Application of the Problem-Based Learning Model to Improve Student Learning Outcomes in Biology Subjects

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Article Info	Abstract
Article History *Received: Jan, 20th, 2024* *Revised: June, 22nd, 2024* *Published: June, 30th, 2024*	This research was conducted to improve student learning outcomes in biology subjects using the Problem-Based Learning (PBL) learning model in class X-6 of SMA Negeri 2 Nganjuk. This type of research is classroom action research (CAR). The subjects were 30 students in class X-6 of SMA Negeri 2 Nganjuk. CAR design includes planning, action, observation, and reflection. Data collection techniques use observation, tests, and documentation. Data analysis uses comparative quantitative methods. The research results showed an increase in the percentage of learning outcomes, namely in cycle I it was 40%, while in cycle II it was 60%. This was accompanied by an increase in the average student learning outcomes in cycle I of 73.01, while in cycle II it was 82.1. Thus it can be concluded that using the Problem Based Learning (PBL) learning model in biology learning can improve student learning outcomes.

INTRODUCTION

Education aims to prepare people to solve problems in their current or future life (Asniadarni, 2018; Novika Auliyana et al., 2018). This is by Law Number 20 of 2003 concerning the National Education System which explains that education is an effort and method to create a learning atmosphere and learning process if students actively develop their potential to have mental strength, self-control, ethics and ethics. . intelligence, noble ethics and skills necessary for himself, society, nation and state (Department of National Service, 2003). According to Rismawati (2021), to achieve educational goals, students are in direct contact with the environment adapted by the teacher during the teaching and learning process. The teacher is the main holder of the learning process. Science learning is a collection of knowledge that has special characteristics, namely science that studies certain natural phenomena, in practical form and is related to cause and effect in learning (Sholekah, 2020).

Natural science is a form of human endeavor that aims to understand the universe through directed observation, as well as using processes and explaining them through reasoning to

arrive at conclusions (Susanto, 2013). Student motivation is needed so that the learning process can take place well (Kusnandar, 2019). Good interaction between educators and students can raise student motivation, therefore the learning process must be made fun so that the material presented can be well received by students. (Gulo, 2022). Student motivation in studying science is still relatively low. This is supported by the results of research conducted (Sholekah, 2020) which states that student learning motivation is low and can be seen when the teacher explains the material, students daydream so that learning seems monotonous (Mayshandy, Mahardika &; Budiarso, 2021). The lack of interaction between teachers and students in the learning process indicates problems that occur. In the learning process, the teacher only uses the lecture method, so that learning only focuses on the teacher.

Therefore, students often tell their classmates without listening to the teacher's explanation. It is necessary to look for other options by innovating science learning models so that the learning that takes place attracts more students' attention in learning. The solution provided in this research to encourage students to participate in learning is to apply an effective and innovative learning model. One of the learning models in question is using the Problem-Based Learning (PBL) learning model. The PBL model is considered effective in learning because in this model learning focuses on students. The teacher is only a facilitator. Apart from that, the PBL model uses problems that exist in the real world, thereby helping students with problem-solving abilities.

Learning outcomes are a benchmark for determining the level of success of students in understanding concepts in learning where learning outcomes can be seen from students' ability to understand the material presented by the teacher in learning which is realized through changes in students' attitudes, social and behavior. and emotional(Wahyuni et al., 2021).The main problem with training in formal education (schools) is the low absorption capacity of students. So this can affect student learning outcomes. The reason that allows this to happen is because students do not pay enough attention to educators during learning activities, apart from that, the learning model used by educators is still teacher-centered, namely the lecture method.

The learning model used by teachers greatly influences the achievement of learning objectives, therefore teachers should choose the appropriate model among the many learning models. Each student is unique in various ways, this shows that the teacher's understanding of the learning model that will be used cannot be ignored. There is no ideal role model. Each has its advantages and disadvantages. This depends on the goals the teacher wants to achieve, the availability of facilities, and the condition of the students.

The problem-based learning (PBL) learning model can be used to stimulate student activity and improve student learning outcomes. Through PBL mode, students not only listen, take notes, and memorize the material presented by the teacher but also think, search, process data, and communicate in the learning process. In PBL, teachers act more as facilitators so that students can solve their problems and are required to be more active (Suliyati et al., 2018; Sumardi, 2019).

In the PBL model, lessons focus on a problem that must be solved by students, so that students have the responsibility to analyze and solve the problem with their abilities, while the role of educators is only to support and provide guidance.

Based on this description, it can be said that the use of a problem-based learning model can improve student learning outcomes. The scope of this research is about improving student learning outcomes. The sample determined through sampling techniques is class X-6. The aim of carrying out this research is to improve the learning outcomes of class X-6 students at SMA Negeri 2 Nganjuk. The benefit of this research is to help class X-6 students at SMA Negeri 2 Nganjuk to improve the quality of learning so that it has an impact on their learning outcomes.

METHOD

This research is Classroom Action Research (PTK). Actions in PTK are carried out in several cycles or rounds. Each cycle consists of four stages, namely: planning, implementing actions, observing, and reflecting (Talib, 2021). The number of cycles used in this research is determined by the results or level of success of the previous cycle. If in a certain cycle the specified indicators have been achieved, then this research will not continue to the next cycle. Cycle I stages:

1. Planning

    The planning step is the first step in researching classroom activities because it provides a reference for carrying out activities. This plan includes, among other things, learning models, determining learning media and sources, analysis of teaching materials, as well as determining assessment and evaluation. Planning in this case is almost the same as learning and is usually called a Learning Performance Plan (RPP) or teaching module.

2. Implementation of Actions

    The implementation of an action is basically the realization of a previously planned action, namely carrying out the plan in accordance with what has been done. The plan for this

research is to apply a problem-based learning model to improve students' problem-solving abilities.

3. Observation

   Observation is an effort to observe the implementation of an action. At this stage, observations, processes, results, situations, and obstacles that occur in the learning process are created. Apart from that, observations were made to find out what actions were carried out by the plans that had been prepared.

4. Reflection

   Reflection includes analysis, interpretation, and evaluation activities resulting from observations. The data collected during observation is analyzed to check whether the actions taken are by the plan, whether the objectives are achieved and to find effective solutions by planning further actions.

   The flow of the classroom action research carried out can be presented in Figure 1.
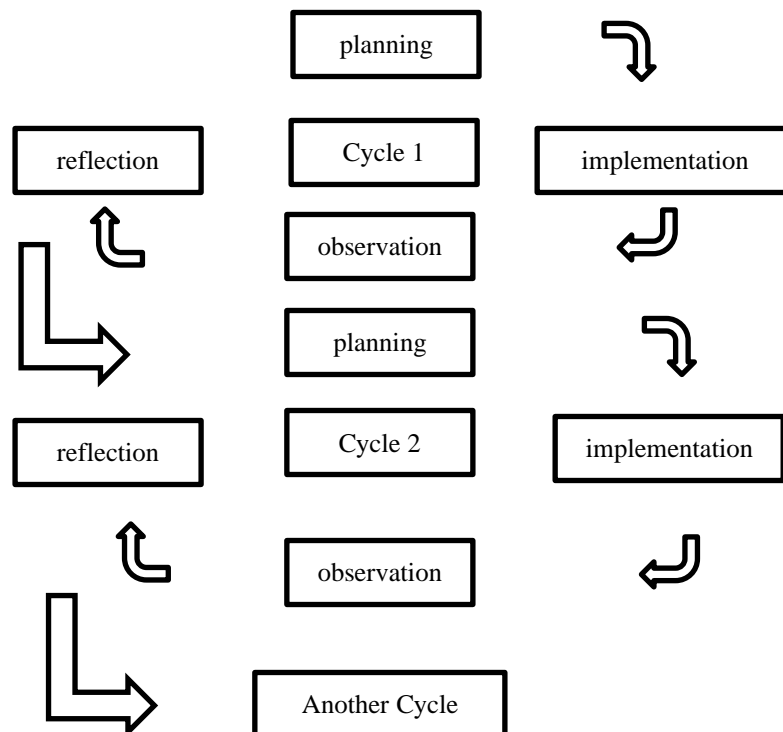

Figure 1. Classroom Action Research Cycle Design

The population of this research is all students from class X. The sample for this research is class X-6. The sample selection technique uses a random sampling technique using a random dice-throwing method. The subjects involved in this classroom action research were students in class.

Table1. description of the sample used

Class	Number of male students	Number of female students
X-6	16	14
Amount		30

Data collection techniques include tests and documentation. The instruments in this research are multiple choice tests and documentation in the form of photographs during the teaching and learning process. The research variables consist of the dependent variable in the form of cognitive learning outcomes, while the independent variable is the PBL learning model. The data analysis technique uses comparative quantitative methods to determine the impact of the problem-based learning model. Analysis was carried out by comparing the difference in scores before learning activities and after learning activities using the Problem Based Learning (PBL) learning model. The device used in the t test is spss. The data analysis technique used is the t test. The reference for the success of this research is having achievement indicators. The indicator of achievement in this research is if the student average is greater than or equal to the KKM of 75 or 80% in the medium category.

Table 2. Success Level Categories

Achievement Percentage	Learning Outcome Category
90-100	Very good
80 – 89	Good
65-79	Enough
40-64	Less
0-39	Very less

RESULTS AND DISCUSSION

This research applies the Problem Based Learning learning model to biology subjects. This learning was carried out to improve the learning outcomes of class X students at SMA Negeri 2 Nganjuk. The implementation of this research followed four stages, namely: planning, action, observation, and reflection. Research activities are carried out during science subject hours and do not interfere with other learning processes. This research found several findings, including the application of the problem-based learning model to learning activities, with visible results namely improving student learning outcomes. Students who take part in teaching and learning activities become more active and motivated through learning methods. In addition to generating interest, attention and participation, students are able to find solutions to

problems that arise using methods provided by the researchers themselves, and student interest produces results, which leads to better student understanding.

The application of the Problem Based Learning learning model shows an increase in learning outcomes from cycle I to cycle II. Here's the explanation:

Table 3. Comparison of Student Learning Outcomes

	Cycle I Test	Cycle II Test
Average	72.97	83.00
Highest score	90	100
Lowest score	45	45
Number of students who completed	12	25
Completion percentage	40%	83%
Qualification	Less	Good

From the table above there are differences in test results in cycle I and cycle II. In cycle I the average student score was 72.97 with 12 students completing and a completion rate of 40% in the poor category. Meanwhile in Cycle II there was an increase in the class average to 83.00 with the number of students completing 18 people, of whom 83% were in the good category. The following data is presented in histogram form.
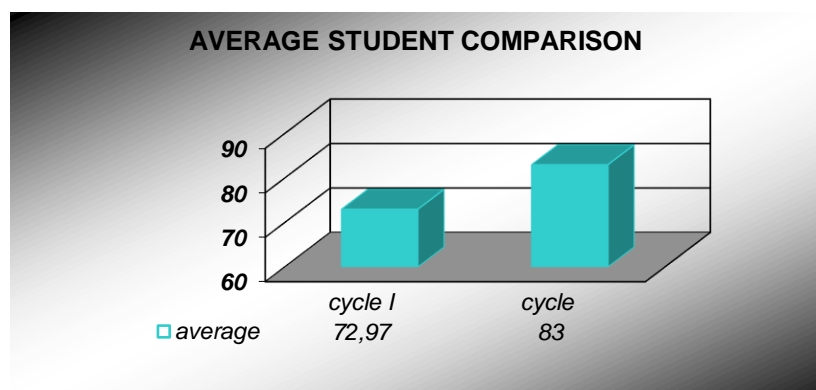

Diagram1. Comparison of Average Student Learning Outcomes

Based on the diagram above, all students experienced an increase in scores before and after cycle II. If we look at the average class score of 30 students in cycle I it was 72.97 with sufficient criteria and in cycle II it was 83.00 with good criteria. The following is a comparison of the percentage of completion for each cycle. Biology learning with the PBL model in class 2) in the core activities there are problems faced by students individually and in groups using models; This means they can complete it individually or in groups. 3) closing activities, namely reviewing the material that has been presented, such as questions and answers.

Comparison of Student Learning Outcomes Percentage
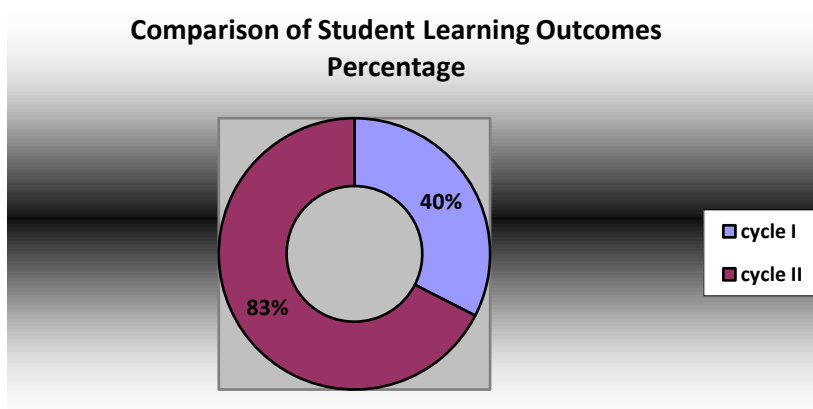

40%

83%

cycle I
cycle II

Diagram2. Comparison of Student Learning Outcome Percentages

From the histogram above, it can be seen that learning completeness in cycle I was 40% and learning completeness in cycle II was 83%. This discussion presents research on the application of problem-based learning (PBL) to improve the learning outcomes of class X-6 students at SMA Negeri 2 Nganjuk. Research shows that the use of PBL can increase student motivation so that it has an impact on improving student learning outcomes.

In Cycle I the average score was 72.97 and the completion rate was 40%. Of the 30 students, only 12 students finished with a completion percentage of 40%, even though the target was 80%. Therefore, the data recapitulation of cycle I was declared incomplete. In Cycle II the average score increased to 83.00 and the level of learning completeness was 83%. In Cycle II 83% of completion met the success criteria for the action to be achieved, so the action was stopped until Cycle II. From these data, it can be seen that students' cognitive outcomes can improve. This is because the Problem Based Learning learning model is quite effective in improving student learning outcomes.

Apart from applying the model, several factors influence learning outcomes: internal and external factors. Internal factors are processes in teaching and learning activities that can change student behavior, such as motivation, concentration and reactions. Motivation occurs when students have the effort and desire to develop and learn better. Concentration is very necessary in learning activities because if students are not able to concentrate in learning activities it can affect learning outcomes that are less than optimal. Responses to teaching and learning activities require physical and mental components. Student presence in the learning process. Students are subjects while learning, not just sitting, silent, listening, or just objects.

The increase in learning outcomes is believed to be caused by increased student interest in learning because learning through the PBL learning model challenges and stimulates students so that it has an impact on improving results. The Problem Based Learning learning model is suitable to be applied because it has many advantages, including: (1) the Problem-Based Learning learning model can increase students' full activity, both physically and mentally, (2) the problem-based learning model can make students learn not by memorizing. , but rather proceeds from students' experiences in real life, (3) classes in Problem-Based Learning as a place to solve problems in the field, (4) lesson material is constructed by the students themselves guided by the teacher. This finding is strengthened by previous findings which state that the Problem-Based Learning learning model affects student learning outcomes in elementary schools (Afifah et al., 2019; Kristiana & Radia, 2021; Suari, 2018). The Problem-Based Learning learning model can also improve learning outcomes with the help of learning media (Andriyani & Suniasih, 2021; Fajar Ali, 2016). Other findings also state that learning motivation can be increased by using the problem-based learning model (Setyosari & Sumarmi, 2017; Suari, 2018).

CONCLUSION

Based on the results of research and discussions that have been completed, it can be concluded that improving science learning outcomes in class X-6 of SMA Negeri 2 Nganjuk can be pursued through learning with the Problem-Based Learning (PBL) learning model. This can be seen in the comparison of science learning outcomes based on (1) the percentage of completeness of learning outcomes obtained by data between cycle 1: 40% and in cycle 2 it was 60%, (2) the average value of students and learning completeness, namely cycle 1: 73, 01 and cycle 2: 82.1. Based on the results of this research, it is stated that this research can be said to be successful because the research results have met the specified indicators.

SUGGESTION

From these conclusions the researcher has suggestions, namely; (1) It is hoped that teachers can make materials and teaching materials well (2) Students must participate in learning actively to improve creative thinking (3) Schools are expected to support learning activities by providing complete materials used for learning so that learning objectives can be met. (4) Researchers should study learning models other than PBL, so that they can provide recommendations to teachers regarding effective learning models to apply in learning.

THANK-YOU NOTE

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REFERENCE

Afifah, EP, Wahyudi, & Setiawan, Y. (2019). The Effectiveness of Problem Based Learning and Problem Solving on the Critical Thinking Ability of Class V Students in Mathematics Learning. Journal of Mathematics Education, Science and Technology, 4(1), 95–107.https://doi.org/10.30651/must.v4i1.2822.

Andriyani, NL, & Suniasih, NW (2021). Development of Learning Videos Based on Problem-Solving Characteristics of Animals and Their Habitats Contain in Science Subjects on 6th-Grade. Journal of Education, 5(1), 37–47. Ariyani et al. 359 https://doi.org/http://dx.doi.org/10.23887/jet.v5i1.32314 .

Ariyani, B., &; Kristin, F. (2021). Problem Based Learning Model to Improve Social Studies Learning Outcomes for Elementary School Students. Journal of Education and Scientific Learning, 5(3), 353. https://doi.org/10.23887/jipp.v5i3.36230

Asniadarni. (2018). Efforts to Increase Students' Science Learning Activities and Outcomes through the Implementation of the Problem Based Learning (PBL) Model. Diklabio: Journal of Biology Education and Learning, 2(1), 103–112. https://doi.org/10.33369/diklabio.2.1.103-112.

Gulo, A. (2022). Application of the Problem Based Learning learning model in increasing motivation and science learning outcomes. Educativo: Journal of Education,1(1), 334–341. https://doi.org/10.56248/educativo.v1i1.58

Handayani, A., & Koeswanti, HD (2021). Meta-Analysis of Problem Based Learning (PBL) Learning Models to Improve Creative Thinking Abilities. Basicedu Journal, 5(3), 1349–1355. https://doi.org/10.31004/basicedu.v5i3.924

Khusna, M., Sudaryanto, &; Dian, D. (2020). Application of the Problem Based Learning (PBL) Model Based on Blended Learning to Increase Student Motivation and Learning Outcomes. Proceedings of Teacher Professional Education, 1(2), 274–282.

Kusnandar, D. (2019). The influence of the problem-based learning model on cognitive learning outcomes and science learning motivation. MADRASCIENCE: Journal of Islamic Education, Science, Social and Culture, 1, 17–30.

Mayshandy, MF, Mahardika, IK, &; Budiarso, AS (2021). The influence of the problem-based

learning model accompanied by a concept map on motivation to learn science in global warming material for class VII SMP. Bioscience: Journal of Education, 7(2), 101–109. https://doi.org/10.24114/inpafi.v3i1. 8028

Meilasari, S., Damris M, DM, & Yelianti, U. (2020). Study of Problem-Based Learning (PBL) Learning Models in School Learning. BIOEDUSAINS:Journal of Biology and Science Education, 3(2), 195–207. https://doi.org/10.31539/bioedusains.v3i2.1849

Novika Auliyana, S., Akbar, S., &; Yuniastuti. (2018). Implementation of Integrated Thematic Learning in Elementary Schools. Journal of Education: Theory, Research, and Development, 3(12), 1572–1582. https://doi.org/10.17977/jptpp.v3i12.11796.

Pertiwi, FA, Luayyin, RH, & Arifin, M. (2023). Problem Based Learning to Improve Critical Thinking Skills: Meta Analysis. JSE: Journal of Sharia Economica, 2(1), 42–49. https://doi.org/10.46773/jse.v2i1.559

Pramudya, E., Kristin, F., &; Anugraheni, I. (2019). Increased activity and science learning outcomes in thematic learning using Pbl. NATURALISTIS: Journal of Education and Learning Research, 3(2), 320–329. https://doi.org/10.35568/naturalistic.v3i2.391

Ricardo, & Meilani, RI (2017). The Impact of Learning Interest and Motivation on Student Learning Outcomes. Journal of Office Management Education, 2(2), 79. https://doi.org/10.17509/jpm.v2i2.8108.

Rismawati, M. (2021). Factor Analysis of Students' Mathematics Learning Difficulties During the Covid-19 Pandemic. Jakarta Mathematics Education Research Journal, 3(2), 8–15. https://doi.org/10.21009/jrpmj.v3i2. 2226

Sapua, MR, Ulfa, NA, & Jaharudin, J. (2022). The Influence of the Problem Based Learning (Pbl) Learning Model on Increasing Student Creativity in Biology Subjects in Class Xi Ipa Ma Nurul Yaqin, Sorong Regency. Biolearning Journal, 9(1), 50–55.

Setyosari, P., & Sumarmi, S. (2017). Application of the Problem Based Learning Model Increases Motivation and Social Studies Learning Outcomes. Journal of Education: Theory, Research, and Development, 2(9), 1188–1195. https://doi.org/10.17977/jptpp.v2i9.9936.

Septaria, K., & Rismayanti, R. (2022). The effect of scientific approach on Junior High school students' Scientific Creativity and Cognitive Learning Outcomes. Jurnal Penelitian dan Pengkajian Ilmu Pendidikan: e-Saintika, 6(3), 173-189.

Septaria, K., Nissak, K., & Wulandari, S. A. (2023). Student Identity and Guided Inquiry Learning in Junior High School Students: A Correlation Analysis. Jurnal Penelitian

Pendidikan IPA, 9(10), 8351-8358

Nurika, L., Septaria, K., & Setyaningsih, S. (2024). Implementing Science Creativity In Junior High School Students Using A Pirporsal Learning Model On Energy Resources. INKUIRI: Jurnal Pendidikan IPA, 13(1), 36-41.

Septaria, K., Fatharani, A., Dewanti, B. A., & Utami, Z. R. (2024). Satuan Pendidikan Aman Bencana (SPAB) Berbasis Partisipatory Rural Appraisal di Madrasah Aliyah Sunan Santri Lamongan. TAAWUN, 4(02), 229-240.

Sholekah, AW (2020). Increasing motivation and learning outcomes for environmental pollution science material through the PjBL model for class VII students at SMPN 9 Salatiga. Journal of Mathematics and Natural Sciences Education, 10(1), 16–22. https://doi.org/10.37630/jpm.v10i1. 260

Sukmawati, R. (2021). Application of the Problem Based Learning Model to Improve Class II Mathematics Learning Outcomes at SDN Wonorejo 01. Glosains: Indonesian Global Science Journal,2(2), 49–59. https://doi.org/10.36418/glosains.v2i2.21

Wahyuni, NKA, Wibawa, IMC, &; Sudiandika, IKA (2021). Application of the PBL (Problem Based Learning) Learning Model to Thematic Learning Outcomes (Indonesian Language Lesson Content). Scientific Journal of Teacher Professional Education, 4(2), 230–239. https://doi.org/10.23887/jippg.v4i2.36088