiveness of collaborative learning, as PBL relies heavily on shared responsibility and teamwork. The lower rating suggests a need for more structured group management to ensure that all members are actively involved and accountable.

These findings imply that while collaboration is generally strong and learners are actively engaged in group work, there is still a need to improve how groups are organized and managed. According to Rivera, J. L. (2020), assigning specific roles, such as leader, recorder, or presenter, can help ensure balanced participation and clearer accountability. Additionally, establishing clear guidelines for group work can further enhance cooperation and productivity.

4.8 The Summary of the Extent of the of the Problem-Based Learning (PBL) Approach Utilized in Teaching Science
The summary of the extent of the Problem-Based Learning (PBL) approach utilized in teaching Science is presented in Table 7. Based on the data, all indicators were rated Much Utilized ranges from 3.79 to 4.31.

Table 7: The Summary of the Extent of the of the Problem-Based Learning (PBL) Approach Utilized in Teaching Science

INDICATORS	CENTRAL SECTOR			MOUNTAIN SECTOR			SEACOAST SECTOR			AVERAGE		
	<u>Wx</u>	I	R	<u>Wx</u>	I	R	<u>Wx</u>	I	R	<u>Wx</u>	I	R
1. Use of Assessment Strategies Aligned with PBL	3.83	MU	5	3.77	MU	5	3.78	MU	5	3.79	MU	6
2. Teacher Roles as Facilitator and Guide	4.31	MU	2	4.31	MU	1	4.31	MU	1	4.31	MU	1
3. Facilitation of Inquiry and Critical Thinking	3.84	MU	4	3.89	MU	4	3.85	MU	4	3.86	MU	4.5
4. Integration of Real-World Problems	4.03	MU	3	4.10	MU	2	3.88	MU	3	4.00	MU	3
5. Lesson Planning and Design	4.44	MU	1	4.08	MU	3	4.19	MU	2	4.24	MU	2
6. Learner Collaboration and Group Work	3.84	MU	4	3.89	MU	4	3.85	MU	4	3.86	MU	4.5
Average <u>Wx</u>	4.05	MU		4.01	MU		3.98	MU		4.01	MU	

The indicators rated Much Utilized (MU) were: teacher roles as facilitator and guide, (4.31); lesson planning and design, (4.24); integration of real-world problems, (4.00); facilitation of inquiry and critical thinking, (3.86); learner collaboration and group work, (3.86); and use of assessment strategies aligned with Problem-Based Learning, (PBL) (3.79). The highest-ranked indicator, “teacher roles as facilitator and guide” (4.31, Much Utilized), highlights the teacher’s active role in supporting learners’ exploration and understanding without directly providing answers. This approach encourages students to take ownership of their learning, promotes self-directed inquiry, and aligns closely with the principles of Problem-Based Learning. By guiding rather than instructing, teachers help learners develop critical thinking, problem-solving skills, and independence.

Conversely, the lowest-rated indicator, “use of assessment strategies aligned with PBL” (3.79, Much Utilized), suggests that while assessments are generally aligned with the PBL approach, there is still room for enhancement. Effective PBL assessment should not only measure knowledge acquisition but also evaluate problem-solving, collaboration, and critical thinking. The slightly lower rating may reflect challenges in consistently designing and implementing assessments that fully capture these multiple dimensions of learning.

These findings imply that while teachers are effectively facilitating learning and planning lessons to support inquiry and real-world application, there is a need to strengthen assessment strategies to ensure they are fully aligned with PBL goals. According to Santos, K. B. (2021), by designing assessments that measure both individual and collaborative problem-solving skills, as well as the application of critical thinking, teachers can provide more accurate feedback and enhance learners’ overall engagement and mastery of concepts.

4.9 The Test of Significant Agreement on the Rank Orders of the Extent of the Problem-Based Learning (PBL) Approach Utilized in Teaching Science

To test the significant agreement on the rank orders of the extent of the Problem-Based Learning (PBL) approach utilized in teaching Science, the researcher employed Kendall’s Coefficient of Concordance (W), and the chi-square test. Table 8 shows the result.

Table 8: The Test of Significant Agreement on the Rank Orders of the Extent of the Problem-Based Learning (PBL) Approach Utilized in Teaching Science

Indicators	Assessment Strategies Aligned with PBL	Teacher Roles as Facilitator and Guide	Facilitation of Inquiry and Critical Thinking	Integration of Real-World Problems	Lesson Planning and Design	Learner Collaboration and Group Work
Sum of squares of the difference	470	270	484	676.5	654	484
Number of Cases	9	8	9	10	11	9
Number of Groups	3	3	3	3	3	3
Coefficient of Concordance W	0.87	0.71	0.90	0.91	0.88	0.90
Computed χ^2 Value	20.88	14.91	21.60	24.57	26.4	21.60
Degree of Freedom	8	7	8	9	10	8
Tabular χ^2 value						
0.05	15.51	14.07	15.51	16.92	18.31	15.51
0.025	18.17	16.01	18.17	19.68	20.16	18.17
0.01	20.09	18.48	20.09	21.67	23.21	20.09
0.005	21.96	20.28	21.96	23.59	25.19	21.96
0.001	26.12	24.32	26.12	27.88	29.59	26.12
Decision on Alternative Hypothesis H_1	Accepted	Accepted	Accepted	Accepted	Accepted	Accepted
Significance of Agreement	0.01	0.05	0.01	0.005	0.005	0.01

Based on the statistical results, it can be seen that the computed Coefficient of Concordance W and the Computed χ^2 value yielded to: Assessment Strategies Aligned with PBL, 0.87 and 20.88, ($p < 0.01$); Teacher Roles as Facilitator and Guide, 0.71 and 14.91, ($p < 0.05$); Facilitation of Inquiry and Critical Thinking, 0.90 and 21.60, ($p < 0.01$); Integration of Real-World Problems, 0.91 and 24.57, ($p < 0.005$); Lesson Planning and Design, 0.88 and 26.4, ($p < 0.005$); and Learner Collaboration and Group Work, 0.90 and 21.60, ($p < 0.01$). Thus, the alternative hypothesis was accepted.

The findings reveal a strong and statistically significant agreement in the rank ordering of the extent of Problem-Based Learning (PBL) strategies utilized in teaching Science across public junior high schools in Sagñay District. The high values of Kendall's Coefficient of Concordance (W), particularly in the areas of Integration of Real-World Problems (0.91), Facilitation of Inquiry and Critical Thinking (0.90), and Learner Collaboration and Group Work (0.90), indicate a very strong consistency among respondents in perceiving these components as highly implemented. Even the lowest coefficient, Lesson Planning and Design (0.66), still reflects a moderate to strong level of agreement.

The corresponding chi-square values, all statistically significant at varying levels ($p < 0.05$ to $p < 0.005$), further confirm that these agreements are not due to chance. This suggests that teachers across the district share common practices and perspectives in applying PBL strategies, particularly emphasizing inquiry, collaboration, and real-world application, while slightly less uniformity is observed in planning and assessment practices.

The implications of these findings vary across the three sectors—central, mountain, and seacoast—within Sagñay District. In the central sector, where access to resources and professional development opportunities is generally more stable, the strong agreement suggests that PBL strategies are systematically and consistently implemented, which may contribute to more cohesive instructional practices. In the mountain sector, despite possible limitations in resources and accessibility, the high concordance indicates that teachers are adapting effectively and maintaining alignment with PBL principles, although targeted support in lesson planning and assessment may still be needed. Meanwhile, in the seacoast sector, the consistency in implementing collaborative and inquiry-based strategies highlights the teachers' ability to contextualize learning using real-world problems relevant to their environment; however, enhancements in structured planning and assessment strategies could further strengthen PBL implementation. Overall, the significant agreement across all sectors implies that district-wide policies and training on PBL are generally effective, but differentiated support tailored to the unique contexts of each sector would further optimize teaching practices.

4.10 The Summary of the Constraints Encountered in the Utilization of the Problem-Based Learning (PBL) Approach in Teaching Science

The summary of the constraints encountered in the utilization of the Problem-Based Learning (PBL) approach in teaching Science is presented in Table 9. Based on the data, all indicators were rated Much Serious ranges from 4.20 to 4.41. The average weighted mean is 4.34 which means that the constraints encountered in the utilization of the Problem-Based Learning (PBL) approach in teaching Science of the Public Junior High school learners is Much Serious.

Table 9: The Summary of the Constraints Encountered in the Utilization of the Problem-Based Learning (PBL) Approach in Teaching Science

INDICATORS	CENTRAL SECTOR			MOUNTAIN SECTOR			SEACDAST SECTOR			AVERAGE		
	Wx	I	R	Wx	I	R	Wx	I	R	Wx	I	R
1. Learners' Readiness and Motivation	4.27	MS	4	4.23	MS	4	4.34	MS	4	4.28	MS	5
2. Teachers' Competence and Facilitation Skills	4.22	MS	5	4.19	MS	5	4.19	MS	5	4.20	MS	6
3. Availability of Resources and Materials	4.35	MS	3	4.44	MS	1	4.45	MS	1	4.41	MS	1.5
4. Time Constraints	4.37	MS	1.5	4.43	MS	2	4.42	MS	2	4.41	MS	1.5
5. Assessment and Evaluation	4.37	MS	1.5	4.34	MS	3	4.36	MS	3	4.35	MS	4
6. Classroom Management and Group Dynamics	4.37	MS	1.5	4.43	MS	2	4.42	MS	2	4.41	MS	1.5
AVERAGE Wx	4.33	MS		4.34	MS		4.36	MS		4.34	MS	

The indicators rated Much Serious (MS) were: Availability of Resources and Materials, (4.41); Time Constraints, (4.41); Classroom Management and Group Dynamics, (4.41); Learners' Readiness and Motivation, (4.28); Assessment and Evaluation, (4.35); and Teachers' Competence and Facilitation Skills, (4.20).

The constraints that ranked highest—Availability of Resources and Materials (4.41, MS), Time Constraints (4.41, MS), and Classroom Management and Group Dynamics (4.41, MS)—reflect the critical factors that most directly impact the effective implementation of Problem-Based Learning (PBL) in Science. Adequate resources and materials are essential for conducting experiments, facilitating inquiry, and supporting hands-on problem-solving activities. Similarly, time constraints limit learners' opportunities to explore, collaborate, and reflect, while challenges in managing group dynamics can disrupt learning and reduce the effectiveness of collaborative tasks. According to Castillo, A. F. (2021), these factors are closely tied to the success of PBL, which relies on active participation, experimentation, and interaction, making them the most pressing concerns for teachers and learners.

The constraint that ranked lowest, Teachers' Competence and Facilitation Skills (4.20, MS), while still "Much Serious," suggests that, despite some challenges, teachers in the district generally possess the knowledge and ability to guide PBL activities. This lower ranking indicates that professional competence and facilitation skills, though important, are less immediate obstacles compared to structural and logistical issues such as resources, time, and classroom management. Teachers can adapt their instructional strategies and employ scaffolding techniques to overcome skill gaps, but they cannot fully compensate for the lack of materials or insufficient time for activities.

The implications of these findings point to the need for a multi-faceted approach to support PBL implementation. School administrators should prioritize providing adequate instructional materials, improving classroom infrastructure, and adjusting schedules to allow sufficient time for PBL activities. At the same time, professional development programs can further strengthen teachers' facilitation and assessment skills, ensuring that they are prepared to guide learners effectively. Addressing both high- and low-ranking constraints will enhance the overall learning environment, enabling learners to engage meaningfully in problem-solving, collaboration, and critical thinking, which are the core goals of PBL in Science education.

4.11 The Test of Significant Agreement of the Constraints Encountered in the Utilization of the Problem- Based Learning (PBL) Approach in Teaching Science

The test of significant agreement on the rank orders of the constraints encountered in the utilization of the Problem-Based Learning (PBL) approach in teaching Science is reflected in Table 18. It was determined using Kendall Coefficient of Concordance W and the computed chi- square test (χ^2). Based on the statistical results, the computed Coefficient of Concordance (W) and the chi-square (χ^2) value yielded to: Learners' Readiness and Motivation, 0.79 and 21.33, ($p < 0.025$); Teachers' Competence and Facilitation Skills, 0.87 and 23.49, ($p < 0.01$); Availability of Resources and Materials, 0.87 and 20.88, ($p < 0.01$); Time Constraints, 0.63 and 13.23, ($p > 0.05$); Assessment and Evaluation, 0.87 and

18.27, ($p < 0.01$); and Classroom Management and Group Dynamics, 0.63 and 13.23, ($p > 0.05$). Thus, the alternative hypothesis was accepted, except on Time Constraints and Classroom Management and Group Dynamics.

Table 10: The Test of Significant Agreement of the Constraints Encountered in the Utilization of the Problem- Based Learning (PBL) Approach in Teaching Science

Indicators	Learners' Readiness and Motivation	Teachers' Competence and Facilitation Skills	Availability of Resources and Materials	Time Constraints	Assessment and Evaluation	Classroom Management and Group Dynamics
Sum of squares of the difference	588.5	644.5	470	240	330	240
Number of Cases	10	10	9	8	8	8
Number of Groups	3	3	3	3	3	3
Coefficient of Concordance W	0.79	0.87	0.87	0.63	0.87	0.63
Computed χ^2 Value	21.33	23.49	20.88	13.23	18.27	13.23
Degree of Freedom	9	9	8	7	7	7
Tabular χ^2 value						
0.05	16.92	16.92	15.51	14.07	14.07	14.07
0.025	19.68	19.68	18.17	16.01	16.01	16.01
0.01	21.67	21.67	20.09	18.48	18.48	18.48
0.005	23.59	23.59	21.96	20.28	20.28	20.28
0.001	27.88	27.88	26.12	24.32	24.32	24.32
Decision on Alternative Hypothesis H_1	Accepted	Accepted	Accepted	Rejected	Accepted	Rejected
Significance of Agreement	0.025	0.01	0.01	NS	0.025	NS

The analysis of the statistical results indicates a significant agreement among respondents on most of the constraints encountered in utilizing Problem-Based Learning (PBL) in teaching Science across public junior high schools in Sagñay District. Specifically, Teachers' Competence and Facilitation Skills, Availability of Resources and Materials, Assessment and Evaluation, and Learners' Readiness and Motivation showed strong concordance, as reflected by high Kendall's W values (0.79–0.87) and significant chi-square values ($p < 0.01$ to $p < 0.025$). This suggests that across the central, mountain, and seacoast schools, teachers and learners face consistent challenges in skills, resource availability, evaluation practices, and motivation when implementing PBL. In contrast, Time Constraints and Classroom Management and Group Dynamics did not show statistically significant agreement ($p > 0.05$), indicating that these issues may vary depending on specific school contexts, such as differences in class schedules, school infrastructure, or learner composition in each sector.

The implications of these findings emphasize the need for differentiated support and interventions across the three sectors of Sagñay District. In central schools, where resources and learner readiness may be higher, targeted professional development on PBL facilitation and assessment can enhance instructional effectiveness. In mountain schools, limited materials and connectivity might require additional logistical support, such as provision of laboratory kits or offline digital resources. Meanwhile, seacoast schools may benefit from strategies addressing learner motivation and engagement, as well as creative classroom management approaches suitable for their specific environments. Addressing the high-ranking constraints while considering sectoral variations will ensure more equitable and effective PBL implementation, improving Science teaching and learning outcomes district-wide.

4.12 The Policy Recommendations

Below were the policy recommendations formulated based from the findings of the study:

1. The teachers must provide timely feedback by setting clear deadlines for evaluating tasks and using brief, actionable comments that guide learners toward improvement.
2. The master teachers should lead capacity-building workshops focused on designing PBL assessments that reflect real-world contexts.
3. The teachers must design activities that include structured reflection prompts.

4. The master teachers must conduct workshops and mentoring sessions on strategies to develop reflective skills and independent thinking in learners.
5. The teachers should consistently design learning activities that encourage learners to explore multiple possible solutions rather than focusing on a single correct answer.
6. The PSDS should ensure that instructional supervision highlights the teacher's role as a learning facilitator.
7. The teachers should design lessons that connect concepts to real-life situations.
8. The school heads should cultivate a school environment that supports collaborative and experiential learning.
9. The master teachers should guide teachers in effective lesson pacing and time management strategies that prioritize analysis and reflection.
10. The teachers should ensure that each group member has a clear role and responsibility during collaborative tasks.
11. The teachers should encourage learner independence by designing activities that require critical thinking and problem-solving before asking for help.
12. The PSDS should monitor and support the adoption of PBL strategies.
13. The school heads should advocate for adequate provision and maintenance of laboratory resources.
14. The PSDS should assist schools in monitoring and optimizing instructional time.
15. The teachers should develop strategies to provide timely and constructive feedback despite high workloads.
16. The DepEd policy makers should consider policies and funding that address infrastructure limitations.

5. Conclusion and Recommendations

This section presents the conclusions and recommendations of this study. The researcher formulated the recommendations drawn from the conclusions. The recommendations for further research are also found at the end of this part.

5.1 Conclusion

The conclusions were summarized as follows:

1. The extent of the Problem-Based Learning (PBL) approach utilized in teaching Science is Much Utilized.
2. There is a significant agreement on the rank orders of the extent of the utilization of the Problem-Based Learning (PBL) approach in teaching Science.
3. The constraints encountered in the utilization of the Problem-Based Learning (PBL) approach in teaching science are Much Serious.
4. There is a significant agreement on the rank orders of the constraints encountered in the utilization of the Problem-Based Learning (PBL) approach in teaching science except on Time Constraints and Classroom Management and Group Dynamics.
5. There are policy recommendations formulated based from the findings of the study

5.2 Recommendations

The following recommendations were drawn from the findings and conclusions of the study:

1. The teachers are encouraged to sustain its implementation while continuously enriching their approaches.
2. The school heads may institutionalize the sharing of best practices through Learning Action Cell (LAC) sessions, peer mentoring, and collaborative lesson planning.
3. The DepEd key officials should provide more adequate instructional materials, and access to laboratories and technology focused on effective PBL facilitation.
4. The teachers may adopt structured time management strategies and classroom management techniques.
5. The policy recommendations formulated based from the findings of the study be adopted.

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