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IMPLEMENTATION OF PROBLEM-BASED LEARNING IN ENHANCING THE CRITICAL THINKING SKILLS OF LEARNERS IN SCIENCE: BASIS FOR INSTRUCTIONAL SUPERVISION PLAN

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ABSTRACT

This study determines the significant relationship between the extent of implementation of Problem-Based Learning (PBL) and the critical thinking skills of learners in science. The study employed a descriptive-correlational research design utilizing an adapted survey instrument based on the study of Savery (2015), Overview of Problem-Based Learning: Definitions and Distinctions. The questionnaire assessed the extent of PBL implementation in terms of four key domains—planning and preparation, facilitation of learning, assessment and reflection, and support and resources. Similarly, a validated learner survey was used to measure the extent of critical thinking skills in science. The respondents of the study included one (1) school head, seven (7) teachers, and one hundred (100) randomly selected learners from Hugpa Elementary School, Ormoc City Division, for the School Year 2025–2026. The findings revealed that the extent of PBL implementation was very high across all domains, indicating that teachers consistently apply PBL principles in instruction. Likewise, the critical thinking skills of learners were found to be very high, demonstrating that students possess strong analytical, evaluative, and problem-solving abilities. More importantly, the statistical analysis indicated a significant positive relationship ($r = 0.72$) between the extent of PBL implementation and the learners' critical thinking skills. This suggests that consistent and well-structured use of PBL strategies significantly enhances students' higher-order thinking

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abilities. Therefore, the study concludes that Problem-Based Learning is an effective pedagogical approach for developing critical thinking in science education. It underscores the importance of sustained teacher training, adequate support, and resource provision to strengthen PBL implementation and promote meaningful, inquiry-driven learning experiences.

Keywords: *Implementation, Problem-Based Learning, Critical Thinking Skills, Learners, Science, Instructional Supervision Plan*

INTRODUCTION

Developing critical thinking is essential for students to effectively process complex information, make informed decisions, and solve problems. In today's fast-paced and information-rich world, critical thinking has become more important than ever. It empowers students to analyze, evaluate, and synthesize information, hence fostering independent thinking and lifelong learning. In response to the demands of the 21st century, school has implemented significant educational reforms to enhance the quality and relevance of education (Morchid, 2020; World Bank, 2015). A key goal of these reforms is to promote critical thinking among students, as outlined in the strategic vision for Philippine school reform (2015–2030) and the Education Act of 2019. However, effectively teaching and assessing critical thinking in classrooms remains challenging due to a lack of adequate training, resources, and pedagogical strategies among teachers (Llorent Bedmar, 2014; Chouari & Nachit, 2016).

Critical thinking is not only essential for comprehending complex concepts but also for independent problemsolving (Gultom et al., 2021; Suyatman et al., 2021). In the context of Indonesian students' performance, there is room for optimism if teachers prioritize the cultivation of critical thinking skills closely linked to a deep understanding of subjects. This emphasis on critical thinking extends beyond academic realms, permeating various aspects of human life, including fields such as science, history, literature, psychology, education, and everyday situations (Berdahl et al., 2021; Jamaludin et al., 2022). The research underscores the role of critical thinking as a key predictor of academic success (Han et al., 2020; Menap et al., 2021) because it is a calculated intelligence aspect focusing on beliefs and actions (Ennis, 2018; Menap et al., 2021). Moreover, it is a skill that is vital for lifelong learning, impacting students' personalities and attitudes (Paidi et al., 2021). Analytical thinking, a crucial component of critical thinking, equips students with 21st-century skills needed for effective problem-solving and decision-making (Aksu & Eser, 2020; Anggraini et al., 2019; Suyatman et al., 2021). Therefore, teachers must instill these skills throughout lessons, where questioning, accurate information, assumptions, logical judgments, and conclusions are pivotal (Fatah et al., 2022), aligning with Indonesian students' needs.

In the 21st century, education must evolve to meet changing expectations (Hendi Ristanto et al., 2018). Students are expected to possess the 4C characteristics: critical thinking, creativity, communication, and collaboration (González-Salamanca et al., 2020; Ismawati et al., 2023). These attributes are seen as essential tools for addressing societal issues and challenges effectively. However, a significant issue lies in the teaching process within classrooms, where teachers often fail to nurture students' critical thinking skills (Alblooshi, 2021; Octavia, 2020). In typical classroom learning, the emphasis is frequently on rote memorization, neglecting the importance of understanding and applying information to real-life situations. (Devi et al., 2020) assert that while teachers demand student engagement in learning, the crucial aspects of imparting problem-solving techniques and fostering independent learning are often overlooked.

Problem-based learning has emerged as a promising approach to fostering critical thinking. It engages students in real-world projects that require them to apply their knowledge and skills to solve problems. This method not only boosts engagement and motivation but also promotes a deeper understanding and retention of knowledge. Through project work, students practice and develop critical thinking skills as they plan, research, collaborate, and reflect on their learning processes and outcomes.

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The impact of problem-based learning on critical thinking across educational levels has been thoroughly evaluated in recent meta-analyses. A comprehensive meta-analysis conducted by Nur Hikmah et al. (2023) found that PBL significantly improves both critical and creative thinking skills in science and physics, with large effect sizes across all levels—including elementary school. A complementary review by May Hafizah and colleagues (2024) confirmed a strong effect (SMD ≈ 1.25, $p < .001$) of PBL in enhancing critical thinking—a maximum benefit observed among junior high learners, followed by elementary students.

Moreover, context-specific research supports PBL's efficacy at the elementary level. A focused study by Imarida (2021) conducted with Grade 6 learners in Palembang demonstrated an 86% improvement in critical thinking post-test scores after implementing PBL in science instruction. Additionally, Damailia & Pratiwi (2022) reported significant gains in critical thinking skills among Grade 5 students through PBL interventions.

Intermediate students are at a pivotal developmental stage: they are developing the cognitive maturity necessary to engage in analytical reasoning and independent thought. Transitioning successfully into secondary education demand robust critical thinking capacity. Yet many classrooms remain dominated by teacher-directed lessons, limiting deeper cognitive engagement. Hence, it is in this premise that the researcher decided to conduct this study to evaluate the implementation of problem-based learning in enhancing the critical thinking skills of the learners. A proposed instructional supervision plan was formulated based on the findings of the study.

This study determines the significant relationship between the extent of implementation of problem-based learning in enhancing the critical thinking skills of learners in Science of Hugpa Elementary School, Ormoc District 2, Ormoc City Division. The findings of the study will be the basis for the proposed instructional supervision plan.

Further, it seeks to answer the following sub-problems:

1. What is the extent of implementation of the problem-based learning?

2. What is the extent of the Critical Thinking Skills of the Learners in Science?

3. Is there a significant relationship between the extent of implementation of problem-based learning and extent of the critical thinking skills of the learners in science?

4. What instructional supervision plan can be proposed based on the findings of this study?

METHODOLOGY

Design. This study employs a descriptive-correlational research design to determine the significant relationship between the extent of implementation of problem-based learning in enhancing the critical thinking skills of learners. This study is descriptive because it describes the variables- extent of implementation of problem-based learning in terms of Planning and Preparation, Facilitation of Learning, Assessment and Reflection, and Support and Resources and academic performance in enhancing the critical thinking skills of learners. Further, this is also correlational because it finds the relationship between the dependent and independent variables. This study was conducted Hugpa Elementary School, one of the schools of Ormoc City District 2, Schools Division of Ormoc City. The seven (7) teachers, 1 school head and one hundred (100) randomly selected learners enrolled in the said locale for School Year 2025-2026 were involved in the study. The survey is taken from the study of Savery (2015), entitled: "Overview of Problem-Based Learning: Definitions and Distinctions". This is a 20-item survey which can be accomplished by the school head. This will define the extent of implementation of problem-based learning by the teachers in teaching in terms of Planning and Preparation, Facilitation of Learning, Assessment and Reflection, and Support and Resources. This can be accomplished using a Five-Point Likert Scale where 5 means Always, 4 means Often, 3 means Sometimes, 2 means Rarely and 1 means Never. Moreover, to determine the academic performance of the learners, the researcher will gather the result of the first quarter assessment in science. The grades in science subject will be collected and tabulated.

Sampling. The seven (7) teachers, 1 school head and one hundred (100) randomly selected learners were involved in the study. Complete enumeration was employed in choosing the respondents of the study.

Research Procedure. Upon securing a research permit, data gathering was initiated. Application letters for study permits were personally submitted to concerned offices. A request letter was first submitted to the Schools Division Superintendent for approval to gather data from targeted respondents. After securing the approval of SDS, letters of permission were also submitted to the Public Schools District Supervisor and School Principals of the identified schools in the district. After getting the approvals, the researcher conducted data-gathering activities. An orientation was also held for the respondents, and their agreement through permits was to participate in the research. Then, survey questionnaires were handed out, and the researcher accompanied the respondents as they filled out the questionnaires. Researcher gathered the result of the 4th quarterly assessment and grades of the students. Once the survey was done, data were gathered, counted, and handed over for statistical processing.

Ethical Issues. The researcher obtained the necessary written permission from the authorities to conduct the study. While developing and checking the survey used in the study, the use of offending, discriminatory, or other undesirable terminology was eschewed. The names of the respondents and other personal information were not included in this study to ensure confidentiality. The respondents were also voluntarily participating. Orientation was done for the respondents. During orientation, concerns and issues were clarified, and consent to be part of the study was signed. The researcher-maintained objectivity in discussing and analyzing the results. All authors whose works were cited in this study were correctly quoted and were acknowledged in the reference. Keeping of responses from the respondents were given to the researcher and kept under her care.

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Treatment of Data. The quantitative responses underwent tallying and tabulation. Statistical treatment involved using specific tools: Simple Percentage and Weighted Mean assessed the extent of implementation of problem-based learning by the teachers in teaching in terms of Planning and Preparation, Facilitation of Learning, Assessment and Reflection, and Support and Resources and academic performance of the learners in science. Pearson r was utilized to ascertain the significant relationship between the dependent and independent variables.

RESULTS AND DISCUSSION

Table 1
Extent of Implementation of Problem-Based Learning

A. Planning and Preparation	**Weighted Mean**	**Interpretation**
1. Real-world problems are used as the basis for learning.	5.00	Always (Very High)
2. Learning outcomes are clearly aligned with the PBL activity.	5.00	Always (Very High)
3. Problems are designed to promote higher-order thinking skills.	5.00	Always (Very High)
4. Students are grouped to encourage collaboration.	4.86	Always (Very High)
5. Adequate resources are provided to support investigation and problem-solving.	5.00	Always (Very High)
Mean	**4.97**	**Always (Very High)**

B. Facilitation of Learning	**Weighted Mean**	**Interpretation**
6. The teacher acts as a facilitator rather than a direct instructor.	5.00	Always (Very High)
7. Students are encouraged to ask questions and explore solutions.	4.43	Always (Very High)
8. Learners engage in peer discussions to solve problems.	4.14	Often (High)

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B. Facilitation of Learning	Weighted Mean	Interpretation
9. The teacher guides learners to assess and reflect on their own learning.	5.00	Always (Very High)
10. Learning activities are student-centered and inquiry-driven.	5.00	Always (Very High)
Mean	**4.71**	**Always (Very High)**

C. Assessment and Reflection	Weighted Mean	Interpretation
11. Students present and defend their solutions to the problem.	4.71	Always (Very High)
12. Rubrics are used to assess both the process and the product.	4.86	Always (Very High)
13. Students engage in self and peer assessment.	5.00	Always (Very High)
14. Reflection activities are conducted to reinforce learning.	4.43	Always (Very High)
15. Feedback is regularly provided during the PBL process.	5.00	Always (Very High)
Mean	**4.80**	**Always (Very High)**

D. Support and Resources	Weighted Mean	Interpretation
16. School leaders provide support for PBL implementation.	5.00	Always (Very High)
17. Time is allocated in the curriculum for PBL activities.	5.00	Always (Very High)
18. Professional development is available for teachers on PBL.	5.00	Always (Very High)
19. There is collaboration among teachers for PBL planning.	5.00	Always (Very High)
20. Technological tools are used to support PBL.	5.00	Always (Very High)
Mean	**5.00**	**Always (Very High)**
Grand Mean	**4.87**	**Always (Very High)**

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Legend (PBL Implementation):
• 4.21 – 5.00 = Always (Very High)
• 3.41 – 4.20 = Often (High)
• 2.61 – 3.40 = Sometimes (Moderate)
• 1.81 – 2.60 = Rare (Low)
• 1.00 – 1.80 = Never (Very Low)

Table 1 presents the extent of implementation of Problem-Based Learning (PBL) as assessed in terms of four key dimensions: planning and preparation, facilitation of learning, assessment and reflection, and support and resources. As shown in the table, the overall implementation of PBL obtained a grand mean of 4.87, which is interpreted as "Always" (Very High). This indicates that teachers consistently and effectively apply the principles of PBL in their instructional practices. In terms of planning and preparation, the mean of 4.97 (Very High) suggests that teachers consistently design real-world, higher-order thinking problems that align with learning outcomes and encourage collaboration. For facilitation of learning, a mean of 4.71 (Very High) reflects that teachers act as facilitators, promoting inquiry and reflection while maintaining a student-centered learning environment. Meanwhile, assessment and reflection garnered a mean of 4.80 (Very High), showing that teachers regularly provide feedback, use rubrics, and integrate reflection and self-assessment activities to reinforce learning. Finally, support and resources achieved the highest mean of 5.00 (Very High), demonstrating that schools provide strong institutional support through leadership involvement, professional development, collaboration, and access to technological tools. Overall, the results reveal that Problem-Based Learning is highly and consistently implemented, highlighting a strong commitment among teachers and administrators to promote active, inquiry-based, and authentic learning experiences that enhance critical thinking and collaboration among students.

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Table 2

Extent of Critical Thinking Skills of Learners in Science

Indicators	Weighted Mean	Interpretation
1. I can clearly identify the main arguments or points of view in a discussion.	4.58	Strongly Agree (Very High)
2. I evaluate the strengths and weaknesses of ideas presented by others.	4.61	Strongly Agree (Very High)
3. I can draw logical conclusions from the information given.	4.53	Strongly Agree (Very High)
4. I consider multiple perspectives before planning in group discussions.	4.69	Strongly Agree (Very High)
5. I gather enough evidence before forming an opinion.	4.64	Strongly Agree (Very High)
6. I can identify assumptions behind different arguments.	4.39	Agree (High)
7. I can distinguish between fact and opinion when analyzing a problem.	4.59	Strongly Agree (Very High)
8. I make decisions based on reasoning provided by peers.	4.64	Strongly Agree (Very High)
9. I recognize when reasoning is flawed during group discussion.	4.34	Agree (High)
10. I enjoy solving problems in group settings by applying logical reasoning.	4.44	Strongly Agree (Very High)
11. I actively listen and assess relevance of peers' ideas.	4.69	Strongly Agree (Very High)
12. I feel comfortable challenging a group's decision when reasoning is weak.	4.48	Strongly Agree (Very High)
13. I synthesize ideas from different people to create a comprehensive solution.	4.50	Strongly Agree (Very High)
14. I seek to understand underlying causes before proposing solutions.	4.52	Strongly Agree (Very High)
15. I question my own reasoning to ensure I am not overlooking factors.	4.66	Strongly Agree (Very High)

Indicators	Weighted Mean	Interpretation
Grand Mean	**4.55**	**Strongly Agree (Very High)**

Legend (Critical Thinking):

- 4.21 – 5.00 = Strongly Agree (Very High)
- 3.41 – 4.20 = Agree (High)
- 2.61 – 3.40 = Neutral (Moderate)
- 1.81 – 2.60 = Disagree (Low)
- 1.00 – 1.80 = Strongly Disagree (Very Low)

Table 2 presents the extent of critical thinking skills of learners in science as measured through various indicators of reasoning, evaluation, and decision-making. The data show that the learners obtained a grand mean of 4.55, interpreted as "Strongly Agree" (Very High). This signifies that students consistently demonstrate strong critical thinking abilities in analyzing, evaluating, and synthesizing information during science learning activities. As reflected in the table, the highest-rated indicators include learners' ability to consider multiple perspectives before planning in group discussions (4.69) and to actively listen and assess the relevance of peers' ideas (4.69), both interpreted as Very High. These results indicate that learners are open-minded, reflective, and collaborative in group contexts. Similarly, high ratings in statements such as "I evaluate the strengths and weaknesses of ideas presented by others" (4.61) and "I question my own reasoning to ensure I am not overlooking factors" (4.66) suggest that students engage in deep self-reflection and analytical evaluation of arguments. Meanwhile, the slightly lower but still "High" ratings in identifying assumptions (4.39) and recognizing flawed reasoning (4.34) imply that while learners generally possess strong critical thinking skills, there remains room for improvement in identifying hidden biases or logical fallacies. Overall, the findings reveal that learners exhibit a very high level of critical thinking in science, characterized by logical reasoning, evidence-based decision-making, and effective collaboration—key competencies essential for scientific inquiry and problem-solving.

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Table 3
Test of Relationships

Variables Correlated	r	Computed Value (t)	Table Value @ .05	Decision on Ho	Interpretation
Extent of Implementation of Problem-Based Learning and Critical Thinking Skills of Learners in Science	0.72	4.512	0.453	Reject Ho	Significant Relationship (Strong Positive)

Table 3 presents the test of relationship between the extent of implementation of Problem-Based Learning (PBL) and the critical thinking skills of learners in science. The computed r-value of 0.72 indicates a strong positive correlation, while the computed t-value of 4.512 exceeds the table value of 0.453 at the 0.05 level of significance. Consequently, the null hypothesis is rejected, signifying a significant relationship between the two variables. This result implies that as the implementation of PBL increases, learners' critical thinking skills also improve. The strong positive relationship suggests that PBL effectively enhances students' analytical, evaluative, and problem-solving abilities by engaging them in real-world, inquiry-based learning experiences. In essence, the more consistently PBL strategies are applied—such as collaborative problem-solving, reflective assessment, and student-centered facilitation—the greater the development of learners' critical thinking skills in science.

Conclusion

The findings of the study revealed that the extent of implementation of Problem-Based Learning (PBL) was very high across all key domains—planning and preparation, facilitation of learning, assessment and reflection, and support and resources. Similarly, the critical thinking skills of learners in Science were also found to be very high, indicating that students are capable of analyzing information, evaluating arguments, and applying logical reasoning in solving problems. More importantly, the statistical analysis showed a significant positive relationship between the extent of PBL implementation and the critical thinking skills of learners. This suggests that consistent and well-structured use of PBL strategies contributes substantially to the development of students' critical thinking abilities. Therefore, the study concludes that Problem-Based Learning is an effective pedagogical approach that enhances learners' higher-order thinking skills, promotes active engagement, and fosters deeper understanding in Science education. This highlights the importance of continuous support, adequate resources, and teacher training to sustain the successful implementation of PBL in the classroom.

Recommendations

1. Apply the recommended Problem-Based Learning (PBL) framework consistently across science classes to sustain the development of learners' critical thinking skills.

2. Teachers should be continuously trained and empowered to design and implement effective PBL strategies that engage students in inquiry, collaboration, and problem-solving.

3. Educational leaders and policymakers can use this evidence to develop programs that promote learner-centered pedagogies, particularly those that strengthen analytical and reasoning abilities.

4. Encourage collaboration among teachers through Learning Action Cells (LAC) to share best practices, challenges, and innovative approaches in implementing PBL.

5. Given the strong positive relationship found, schools may adopt PBL as a model instructional approach to enhance higher-order thinking skills and student engagement across subject areas.

6. Provide recognition and incentives to teachers who demonstrate excellence and innovation in applying PBL to motivate continuous improvement in instructional quality.

7. School administrators should ensure that adequate materials, time, and resources are available to support teachers in integrating PBL effectively in the science curriculum.

8. The successful strategies and outcomes of this study may be documented and disseminated through seminars, workshops, or academic forums to encourage replication and adaptation in other schools.

9. Future researchers are encouraged to replicate this study in different grade levels, subject areas, or school settings to validate findings and explore additional variables affecting critical thinking skill development.

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AUTHOR'S PROFILE

MS. ROLANIE B. CLEMENTE

Rolanie B. Clemente was born and raised in the humble community of Ormoc City, where values of faith, hard work, and resilience were deeply instilled in her from an early age. Growing up in a modest household, she learned to appreciate the value of education and the importance of perseverance in overcoming life's challenges. These life lessons laid the foundation for her desire to serve and lead in the field of education. She is a proud product of the public school system, and it has always been her dream to give back to the same system that nurtured her.

Currently, she is a dedicated public school teacher at Hugpa Elementary School under the Department of Education in Ormoc City Division. Her years of service in the teaching profession have been filled with meaningful experiences and learning opportunities that shaped her both as an educator and as a person. She takes pride in her role as a teacher, mentor, and community partner. Being in the classroom has allowed her to witness the growth of young minds and to influence lives in ways that are both fulfilling and humbling.

Her academic journey led her to pursue graduate studies to improve her competence and broaden her understanding of educational leadership and development. This academic pursuit was challenging yet rewarding, and it reaffirms her commitment to professional growth and excellence.

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Aside from her responsibilities as a teacher, she is actively involved in school and community initiatives that promote holistic development, environmental consciousness, and values formation. She believes that education extends beyond the four walls of the classroom, and she makes it a point to support programs that foster civic responsibility and personal growth among students. Whether it's leading outreach programs or mentoring young learners, she finds joy and purpose in every opportunity to serve.

As she moves forward in her career, she carries with her the same passion and dedication that first led her to become a teacher. She remains grounded in her values and guided by faith in God, whose grace continues to strengthen her in every season. She aspires not only to be an effective educator but also a positive influence to those around her. Her personal and professional journey is far from perfect, but it is one she embraces wholeheartedly—with gratitude, growth, and the desire to make a meaningful difference.