Biota
Biologi dan Pendidikan Biologi

http://biota.ac.id/index.php/jb
DOI: http://dx.doi.org/10.20414/jb.v16i2.470

Research Article

Implementation of Problem Based Learning (PBL) Model to Improve Learning Outcomes Class X IPA 1 SMAN 2 Labuapi

Sri Wulan Dari[1], Baiq Sri Handayani[1], Hadratullaili[2]
[1]*Program Pendidikan Profesi Guru Prajabatan, Faculty of Teacher Training and Education Universitas Mataram, Mataram, West Nusa Tenggara, Indonesia*
[2]*Sekolah Menengah Atas Negeri (SMAN) 2 Labuapi, West Lombok, West Nusa Tenggara, Indonesia*

Corresponding author: baiqsrihandayani.fkip@unram.ac.id

Abstract

Improving learning outcomes can be achieved by implementing models that cater to students' learning needs and are integrated with contextual issues as part of the learning process. Problem Based Learning (PBL) is an effective model widely used to facilitate student-centered learning activities and promote problem-based learning. The implementation of PBL directs learning towards contextual issues and the relevant experiences of students, resulting in improved learning outcomes. This study aims to enhance student learning outcomes of class X IPA 1 through the implementation of the PBL model. It employs Classroom Action Research conducted in two cycles with stages including planning, implementation, observation, and reflection. Data was gathered through observation, pre-tests, and post-tests in both cycles. Data analysis techniques involved both qualitative and quantitative analyses. The results revealed an initial class average score of 70.00 in the first cycle, achieved through the implementation of the PBL model. The average class score further improved to 85.00 in the second cycle, obtained through reflective practices using the PBL model and discussion methods. This demonstrates that employing the PBL model alongside discussions enhances the learning outcomes of class X IPA 1 students in the topic of ecosystems.

Keywords: Learning Outcomes, Problem Based Learning, Classroom Action Research.

1. Introduction

Education can be seen as an effort to understand an individual's potential by creating justice in society, participating in global progress, providing decent employment, and ensuring a bright future (Yadav & Yadav, 2023). Therefore, education can be considered a significant investment in long-term human resources that hold value for future interests (Irawan, 2021). This has led nearly every country in the world to prioritize education as something crucial in the context of national development. Numerous countries worldwide are currently witnessing a downturn in the academic performance of students, a phenomenon extensively documented by cross-national studies such as PISA, PIRLS, and TIMSS. There has been a discernible decline in the average levels of reading and mathematical proficiency, amounting to at least the equivalent of half a year of formal education. This decline raises significant global scale, exacerbated by the profound impact of the COVID-19 pandemic, which has severely

compromised academic performance. Educational policymakers and institutions globally are actively exploring strategies to counteract this pervasive decline and enhace academic achievement universally (Agirdag & Muijs, 2023). Education is a learning process that involves teaching and learning activities. The teaching and learning process is inseparable from the role of a teacher. In the field of education, a teacher serves as an educator who guides students to develop knowledge and transform their conditions from ignorance to knowledge. Teachers are fundamentally regarded as a cornerstone in education and are entrusted with a great deal of responsibility in transforming and improving the quality of students. As a teacher, there are two functions within them that cannot be separated: educating and teaching (Juhji, 2016). In carrying out their duties, teachers are required to master various skills to become professionals in their field (Sari, 2016). The professionalism of a teacher in the field of education will be a reflection of the success of the learning process.

The success of the learning process is greatly influenced by the performance of the teacher. The ability of a teacher to determine and implement suitable models and methods of teaching in accordance with the learning environment will impact the achievement of students' learning outcomes and their enthusiasm in participating in a series of learning activities in the classroom (Ifianti & Fitriani, 2022). In order for the teaching and learning activities conducted by the teacher to yield efficient results, each lesson requires an engaging and varied method of delivery. Therefore, teachers must be able to select various effective and efficient teaching methods or models for specific subject matter (Surya & Noviyanti, 2017). The implementation of biology teaching emphasizes providing direct experiences. The direct learning experiences will enable students to develop their competencies in understanding the natural world scientifically, fostering the ability to think, work, and behave scientifically, and communicating this as an important aspect of life skills (Kono, Mamu, and Tangge, 2016). The implementation of teaching through direct experiences can be one of the efforts towards achieving the predetermined learning objectives.

Efforts to achieve the goals of Biology learning can be carried out by teachers through implementing teaching methods that foster students' critical thinking skills, allowing them to master a concept not just through memorization, but also by being able to apply the concept to other aspects. What can be done to achieve this is that schools and teachers, as the main components of education, need to manage learning activities in accordance with the principles of teaching and learning activities, namely: (1) student-centered learning activities, (2) learning through doing, (3) independent learning and collaborative learning, so that learning is expected to be focused on the students rather than just the teacher (student active learning) (Kono, Mamu & Tangge, 2016). One effort to improve the quality of learning is by implementing teaching models that can actively engage students, such as the Problem Based Learning (PBL) model, which can motivate and engage students actively in the learning process (Surya & Noviyanti, 2017).

The implementation of Problem Based Learning (PBL) model is widely used because it has many advantages, such as making learning more meaningful, integrating knowledge and skills simultaneously and applying them in relevant contexts, as well as enhancing students' critical thinking abilities. Additionally, the PBL model is one that centers the learning around the students (Kono, Mamu & Tangge, 2016). Through the application of this model, learning is designed in the form of starting with real-life problem scenarios that are related to the biology concepts being taught. Information is gathered by students through activities like studying the teaching materials, conducting laboratory practices, or engaging in discussions with peers to solve the problems encountered in learning. There are several theories that suggest problem-based learning can improve students' problem-solving abilities and critical thinking. When students can think critically, they will be prepared to think critically in their respective disciplines, fulfilling their intellectual needs and developing them as individuals with potential (Surya & Noviyanti, 2017). This consequently leads to an improvement in students' learning outcomes.

The term "learning outcomes" refers to the achievements attained by a student during or at the end of an educational activity, course, or program, and is part of the learning results. Learning outcomes are described in the form of performance, such as grades or observable behaviors in students, and serve as evidence of achieving learning objectives (Trinchero, 2022). Students' learning outcomes are the academic achievements they attain through various activities like assignments, exams, participation, and answering questions that support the acquisition of these learning results (Dakhi, 2020). Teaching in schools generally still employs conventional methods that are teacher-centered, with students primarily playing the role of listeners and receivers of all information provided by the teacher. Learning that is not centered around students can impact the learning outcomes achieved by students.

Based on the observations conducted at SMA Negeri 2 Labuapi in class X IPA 1 during guided learning, it was found that there is an issue in the learning process where the students' interest in learning is still lacking due to the continued application of a teacher-centered approach. Considering the importance of students' interest in achieving learning proficiency, it is crucial to pay attention to their learning interest. In response to this reality, improvements must be made in classroom learning practices, and one of the ways to do this is by implementing the Problem Based Learning (PBL) model.

2. Material and Method

The research method used is Classroom Action Research (CAR). Classroom Action Research, is a type of research that conducted by teachers in the classroom to refine or improve the learning process. It closely relates to the daily teaching and learning issues faced by teachers. CAR is a reflective form of research that involves specific actions to enhance or improve teaching practices in a more professional manner (Nanda, et al., 2021). This research was carried out over two cycles. Each cycle consisted of several

stages: planning, action, observation, and reflection. The data analysis techniques employed in the study included both qualitative and quantitative analyses. Qualitative data analysis involved direct observation of each learning activity with the application of the Problem Based Learning (PBL) model. Quantitative analysis used pre-test and post-test results to determine the impact of implementing the Problem Based Learning teaching model on student learning outcomes. The following is a diagram illustrating the cycle of Classroom Action Research activities (Nanda, et al., 2021).

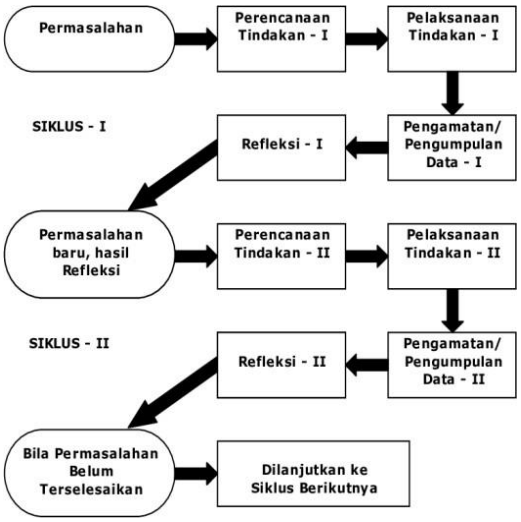

Figure 2. The Diagram of Classroom Action Research Activity Cycle

The Classroom Action Research (CAR) model can be described as a repeated experiment or a continuous experiment, depending on the satisfaction of the teacher with the obtained results. Classroom action research consists of four stages that form two cycles, starting with planning, implementation, observation, and reflection (Arikunto, et al., 2019).

This research utilizes data and data sources obtained from all observations of the ongoing learning activities containing pertinent information for the conducted research. Research data is collected from various sources, including the biology teacher of class X IPA 1 and all students. Additionally, data is also derived from the ongoing learning outcomes. Data collection techniques primarily involve observation and tests. Other data collection methods include interviews and documentation.

3. Results and Discussion

3.1. Results

The Classroom Action Research (CAR) conducted over two cycles yielded significant results in improving students' learning outcomes regarding the ecosystem material. The research activities were carried out by comparing the students' learning outcomes in the pre-action phase, Cycle I, and Cycle II. The pre-action results were obtained from pre-tests and direct observations, with a class average that was quite low

compared to the Minimum Completion Criteria (KKM) of 50.00. After Cycle I, there was an improvement in the class average score to 70.00, although it did not yet meet the KKM standard of 75.00. Following the reflection on Cycle I, Cycle II was implemented, resulting in a satisfactory class average score of 85.00. The improvement was achieved by following the CAR stages. Each cycle encompasses planning, implementation, observation, and reflection phases.

The results obtained in Cycle I depict a change in student behavior, leading to an improvement in learning outcomes. The class's average score in learning outcomes increased to 70.00, whereas in the pre-action or pre-test phase, it was 50.00. This change was achieved by following several CAR stages, such as planning, implementation, observation, and reflection. In the planning phase, a lesson plan was developed for the ecosystem material in class X IPA 1, integrated with the Problem Based Learning (PBL) model based on the pre-test results. After the planning, the implementation phase took place according to the designed plan. During the implementation phase, it was noted that the learning process was more organized compared to the previous conventional method. Implementing the PBL model affected the students' participation and learning interest as the learning activities were based on real-life problems and contextual issues. However, there were still shortcomings observed, with students facing difficulties in solving problems related to current issues due to their lack of familiarity with designing solutions for the given problems. This stemmed from the fact that the learning activities so far had been conducted using conventional methods, and there was also a lack of student literacy regarding ecosystem-related issues. In the reflection phase, students' response to the learning process with the PBL model was very positive. This was evident from the students' enthusiasm in participating in the learning process, despite encountering some challenges. Students expressed that learning with the PBL model was very enjoyable because it was relevant to real-life issues.

The results obtained from the reflection in Cycle I were implemented in Cycle II. The activities in Cycle II also followed the stages of the Classroom Action Research (CAR) learning cycle. The planning stage in Cycle II was conducted by designing the learning based on the reflections and weaknesses identified in the implementation of learning in Cycle I. The planning activity in Cycle I involved adjusting the Lesson Plan (RPP) to cater to the needs of the students, taking into account their learning requirements, readiness, and the shortcomings identified in the reflection of Cycle I. Planning in Cycle II utilized the Problem Based Learning (PBL) model with group discussion methods, enabling students who initially struggled with problem-solving to engage in discussions with their peers to find solutions. Furthermore, the presented learning material was related to contextual issues regarding ecosystems, which increased student enthusiasm for learning. The next activity after planning was the implementation of learning in the classroom based on the prepared Lesson Plan. Subsequently, the results obtained from observations showed that the students became more enthusiastic and actively worked together to solve the given problems. They found it easier to solve problems when learning through discussions with

their peers. The reflection on learning in Cycle II indicated that students responded positively to the implementation of the Problem Based Learning (PBL) model. This was demonstrated by the increase in the class's average learning outcomes, rising from 70.00 to 85.00, surpassing the Minimum Completion Criteria (KKM).

Data regarding the comparison of student learning outcomes in the pre-cycle, Cycle I, and Cycle II activities, as well as the results of the stages in the learning cycle, can be seen in Table 1 and Table 2:

Table 1. Comparison of Learning Outcomes of Class X IPA 1 at SMAN 2 Labuapi in Pre-cycle, Cycle I and Cycle II

Phases	The Average StudentLearning Outcomes Score
Pre-cycle	50.00
Cycle I	70.00
Cycle II	85.00

Table 2. The Stages of the Learning Cycle

Cycle	Planning	Implementation	Observation	Reflection
I	The development of Lesson Plans using the PBL model with the syntax: (1) problem orientation for students; (2) organizing students for learning; (3) guiding individual inquiry; (4) developing and presenting creative work; and (5) analyzing and evaluating the problem-solving	The implementation of the learning activities that have been designed in the Lesson Plan (RPP) using the Problem Based Learning (PBL) model, focusing on the specified ecosystem issue.	The PBL model has been implemented successfully, but students still face difficulties in solving problems related to current issues.	The students' response to the learning process with the PBL model is very positive. However, students still face challenges in conducting individual inquiries and formulating solutions to the given problems.
II	The development of Lesson Plans (RPP) using the PBL model based on reflection results,	The implementation of the designed Lesson Plan (RPP) using the PBL model and group discussion method focuses on real-life ecosystem issues.	By aligning the learning process with current real-life issues that are relevant to the students themselves, and	The students' response to the learning process with the Problem Based Learning (PBL) model and group discussion

	following the syntax: (1) problem orientation for students; (2) organizing students for learning; (3) guiding group inquiry; (4) developing and presenting creative work; and (5) analyzing and evaluating the problem-solving process.	incorporating group activities, the students become more enthusiastic and engaged in the learning process.	method is very positive.

3.2. Discussion

The implementation of Problem Based Learning (PBL) aims to create active learning experiences for students, provide opportunities to solve problems, cultivate critical and in-depth thinking, and encourage students to confidently present their findings from problem-solving activities in the learning process. Problem Based Learning (PBL) model has gained widespread adoption across diverse fields and educational settings as a pedagogical approach aimed at fostering critical thinking and problem-solving skills within authentic learning situations (Yew & Goh, 2016). The focus of applying the PBL model is to promote active learning for students, thereby tasking educators with designing learning experiences aligned with the intended objectives and conducive to enhancing students' learning outcomes. The characteristic of the Problem Based Learning (PBL) model is to guide students to comprehend, analyze, and discover concepts by integrating their existing knowledge. This approach is intended to train and develop students' thinking abilities (Rahmadana, Khawani, and Roza, 2023).

This research endeavors to investigate the implementation of the Problem Based Learning (PBL) model in the context of biology education, with specific focus on class X IPA 1 at SMAN 2 Labuapi. The research methodology employed adheres to the priciples of Classroom Action Research (CAR), encompassing iterative cycles of planning, action, observation, and reflection. Notably, our research introduces a novel dimension by strategically integrating group discussions within the conventional PBL framework, thereby enhancing collaborative problem solving and augmenting the pedagogical impact. The distinctive feature of our study lies in its targeted application of the PBL model to the ecosystems topic, aligning with current and contextual issues.

Quantitative analyses, including pre-test and post-test, in conjunction with qualitative methods such as observation and reflection, provide comprehensive

evaluative framework. The research design incorporates two successive CAR cycles, manifesting a commitment to dynamic refinement based on insight gleaned from the initial cycles. The outcomes underscore the positive reception and heightened student engagement facilitated by the amalgamation of the PBL model and group discussion methodologies.

Comparative analysis with antecedent research eludicates nuanced differentiation in our approach, underscoring the contextual adaptations and methodological innovations embedded in our study. In summation, this research presents a distinctive contribution to the scolarly discourse on PBL within the realm of biology education, characterized by tailored modifications, innovative methodological integrations, and an unwavering dedication to pedagogical enhancement.

Inceptive data regarding the state of students in class X IPA 1 was acquired via systematic observation, and a pre-test assessment. The outcomes derived from this preliminary investigative phase, including both observational data and pre-test results, served as a foundational precursor to discern multiple challenges inherent in the biology learning trajectory of students in the X IPA 1 class. Among these challenges, a prominent concern was the manifestation of a suboptimal average class learning outcome, quantified at 50.00. The observational findings underscored a persisting conventional instructional approach devoid of student-centered attributes. Consequently, the data from this pre-action phase functioned as a pivotal reference point, steering the author towards the execution of remedial measures grounded in the Problem Based Learning (PBL) model. This strategic intervention unfolded across two iterative cycles, with the PBL model intricately designed to accentuate real-world problem-solving dynamics. The overarching objective of this methodological integration was to cultivate an enhanced comprehension of biological concepts and scientific procedural skills among students, with a specific emphasis on the ecosystems domain replete with contemporary issues. The envisaged outcome of this pedagogical recalibration is a concomitant amelioration in the overall learning outcomes exhibited by the student cohort.

Based on the learning outcomes using the Problem Based Learning (PBL) model for class X IPA 1 students at SMA Negeri 2 Labuapi on the topic of ecosystems, there was an improvement. In the pre-action phase, the average learning outcome was 50.00, which increased to 70.00 after the first cycle. Following the second cycle, it further improved to 85.00 for the class average. In the first cycle, the average learning outcome of the students improved significantly, although it had not yet reached the minimum completeness criteria (KKM) of 75.00. Some findings from the first cycle reflection included students still having difficulty in solving problems related to current issues because they were not accustomed to designing solutions for the given problems based on the learning materials in the answer sheets used for evaluating the learning outcomes. Therefore, reflecting on these issues, improvements were made in the second cycle of learning. While still using the PBL model, group discussion was introduced as a method. Engaging in group discussions would help students collaborate with their peers in designing solutions to the

given problems. The learning outcomes data for the second cycle showed a significant improvement in the learning outcomes for the ecosystem material, reaching the minimum completeness criteria (KKM) with an average class score of 85.00. Learning activities with a real-life problem-solving approach and group activities provided motivation and ease for the students in learning.

The results of the actions taken in both cycles indicate that the implementation of Problem Based Learning (PBL) can enhance students' learning outcomes. This aligns with a study conducted by Tabroni, Syukur, and Indrayani (2022), which emphasizes that the success of the learning process and the achievement of predetermined final objectives are greatly influenced by the teaching model employed by the teacher. One effective model is Problem Based Learning (PBL), as it encourages students to solve real-life problems and shifts the focus of learning towards the students, leading to increased enthusiasm and motivation. The rise in learning interest consequently leads to improved learning outcomes. According to Julianingsih, Rahmah, and Fitria (2022), discussion methods are suitable for developing students' collaborative problem-solving skills. Additionally, it helps train students to express their opinions verbally within their groups. Furthermore, Marpaung (2021) suggests that learning outcomes and student engagement can be enhanced by implementing the Project Based Learning model.

Through the application of PBL, students become more eager to attend and participate in group discussions to solve problems, present their work or ideas, which ultimately impacts their learning outcomes. The author confirms that the application of Project Based Learning (PBL) combined with group discussion methods proves beneficial in improving student learning outcomes, making learning more meaningful and relevant to real-life situations. Furthermore, students learn to collaborate with their group members in problem-solving activities. This enhances students' motivation and learning interest, ultimately leading to improved learning outcomes.

Conclusion

The implementation of Problem Based Learning (PBL) over two cycles in this study has shown an improvement in student learning outcomes of class X IPA 1 of SMAN 2 Labuapi in the subject of ecosystems. This is evident in the increased interest and activity levels of the students, attributed to the integration of real-life problems into the learning process. Additionally, group activities facilitate discussions and collaboration among peers, enabling them to collectively formulate solutions to the given problems. This is supported by the rise in the average learning outcomes, which increased from 50.00 in the pre-action phase to 70.00 in Cycle I, and further to 85.00 in Cycle II. This demonstrates that implementing Problem Based Learning (PBL) effectively enhances student learning outcomes.

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