Implementation of Problem-Based Learning Model to Improve Science Learning Outcomes in Grade V Students of Elementary Schools GMIM Pinaras

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Abstract. Starting from the problems found at GMIM Pinaras Elementary School regarding low student learning outcomes caused by the dominance of conventional learning processes, researchers conducted research at the school by implementing an innovative learning model. The aim of this research is to find out how to apply the Problem Based Learning Model to

Keywords: Learning model; Problem Based Learning; Science Learning Outcomes

Abstrak. Berawal dari permasalahan yang ditemukan di SD GMIM Pinaras terhada rendahnya hasil belajar siswa yang disebabkan dominannya proses pembelajaran konvensional, maka peneliti melakukan penelitian di sekolah tersebut dengan menerapkan suatu model pembelajaran Problem Based Learning. Tujuan penelitian ini yaitu untuk mengetahui bagaimana Penerapan Model Pembelajaran Problem Based Learning untuk meningkatkan hasil belajar IPA pada siswa kelas V SD GMIM Pinaras. Peneliti menggunakan rancangan penelitian tindakan kelas (PTK) meliputi empat tahap yaitu: (1) perencanaan, (2) tindakan, (3) observasi, dan (4) refleksi yang dilaksanakan dengan dua siklus. Adapun yang menjadi subjek penelitian ini adalah siswa kelas V SD GMIM Pinaras dengan menggunakan model pembelajaran Problem Based Learning. Teknik pengumpulan data dilakukan melalui observasi yaitu dengan mengamati secara langsung pelaksanaan tindakan pembelajaran dan tes tertulis untuk mengetahui sejauh mana kemampuan siswa dapat memahami materi dari dua siklus. Hasil yang diperoleh pada siklus I mencapai 69% sedangkan pada siklus II hasil belajar siswa mencapai 88% siswa sudah memahami dan dapat mencapai tujuan pembelajaran yang diharapkan. Berdasarkan hasil penelitian dan pembahasan dapat disimpulkan bahwa guru SD GMIM Pinaras diharapkan untuk menerapkan model pembelajaran Problem Based Learning untuk meningkatkan hasil belajar IPA siswa kelas V SD GMIM Pinaras.
improve science learning outcomes for fifth grade students at GMIM Pinaras Elementary School. Researchers used a classroom action research (PTK) design including four stages, namely: (1) planning, (2) action, (3) observation, and (4) reflection which was carried out in two cycles. The subjects of this research were fifth grade students at GMIM Pinaras Elementary School using the Problem Based Learning learning model. The data collection technique was carried out through observation, namely by directly observing the implementation of learning actions and written tests to determine the extent to which students were able to understand the material from the two cycles. The results obtained in cycle I reached 69%, while in cycle II student learning outcomes reached 88%. Students understood and were able to achieve the expected learning objectives. Based on the results of the research and discussion, it can be concluded that GMIM Pinaras Elementary School teachers are expected to apply the Problem Based Learning learning model to improve the science learning outcomes of fifth grade students at GMIM Pinaras Elementary School.

INTRODUCTION

Education plays an important role in the progress of a nation's civilization. Quality education is the kind of education that helps students to move forward in the functions of education (Muh & Muhsalim, 2022). One of the important roles is that education creates citizens who are intelligent, ethical, and democratic (Supriyanto et al., 2020). Education is carried out with the aim of developing individuals into moral beings. The educational process must shape the character of students, as well as provide life skills (Sadewo, et al., 2022). Furthermore, in its implementation, education must integrate intellectual and character education. Therefore, we must strive for the integration of intellectual and character education to produce students who are in line with the goals of national education set by the Constitution (Suryana & Muhidin, 2022).

According to Rismawalti (2021), to achieve educational goals, students' direct interaction with the environment in real life is facilitated by teachers as the learning process unfolds. Learning involves various crucial activities essential to daily life and should not be separated from everyday experiences (Novialti, 2022; Saputro, 2023). Teachers must provide quality learning experiences so that the potentials of each student can develop, whether in terms of knowledge, skills, attitudes, abilities, social relationships, and expressions (Purnasari, et al., 2023). This underscores the pivotal role of teachers in the educational process. Environmental Education (IPAL) learning is a body of knowledge with special characteristics that involve experiential and concrete phenomena, providing clarity and quality in its educational process (Gulo, 2022).
Primary education provides a formal educational journey aimed at fostering cognitive development and character formation to enhance competence and adaptability in shaping individual personalities and character in accordance with societal demands (Anggraeni, S. F., & Zakir, S., 2022; Purnasari & Sadewo, 2021). Science learning stands as one of the essential subjects in primary schools (SD) recognized for its pivotal role in shaping students into environmentally conscious individuals. Environmental science education also plays a crucial role in preparing students with essential skills to address global challenges. In line with this, Rakhayu et al. (2020) assert that science learning represents a structured knowledge domain, with its utilization focused on addressing various environmental phenomena. Science learning is indispensable in primary schools, as science learning teachers can provide opportunities for active learning and improve students' learning outcomes (Social Bona et al., 2023). Science learning represents a form of education that aligns with naturalistic tendencies and influences life, resulting in individuals with naturalist characteristics who are more adept in the learning process of science learning (Zuleni & Marlifilinda, 2022).

Science learning, particularly in primary schools (SD), is crucial in equipping students with essential skills to navigate their daily lives and the surrounding environment. Science education involves discovering the natural phenomena of the world around us. It is not merely about imparting accumulated knowledge in the form of facts, theories, or principles but rather about fostering a process of discovery. Science education in primary schools aims to encourage students to enhance their curiosity and understanding of environmental and societal phenomena and their interrelationships, as well as to cultivate problem-solving skills in their daily lives. However, teaching approaches in schools vary. Some employ traditional methods involving lectures, assignments, and heavy reliance on textbooks, resulting in passive learning experiences (Melo et al., 2023; Purnasari, et al., 2023).

The advantages of implementing problem-based learning models compared to other teaching models lie in their ability to engage students in developing innovative knowledge, enhancing learning activities, and cultivating conceptual thinking skills. Another advantage of implementing problem-based learning models is that they improve student motivation by making learning more meaningful, encouraging quicker adaptation to learning materials, and enabling students to actively engage in group activities, fostering student discipline so that students can develop solutions to various problems provided by teachers (Purnasari, 2019; Sulastri et al., 2022). One notable difference between problem-
based learning models and other research lies in the analysis results, indicating that problem-based learning models are more effective in influencing the improvement of critical thinking skills in primary school students compared to other teaching models (Suryaningsih & Dewi Koeswant, 2021).

Based on the observations and interviews conducted by researchers during the learning process at V SD GMIM Pinaras in Tomohon City, several issues were identified: (1) teaching is still predominantly teacher-centered, (2) teachers have not fully implemented active and creative teaching methods, often dominating the classroom and using conventional methods, (3) in the teaching process, teachers heavily rely on the teacher's book, neglecting to engage students as active learning resources, and (4) students tend to be noisy and less attentive during teaching sessions. These challenges result in the failure to achieve learning objectives. This is evidenced by the results of the assessments, where some students have not met the Minimum Mastery Criteria (KKM). Out of 11 students in class V SD GMIM Pinaras, only 4 have met the KKM, while the remaining 7 have not. Additionally, the results of the midterm and final exams also indicate that most students have not reached the Minimum Mastery Criteria (75).

The challenges mentioned earlier indicate the need for alternative methods and teaching models that actively engage students. One such teaching model is problem-based learning (PBL). Problem-based learning constitutes a curriculum model that relates to real-world issues faced by students (Sulistianingrum, 2022). Therefore, it is essential to rethink the learning process to improve student outcomes. One approach to enhancing student outcomes is by implementing problem-based learning models. Utilizing problem-based learning (PBL) models can significantly impact student learning outcomes, especially in subjects like Environmental Science Education (ESE) (Gulo, 2022). Thus, researchers are motivated to conduct action research (PTK) as a solution to improve the teaching-learning process. The proposed action research title could be: "Development of a Problem-Based Learning Model to Enhance Environmental Science Education (ESE) Learning Outcomes for Fifth-Grade Students at SD GMLIML Pinaras." The objective of this research is to determine the general plan of the problem-based learning model in improving the learning outcomes of students in the thematic subjects and their sub-themes, such as temperature and heat, for fifth-grade students at SD GMIM Pinaras during the academic year 2022/2023.
METHOD

This research utilizes Classroom Action Research (CAR). Classroom Action Research is a type of research conducted by teachers in their own classrooms to address specific educational issues (Fembriani et al., 2022). The research method proposed by the Ministry of Education and Culture (2006) consists of four main steps: planning, acting, observing, and reflecting.

Figure 1. Kemmis and McTaggart's Classroom Action Research Cycle (2006)

This research was conducted at GMIM Pinarials Elementary School, South Tomohon District, Tomohon City, North Sulawesi Province. The subjects of this research were fifth-grade students, totaling 11 students consisting of 6 male students and 5 female students.

The data collection techniques used in this research were observation, tests, and documentation. Observation was conducted through participant observation to assess the level of student participation during the learning process through active learning. Tests were conducted in written and oral forms. Written tests utilized test items/instruments to measure student learning outcomes. Documentation included recording activities to capture any incidents to provide clarity about the situations occurring during the learning process, such as various learning outcomes that provide information about student success and documentation that captures learning process situations.
The data obtained were then analyzed to determine the extent of students’ mastery of the presented material. The data analysis technique in this study utilized descriptive analysis by calculating the percentage of learning mastery. According to Trianto (2012), the achievement of student learning outcomes can be analyzed using the following formula:

\[ KB = \frac{T}{Tt} \times 100\% \]

\( KB \) = Ketuntasan Belajar  
\( T \) = Jumlah skor yang diperoleh Siswa  
\( Tt \) = Jumlah skor total

The learning implementation is considered successful if the students' learning outcomes have reached a score of 75, following the minimum completeness criteria (KKM) determined by the ILPALL learning implementer. Grade V is considered to have achieved learning mastery if at least 80% of the total students obtain a score of at least 75. The indicator of the learning process from this research is derived from the presentation of learning success obtained from the score derived from observation results.

**RESULTS AND DISCUSSION**

**Results**

The results of the research on the implementation of the Problem-Based Learning model to assess the learning outcomes of Grade V students at GMIM Pinaralis Elementary School were conducted in two cycles, each cycle consisting of one meeting with a duration of 4 x 35 minutes per session.

Cycle I of the action research was conducted on September 18, 2023, and Cycle II was conducted on September 20, 2023. Cycle II was a refinement derived from Cycle I. During Cycle II, the researchers focused on the implementation of Problem-Based Learning in teaching material related to temperature and heat, heat, and its transformation using the Problem-Based Learning model. This model was chosen by the researchers to understand the overall learning outcomes achieved by Grade V students at GMIM Pinaralis Elementary School.

The implementation of learning activities in the teaching and learning cycle is carried out in the following stages: (1) Planning Stage, which includes determining the learning objectives, composing lesson plans (RPP), preparing materials, preparing learning activities, assessment instruments, and supporting facilities. (2) Implementation Stage,
Implementation involves the entire process of guiding learners through the IPA approach regarding temperature and heat, as well as understanding the concepts through problem-based learning (PBL) models in the 5th-grade Science class at GMIM Elementary School. In this stage: (a) Preparatory stage, the first step involves the teacher providing a scenario and assigning one student to lead the discussion, then the teacher checks student attendance, explains learning objectives, and students understand the steps of learning to be taken. (b) Core stage, the steps are as follows: first step: orienting students to the problem, second step: organizing student groups, third step: guiding investigation, fourth step: facilitating and summarizing discussion outcomes, fifth step: analyzing and evaluating the problem-solving process. (c) In the final stage, the teacher provides individual assessment and tasks for students to work on independently. Upon concluding the teaching and learning process, students and teachers gather to summarize the learning outcomes.

The teacher may inquire about the students' understanding of the material after participating in the learning session. The teacher provides feedback on the progress made, addressing any areas that may need further attention. Finally, the session ends with a closing discussion led by one of the students. (3) Observation, this observation was conducted on fifth-grade students at SD GMIM Pinaras during a science lesson using the Problem-Based Learning (PBL) model. In this regard, the researcher observed the students' attention while explaining the material, during group discussions, and during the evaluation provided by the teacher to assess the extent of the students' understanding of the material taught. The observation results indicate that students actively engage in the learning process when the teacher utilizes the PBL model. Not only one student answers questions, but all students in each group are given the opportunity to participate actively in the discussion activities, both in seeking answers and in answering questions. (4) Reflection, based on the results of the implementation of the first cycle of action from observations by both observers and practitioners themselves, data obtained include: 1) in the first meeting, students were still somewhat rigid with the applied learning process, so their response to giving opinions openly was not yet apparent, 2) the classroom atmosphere during discussions was still chaotic, 3) students have not yet developed critical thinking skills because their thinking abilities are not well honed, thus the learning process still relies on what is in the theme book, 4) students still do not understand the material well and grasp the benefits of the material they are learning as well as its application. This is evident from the evaluation results; therefore, the researcher plans learning activities for the second cycle.
to observe the learning progress of students in the first cycle. The actions in the first cycle will be reviewed in the following manner:

Table 1. Cycle I Results

<table>
<thead>
<tr>
<th>No</th>
<th>Score</th>
<th>Frequency</th>
<th>Score x Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>35</td>
<td>3</td>
<td>105</td>
</tr>
<tr>
<td>2.</td>
<td>50</td>
<td>1</td>
<td>50</td>
</tr>
<tr>
<td>3.</td>
<td>75</td>
<td>1</td>
<td>75</td>
</tr>
<tr>
<td>4.</td>
<td>80</td>
<td>1</td>
<td>80</td>
</tr>
<tr>
<td>5.</td>
<td>85</td>
<td>3</td>
<td>255</td>
</tr>
<tr>
<td>6.</td>
<td>95</td>
<td>1</td>
<td>95</td>
</tr>
<tr>
<td>7.</td>
<td>100</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Sum</td>
<td>11</td>
<td>760</td>
</tr>
</tbody>
</table>

The presentation of the data will be observed from the following aspects:

\[ KB = \frac{T}{n} \times 100\% \]

\[ = \frac{760}{1100} \times 100\% \]

\[ = 69\% \]

From the table presented, it indicates that the results of Cycle I show that 69% of students have not yet achieved satisfactory completion. This may be attributed to the fact that the concepts provided by the teacher have not been fully grasped by the students, leading to their inability to succeed. Therefore, it is necessary to proceed to Cycle II to address this issue.

Implementation activities for Cycle II will be carried out through the following steps: (1) Planning Stage: The activities carried out in the planning stage include developing the Learning Implementation Plan (RPP), preparing teaching materials, organizing student activity sheets, developing assessment instruments, and arranging other supporting facilities. (2) Implementation Stage: This stage involves the entire process of guiding learners through the science approach regarding temperature, heat, and their applications using the Problem-Based Learning (PBL) instructional model in the fifth-
grade class at GMIM Elementary School. In this phase: (a) Preparatory steps will include the teacher presenting a scenario and assigning a student to lead the discussion. Subsequently, the teacher will check student attendance, explain learning objectives, and students will proceed with goal setting. The teacher will then monitor student presence, reaffirm learning objectives, and guide students through the steps of the learning process. (b) The main stages in educational activities are as follows: first, orienting students' learning goals, second, organizing students' learning activities, third, formulating research problems, fourth, facilitating and analyzing the results of discussions, fifth, analyzing and evaluating the learning process outcomes. In the final stage, teachers provide evaluations of students' performance and tasks to be completed independently, concluding the teaching and learning process by summarizing student and teacher experiences to improve the teaching-learning process. At this point, teachers inquire about students' concerns after participating in the learning process, provide guidance on the tasks that have been completed, and evaluate the overall performance. The educational activity concludes with a prayer led by one of the students.

Observation Stage (3): This observation was conducted on fifth-grade students at SD GMIM Pinaras during an IPA (Science) lesson using the Problem-Based Learning (PBL) model. In this case, the researcher observed students' attention during the explanation of the material, during group discussions, and during the evaluation provided by the teacher to assess the extent of students' understanding of the taught material. The observation results indicated that students actively participated in the learning process when the teacher utilized the PBL model. It wasn't just one student answering questions, but all students in each group were given the opportunity to actively engage in discussion activities, both in finding answers and in responding to questions. Reflection: Based on the observations made during the learning activities, the teacher provided the following reflections: 1) The learning process proceeded according to the planned lesson, 2) Students appeared more active in group discussions, 3) Students' problem-solving abilities improved, 4) Students were able to complete all given tasks correctly, 5) There were no disruptions during the discussions; all students were calm and focused on the given topics. Based on these reflections, the researcher concluded not to proceed to Cycle III as the learning outcomes achieved by the students were optimal. Therefore, it can be said that in Cycle II, the researcher successfully achieved the expected results. The actions taken in Cycle II are summarized as follows:
### Table 2. Cycle II Results

<table>
<thead>
<tr>
<th>No</th>
<th>Score</th>
<th>Frequency</th>
<th>Score x Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>60</td>
<td>1</td>
<td>60</td>
</tr>
<tr>
<td>2.</td>
<td>75</td>
<td>3</td>
<td>225</td>
</tr>
<tr>
<td>3.</td>
<td>90</td>
<td>1</td>
<td>90</td>
</tr>
<tr>
<td>4.</td>
<td>95</td>
<td>1</td>
<td>95</td>
</tr>
<tr>
<td>5.</td>
<td>100</td>
<td>5</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>Sum</td>
<td>11</td>
<td>970</td>
</tr>
</tbody>
</table>

Actions taken in Cycle II were summarized during the presentation of findings as follows:

\[
KB = \frac{T}{T'} \times 100\%
\]

\[
= \frac{970}{1100} \times 100\%
\]

\[= 88\%
\]

### Table 3. Recapitulation of average learning outcomes scores in Cycle I and II

<table>
<thead>
<tr>
<th>No</th>
<th>Cycle</th>
<th>Sum of Score</th>
<th>Sum of Score Total</th>
<th>Data Analysis</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I</td>
<td>760</td>
<td>1100</td>
<td>(\frac{760}{1100} \times 100%)</td>
<td>69%</td>
</tr>
<tr>
<td>2.</td>
<td>II</td>
<td>970</td>
<td>1100</td>
<td>(\frac{970}{1100} \times 100%)</td>
<td>88%</td>
</tr>
</tbody>
</table>

From the table above, it is evident that the presentation of learning outcomes in Cycle II indicates an 88% achievement, surpassing the success criterion of >80% set by this research. Thus, the implementation of the Problem-Based Learning (PBL) teaching model in Grade V of SD GMIM Pinaras has been deemed successful.
Discussion

The implementation of the Problem-Based Learning (PBL) teaching model has a positive impact on students (Meilasari et al., 2020). Through active engagement and collaboration among students in solving problems, the teaching model facilitates learning by encouraging critical thinking and problem-solving skills. Additionally, the use of assessment tools in the form of evaluation questions aids in measuring students' progress during the teaching-learning process. Moreover, research suggests that the application of teaching models also influences the effectiveness of teaching and learning activities, regardless of the teachers' qualifications (Nalfi, 2023).

According to Rantawati et al. (2020), the Problem-Based Learning (PBL) teaching model is a learning approach that engages students in active, inquiry-based learning, providing them with opportunities to learn through problem-solving activities. In this approach, students are presented with real-world problems before being provided with instructional materials, encouraging them to develop their own understanding of concepts through the learning process. This teaching model is particularly suitable for subjects like science, as in science education, students are required to think creatively, imaginatively, and critically. Creativity in students is not only demanded in science education but also practiced through conducting experiments (Gusti & Yasmini, 2021). Through the Problem-Based Learning teaching model, students are motivated to engage in self-directed learning and enhance their knowledge. This research is supported by other studies that have also reported improvements in student learning outcomes through the implementation of the Problem-Based Learning teaching model (Widyal et al., 2021).

The teaching model recommended, namely the Problem-Based Learning (PBL) model, possesses several advantages. According to Vera et al. (2019), the benefits of the PBL model include students becoming more proactive in their learning, engaging in problem-solving, comprehensively understanding concepts, integrating knowledge, reasoning critically, aspiring, accepting others' opinions, and interacting within groups (Amris & Desyandri, 2021). In science education, students are required not only to memorize concepts but also to apply them through practical work (Izzatun Nadiyah et al., 2022).

Following the culmination of information collected from both Cycle I and Cycle II, it has been concluded that the research process in each cycle, as well as the outcomes achieved in each cycle, have shown the progression of the Problem-Based Learning teaching model. This progression signifies an improvement in both student learning...
outcomes and their understanding of science concepts, leading to better overall learning results. As observed in the study, the implementation of the Problem-Based Learning model in Cycle II differs from Cycle I, as Cycle II demonstrates a higher level of mastery in the utilization of the Problem-Based Learning teaching model.

The Problem-Based Learning (PBL) teaching model initiates student engagement in active learning through problem-solving and collaborative experimentation within groups. The findings of a study by Rinal Ramlasari titled "Developing a Problem-Based Learning Teaching Model to Improve Science Learning Outcomes for Fourth Grade Elementary School Students" demonstrate the effectiveness of implementing the Problem-Based Learning (PBL) teaching model as devised by the researcher. The development of the Problem-Based Learning teaching model has provided significant benefits in addressing the difficulties faced by students, particularly in comprehending science concepts. With the implementation of the Problem-Based Learning teaching model, students become more motivated to learn, fostering collaboration and providing opportunities for students to actively participate in discussions and present their findings based on their inquiries. Knowledge is not solely imparted by the teacher but is also acquired through active student involvement. Through the Problem-Based Learning teaching model, students are consistently encouraged to actively participate in the learning process, leading to improved learning outcomes as evidenced by the results obtained in Cycle II of the study (Yuafian & Astuti, 2020). The research conducted has significant implications for enhancing science learning outcomes in schools, particularly in nurturing higher-order thinking skills. Active participation in science learning enables students to engage in problem-solving activities, which in turn contribute to the development of their critical thinking abilities. Through active involvement in science learning facilitated by effective teaching methods, students not only improve their understanding of the material but also retain it more effectively (Suci Widuri et al., 2021).

Based on the results obtained, it is recommended that further attention and support be provided for the implementation of the Problem-Based Learning teaching model in Grade V of SD GMIM Pinaras Elementary School, ensuring continuous progress among students. The observed improvements in students' academic performance not only indicate enhanced learning outcomes but also reflect increased confidence and proficiency in articulating and comprehending scientific concepts. To sustain these positive outcomes, teachers must continue to enhance their roles as facilitators, motivators, demonstrators, and evaluators in the teaching process. Therefore, the recommendation for the ongoing
implementation of the Problem-Based Learning teaching model to enhance science learning outcomes in Grade V of SD GMIM Pinaras Elementary School remains valid.

CONCLUSION

Based on the research findings and discussions, it can be concluded that the implementation of the Problem-Based Learning (PBL) teaching model used in the study for fifth-grade students at SD GMIM Pinaras has led to an improvement in students' learning outcomes in the subject of science, particularly in the topics of temperature and heat transfer. This is evident from the achievement of student learning outcomes, which have reached 75%. The percentage of classical learning outcomes has increased from 69% to 88%, resulting in a 19% increase. Therefore, based on these percentages of student learning outcomes, it can be concluded that the research conducted has been successful.

REFERENCES


