

Analysis of Marine Wealth and Environmental Awareness Teaching Through Problem Base Learning (PBL) Model in Elementary Grades

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ABSTRAK

Pemahaman kekayaan laut dan kesadaran lingkungan di sekolah dasar (SD) perlu ditanamkan sejak dini dalam rangka menjaga dan melestarikan kekayaan laut nusantara. Penelitian ini bertujuan untuk mengetahui pemahaman peserta didik kelas rendah di SDN 9 Kabila Bone Kabupaten Bone Bolango Provinsi Gorontalo terkait dengan kekayaan laut dan kesadaran lingkungan, sebelum dan sesudah dilakukan treatment (pengajaran kekayaan laut dan kesadaran lingkungan melalui model Problem Based Learning). Jenis penelitian yang digunakan yaitu penelitian kuantitatif dengan desain penelitian eksperimental (*one grup*). Populasi pada penelitian ini adalah perwakilan dari kelas rendah yaitu kelas satu, dua, dan tiga yang diambil secara acak (*random sampling*) yang berjumlah 8 peserta didik setiap kelas sehingga total keseluruhan berjumlah 24 peserta didik. Hasil penelitian menunjukkan model Problem Base Learning (PBL) efektif dalam meningkatkan pemahaman serta hasil belajar peserta didik materi kekayaan laut dan kesadaran lingkungan kelas rendah di SDN 9 Kabila Bone. Hal ini ditunjukkan dengan peningkatan skor rata-rata peserta didik dari 53,750 pada pretest menjadi 83,125 pada posttest. Selanjutnya, jumlah peserta didik yang mencapai penguasaan pembelajaran meningkat dari 7 peserta didik (29%) menjadi 20 peserta didik (83,3%). Skor N-Gain 0,67 hal ini menunjukkan dalam kategori efektif.

Kata Kunci: Model Problem Base Learning; Kekayaan Laut; Kesadaran Lingkungan

ABSTRACT

Understanding of marine wealth and environmental awareness in elementary schools (SD) needs to be instilled from an early age in order to maintain and preserve the archipelago's marine wealth. This study aims to determine the understanding of low-grade students at SDN 9 Kabila Bone, Bone Bolango Regency, Gorontalo Province related to marine wealth and environmental awareness, before and after treatment (teaching marine wealth and environmental awareness through the Problem Based Learning model). The type of research used is quantitative research with an experimental research design (*one group*). The population in this study is representative of the lower classes, namely grades one, two, and three which were taken randomly (*random sampling*) which amounted to 8 students per class so that the total number of students was 24 students. The results of the study showed that the Problem Base Learning (PBL) model was effective in improving students' understanding and learning outcomes of marine wealth materials and environmental awareness in the lower classes at SDN 9 Kabila Bone. This is shown by the increase in the average score of students from 53,750 in the pretest to 83,125 in the posttest. Furthermore, the number of students who achieved learning mastery increased from 7 students (29%) to 20 students (83.3%). An N-Gain score of 0.67 indicates that it is in the effective category.

Keywords: Problem Base Learning Model; Marine Wealth; Environmental Awareness

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INTRODUCTION

Basic education has a very important role in shaping knowledge, attitudes, and skills as a provision to face various life challenges in the future. One of the goals of basic education is to instill an understanding of the surrounding environment and build students' awareness to maintain and preserve it. At the elementary school level, learning not only focuses on mastering academic concepts, but also on building characters who care about the environment. In the context of coastal areas such as Bone Bolango Regency, Gorontalo Province, understanding of marine wealth and environmental awareness is a very important aspect to be instilled from an early age in students. The sea is a natural resource that has great potential in supporting people's lives, both in terms of economy, social, culture, and ecology. Therefore, students need to have a good understanding of marine wealth and awareness to preserve the coastal and marine environment (Rahmadi et al., 2025).

Indonesia is known as a maritime country that has a very large sea area with high biodiversity. Various marine resources such as fish, coral reefs, seagrasses, mangroves, and various other types of marine life are natural resources that must be maintained in sustainability. However, various environmental problems such as marine pollution, coral reef damage, unenvironmentally friendly fishing, and increasing plastic waste in the waters are serious threats to the sustainability of marine ecosystems. This condition shows that efforts to preserve the marine environment are not only the responsibility of the government and the community, but also need to be instilled through education from an early age. Elementary schools are one of the strategic means to foster understanding and environmental awareness in students through a meaningful learning process (Utomo et al., 2025).

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One of the learning models that can be used to overcome these problems is Problem Based Learning (PBL). Problem Based Learning is a student-centered learning model by using real problems as a starting point for learning. According to experts, PBL encourages students to actively seek information, analyze problems, discuss, and find solutions to the problems given. Through this process, students not only gain knowledge, but also develop critical thinking skills, problem-solving skills, cooperative skills, and an attitude of responsibility towards the surrounding environment (Husna et al., 2025).

The application of the Problem Based Learning model to marine wealth and environmental awareness materials is considered very relevant because these materials are closely related to the daily lives of students, especially those living in coastal areas. In learning, teachers can present various real environmental problems, such as coastal pollution due to plastic waste, reduced fish populations, coral reef damage, or the importance of maintaining a clean coastal environment. These problems then become the subject of discussion and investigation for students to find the causes, impacts, and solutions that can be done. Thus, learning becomes more contextual, interesting, and meaningful so that it can increase students' understanding of the material learned (Parvati, 2025)

In addition to increasing understanding of concepts, the Problem Based Learning model also has the potential to increase students' environmental awareness. Environmental awareness is an attitude of care and individual responsibility towards environmental conservation efforts. This awareness is not enough to be built through the provision of information alone, but requires a learning experience that allows students to interact directly with various environmental problems that occur around them. Through PBL, students are invited to identify environmental problems, analyze their impact on human life and other living things, and formulate actions that can be taken to overcome them. The learning experience is expected to form a stronger and more sustainable attitude of caring for the environment (Amelia et al., 2025).

SDN 9 Kabila Bone is one of the elementary schools in Bone Bolango Regency, Gorontalo Province. The school's location close to the coastal area provides a great opportunity to integrate learning about marine wealth and environmental awareness into learning activities. However, based on the results of initial observations, there are still several problems found in the learning process. Low-grade students show varying levels of understanding of the marine wealth in their area. Some students have not been able to explain the types of marine resources, their benefits for people's lives, and the importance of preserving the marine environment. In

addition, environmentally caring behaviors such as disposing of garbage in place, maintaining the cleanliness of the school environment, and reducing the use of single-use plastics still need to be improved (Laliyo et al., 2023)

This condition shows that a learning approach is needed that is able to increase students' understanding while building environmental awareness from an early age. The Problem Based Learning model is seen as an alternative that can answer these needs because it provides opportunities for students to learn through real experience and problem-solving. Student-centered learning is expected to increase students' active involvement so that concepts about marine wealth can be better understood. On the other hand, the involvement of students in analyzing and solving environmental problems can foster awareness and responsibility for environmental conservation (Sri Maryati et al., 2024)

Various previous studies have shown that the application of Problem Based Learning can improve learning outcomes, critical thinking skills, and environmental care attitudes of students. However, research that specifically examines the influence of the Problem Based Learning model on the understanding of marine wealth materials and environmental awareness in elementary school students is still relatively limited, especially in the Bone Bolango Regency area. Most of the research is conducted at the secondary education level or focuses on specific subjects. Therefore, this study has a novelty value because it examines the application of the Problem Based Learning model in elementary school students with a focus on marine wealth and environmental awareness materials that are relevant to the characteristics of coastal areas

Based on this description, it can be understood that understanding of marine wealth and environmental awareness is an important aspect that needs to be instilled since basic education. The problem of low student understanding and lack of optimal environmental awareness requires a solution through the application of innovative and contextual learning models. Problem Based Learning offers a learning approach that allows learners to learn actively through solving real problems related to the surrounding environment. Therefore, this study was conducted to determine the influence of the Problem Based Learning (PBL) model in improving students' understanding of marine wealth materials and environmental awareness in the lower class at SDN 9 Kabila Bone, Bone Bolango Regency, Gorontalo Province. The results of this research are expected to contribute to the development of learning in elementary schools, especially in improving the quality of environmental education and the use of the local potential of coastal areas as a meaningful learning resource.

METHOD

The method used in this study is a quantitative method with a one-group design. The total population was 24 students consisting of representatives of three classes taken randomly (*random sampling*), namely grades one, two, and three, each amounting to 8 students which were then united into one group called a low class and then used as an experimental class. This study uses a pre-experimental design, especially a pretest-posttest design of one group.

According to Sugiyono (2023), the design of a pretest–posttest for one group can be illustrated as follows:

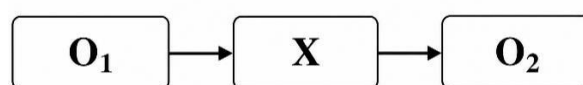


Figure 1. One Group Pretest-Posttest Design

Where:

1. O₁ = Pretest (measurements taken before treatment)
2. X = Treatment (Teaching of marine wealth and environmental awareness using model PBL)
3. O₂ = Posttest (measurements are taken after treatment)

In this design, students are given a pretest before treatment to determine their initial level of understanding. After the implementation of treatment, a posttest was given to measure changes in learning outcomes. The difference between pretest and posttest scores is used to determine the effect of treatment on student learning outcomes. The variables in this study consist of independent variables, namely the Problem Base Learning learning model and dependent variables, namely students' understanding of marine wealth materials and environmental awareness.

The instruments of this research are the prestes test and posttest in the form of multiple-choice questions and essays given to measure students' understanding of marine wealth and environmental awareness. Data is collected through pretest, posttest, and documentation. The research procedure includes five stages, namely the preparation stage, the pretest stage, the treatment stage (teaching marine wealth and environmental awareness using the Problem Base Learning (PBL) model, the posttest stage, and the final stage, namely data analysis and conclusion drawn.

The data were analyzed using descriptive statistics to determine their understanding

of marine wealth and saturation awareness. Increase is measured using a Normalized Gain (N-Gain) score.

RESULTS AND CONCLUSIONS

Results

This research was conducted at SDN 9 Kabila Bone in the lower class with a total of 24 respondents consisting of grades one, two, and three which were taken randomly (random sampling), in one class consisting of 8 students. The data on learning outcomes was obtained through a pretest given before treatment and a posttest given after treatment, in this case teaching related to marine wealth and environmental awareness through the Problem Base Learning (PBL) learning model.

Table 1. Descriptive Statistics of Pretest and Posttest Scores

Statistics	Pretest	Posttest
Total Sample	24	24
Highest Score	75	100
Lowest Score	35	55
Average Score	53.750	83.125

Table 1 presents descriptive statistics of students' pretest and posttest scores. The results showed that the average pretest score was 53,750, while the average posttest score increased to 83,125. The highest score increased from 75 on the pretest to 100 on the posttest, while the lowest score increased from 35 to 55. These findings show an improvement in students' cognitive learning outcomes after teaching related to marine wealth and environmental awareness through the PBL model. The increase in the average score, as well as the increase in the highest and lowest scores, showed that students experienced an increase in better understanding related to the concept of marine wealth and environmental awareness after treatment.

Table 2. Mastery of Learning in Pretest and Posttest

Category	Pretest (Frequency)	Prates (%)	Posttest (Frekuensi)	Posttest (%)
Already mastered	7	29%	20	83,3%
Not yet mastered	17	70,8%	4	16,7%

Students are considered to have achieved mastery of learning if they obtain **a score of ≥ 75** , in accordance with the Minimum Completeness Criteria (KKM) at school.

Table 2 shows the level of students' mastery of learning before and after the teaching of marine wealth and environmental awareness. Before treatment, only 7 students (29%) have successfully met the KKM, while 17 students (70%) have not met the minimum completeness criteria (KKM).

After the teaching of marine wealth and environmental awareness, the number of students who master learning increased to 20 students (83.3%), while the number of students who have not mastered learning decreased to 4 students (16.7%). These findings show a substantial increase in students' mastery of learning after participating in learning activities.

The increase in the percentage of students who achieved mastery from 29% to 83.3% shows that the teaching of marine wealth and environmental awareness contributes positively to students' learning outcomes. Learning activities provide opportunities for students to be actively involved in the learning process which causes learning outcomes to increase.

Table 3. N-Gain Score

Category N-gain overnight	
0.67	Medium

Table 3 presents the results of the N-Gain analysis used to measure the improvement of students' cognitive learning outcomes after teaching marine wealth and environmental awareness. The analysis showed an average N-Gain score of 0.67 which was in the medium category. These results show that students experience a moderate level of improvement in their understanding of the topic of the influence of the Problem Base Learning (PBL) model in improving students' understanding of marine wealth materials and environmental awareness, in the lower grades at SDN 9 Kabila Bone, Gorontalo Province. The N-Gain score shows that the learning treatment is effective in improving the cognitive achievement of students as evidenced by the increase in pre-treatment grades compared to post-treatment grades.

These findings show that teaching marine wealth and environmental awareness provides a meaningful learning experience and helps learners develop conceptual understanding related to marine wealth and environmental awareness. Through this research

activity, students are encouraged to identify problems, formulate strategies and determine rarities as solutions that can be taken, by connecting concepts with strategies so that students can achieve measurable improvement in learning outcomes. Therefore, the teaching of marine wealth and environmental awareness through the PBL model is considered effective in improving the achievement of students' cognitive learning outcomes.

Discussion

The findings of this study show that the influence of the problem base learning (PBL) model in improving students' understanding of marine wealth materials and environmental awareness in the lower classes at SDN 9 Kabila Bone, Gorontalo Province has a positive effect on student learning outcomes. This is evidenced by the increase in the average score of students from 53,750 in the pretest to 83,125 in the posttest. Furthermore, the number of students who achieved learning mastery increased from 7 students (29%) in the pretest to 20 students (83.3%) in the posttest. These results show that the learning model applied in this study is effective in improving students' understanding of the subject matter.

The improvement in learning outcomes occurs because students are given the opportunity to be actively involved in the learning process. Students do not only receive information from teachers; But they are guided to understand the problem by identifying relevant information in the given tasks, especially those related to marine wealth and environmental awareness material which further formulates rarities that can be taken as solutions in research.

This improvement in learning outcomes is in line with Arends' (2012) theory. According to Arends, Problem Based Learning is a learning model designed to help students develop high-level thinking skills, problem-solving skills, independent learning, and gain knowledge through the investigation of authentic problems. Furthermore, Duch's theory (1995). According to Duch Problem, Based Learning is a learning method that uses real problems as a context so that students learn to think critically, solve problems, and at the same time obtain important concepts from the material studied.

Theory of Comprehension. According to Anderson and Krathwohl (2001), understanding is the ability to explain the meaning of a concept. Comprehension indicators include, interpreting, exampleing, classifying, summarizing, summarizing, comparing, and explaining. This theory can be used as an indicator to measure students' understanding of

marine resources, marine ecosystems, Indonesia's marine potential, and environmental conservation.

The Theory of Marine Wealth. Ocean Literacy (Cava et al., 2005). According to Cava et al. (2005). Ocean Literacy is a person's understanding of the influence of the ocean on humans and the influence of humans on the sea. The principles of Ocean Literacy include the ocean as a life system, marine biodiversity, the use of marine resources, human relations with the sea, and the responsibility to maintain marine sustainability. This theory is very suitable as the basis for the preparation of indicators of marine wealth material.

Environmental Awareness Theory. Roth (1992) According to Roth (1992), environmental awareness is a person's ability to understand environmental conditions and show responsible behavior towards the environment. The indicators include environmental knowledge, environmental attitudes, care, and real actions. Furthermore, the theory of Hungerford & Volk (1990) According to Hungerford and Volk, environmental education aims to produce behavior that is responsible for the environment through knowledge, skills, attitudes, and willingness to act. This theory is very relevant as the basis of the variable of environmental awareness.

Furthermore, the findings of this study are in line with the results of research conducted by Dewi & Prastiwi (2024) with *the title* The Influence of LKPD based on the Problem Based Learning model to train students' environmental conservation awareness on environmental change materials. Research Results The use of PBL-based LKPD significantly increases environmental conservation awareness. The experimental group obtained a level of consciousness of around 80%, higher than the control group (57%) (Dewi and Pratiwi, 2024).

The research conducted by Pattimura, Leasa, & Batlolona (2025) with the title effects of problem-based learning on elementary students' scientific literacy a quasi-experimental study. The results of the PBL research significantly increased the science literacy of elementary school students in ecosystem materials compared to teacher-centered learning. Learning that uses authentic problems makes it easier for students to understand scientific concepts (Dadiara et al., 2026).

The research conducted by Exa & Daryanto (2026) with the title The Application of the Problem Based Learning model assisted by socio scientific issue (SSI) to increase environmental awareness in the learning of IPA students in grade V of Elementary School. The results of the research through classroom action research, the application of PBL based on socio-scientific issues succeeded in increasing students' environmental awareness.

Improvements can be seen in understanding environmental issues, sense of responsibility, empathy, and environmentally friendly behavior (Exa & Daryanto, 2026).

CONCLUSION

The Problem Base Learning (PBL) model is effective in improving the understanding and learning outcomes of students in the lower grades at SDN 9 Kabila Bone, Bone Bolango Regency, Gorontalo Province. This is shown by the increase in the average score of students from 53,750 in the pretest to 83,125 in the posttest. Furthermore, the number of students who achieved learning mastery increased from 7 students (29%) in the pretest to 20 students (83.3%) in the posttest. An N-Gain score reaches 0.67, which indicates that it is in the effective category. Furthermore, the results of the study show that the influence of the Problem Base Learning (PBL) model in improving students' understanding of marine wealth and environmental awareness in the lower grade of SDN 9 Kabila Bone, Gorontalo Province contributes positively to the improvement of students' cognitive achievement. The findings suggest that the PBL model can provide a meaningful learning experience and can serve as an innovative learning model to improve learners' learning outcomes.

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