

Research Article

Improving the Biology Learning Outcomes of Class XI Students on Respiratory System Material Using the Problem-Based Learning Model at SMAN 2 Mataram

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ABSTRACT

High-quality education can keep up with the demands of the times and be able to compete with the environment. Changes and improvements that occur in the world of education due to the dynamics that occur in the environment to face challenges and progress according to developments, will influence the implementation of learning in schools. Problem-Based Learning (PBL) is an innovative learning model that can provide active learning conditions for students. This research aims to improve the biology learning process and learning outcomes through Problem-Based Learning. This research is classroom action research (PTK). The research subjects were 36 students in class The types of data collection techniques used in this research are observation, cognitive learning outcomes tests, and documentation. The research procedure was carried out in two cycles, and each cycle consisted of 2 meetings starting from planning, implementing actions, observing, and reflecting. The research results show that there has been an increase in the quality of learning and learning outcomes. This can be seen in increasing learning motivation, student activity, and cognitive learning outcomes. Students' learning motivation in Cycle I (55.56%) and Cycle II (86.11), while for students' activeness in Cycle I (69.44%) and in cycle II (88.89%). For completeness of learning outcomes in Cycle I (66.67%) and in Cycle II (80.55%). Based on the results obtained, it can be concluded that the application of PBL can improve learning outcomes in respiratory system material.

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INTRODUCTION

Education in the 21st century aims to build students' intelligence abilities in learning so they can solve problems that exist around them. Forming intelligence in the real world is not just about knowing, but can solving problems faced in the environment in a meaningful, relevant, and contextual way. Contextual student learning, which can train critical thinking, master technology, be cooperative, and collaborate is very necessary in solving problems. In line with the progress of the times, the development of science and technology in the increasingly rapid era of globalization, the problems that arise are increasingly diverse and complex. Humans must be tough and able to competently face these challenges. Humans must be able to find solutions to problems that arise from the impact of progress over time. Efforts to prepare people who are competent to face the progress of the times are by equipping students with the ability to solve problems. According to Wena (2011:53), the ability to solve problems is very important for students and their future. The results of the 2018 Program for International Student Assessment (PISA) survey published in March 2019 captured a glimpse of Indonesia's education problems. In the reading, science, and mathematics ability categories, Indonesia's score is relatively low because it is in 74th place out of 79 countries. The 2018 survey again placed Indonesian students in the lowest grades on reading, mathematics, and science measurements. In the reading ability category, Indonesia is ranked 6th from the bottom (74) with an average score of 371. Down from 64th in 2015. Then in the mathematics category, Indonesia is ranked 7th from the bottom (73) with a score average of 379. Down from rank 63 in 2015. Meanwhile, in the science performance category, Indonesia is ranked 9th from the bottom (71), namely with an average score of 396. Down from rank 62 in 2015. Study results PISA shows that students' ability to master science in Indonesia is still low. Indonesian students are not used to connecting knowledge with real-life problems. Efforts to equip students with problem-solving skills at SMA Negeri 2 Mataram also still face obstacles. Based on the results of daily test analysis, when students were given problem-solving questions, only around 30% were able to do it well. The learning outcomes obtained by students are also still low.

One effort needs to be made to overcome the problem of low student learning outcomes, namely through the Problem Based Learning (PBL) learning model. PBL is a learning model that gives students problems to solve. According to Resti Ardianti et al, (2021) Problem-Based Learning (PBL) is a learning model in which students are faced with real problems that have been experienced by students. The processes in solving these problems can provide students with the means to carry out investigations and solve problems. Through this investigation, students gain learning experience and knowledge. It is hoped that the PBL model can also help students to improve their ability to solve problems, so that they can improve learning outcomes in the respiratory system material and ultimately can lead students to compete in the era of globalization. Biology learning using the PBL model has been carried out by Asra Indah et al. (2021). The results of implementing the PBL learning model can improve learning outcomes in biology learning in high school. The Problem Based Learning model is a learning model that involves students solving a problem through scientific methods so that students gain knowledge and have skills in solving problems (Farida et al., 2019; Ningsih et al., 2018; Permatasari

et al., 2019). The Problem Based Learning model makes students able to identify problems, find causal relationships and apply concepts that are appropriate to the problem (Rais & Suswanto, 2017). The knowledge gained will be stored for a long time in students' memories. Students need to have the ability to solve problems because this ability can help students make appropriate, careful, systematic, logical decisions and consider various points of view. This fact has an impact on students' poor ability to understand the material, students' interest in learning is low, so that learning outcomes are less than optimal, therefore teachers are required to be able to anticipate and pay close attention by using appropriate learning methods according to the situation, so that students are more motivated in participating in learning (Ilhamdi et al. (2020). Feelings of joy in learning can create interest and foster motivation to learn so that it will give a deep impression of what is being learned (Sumitro et al., 2017).

Learning outcomes are the output of a processing system for various inputs in the form of information (Abdurrohman, 2003:38). Meanwhile, Azwar (2007:11) states that learning outcomes are the results that students have achieved in the teaching and learning process which are expressed in the form of symbols, numbers or letters through an evaluation process. Bloom (in Sagala, 2003), classifies learning outcomes into three domains, namely the cognitive domain, the affective domain and the psychomotor domain. Learning outcomes are said to be perfect if they meet three aspects: cognitive, affective and psychomotor, whereas learning outcomes are said to be less than satisfactory if someone has not been able to meet the targets in these three criteria. Learning can simply be interpreted as a product of continuous interaction between development and life experience. A more complex meaning of learning is essentially a teacher's conscious effort to teach students (directing students' interactions with other learning resources) in order to achieve the expected goals (Trianto, 2010).

Biology learning is the same as science learning, it has a different nature from the nature of other learning. The essence of science learning is learning that is able to stimulate students' thinking abilities including four main elements, namely attitudes, processes, products and applications (Rustaman, 2005). The PBL model is a problem-based learning model that is based on the constructivism paradigm which places great importance on students and is oriented towards the student learning process (student centered learning). Learning is expected to become more meaningful with the use of the PBL model, so that it can improve student learning outcomes. According to Boud and Felletti (in Wena, 2009), a problem-based learning strategy is a learning approach that confronts students with practical problems, ill-structured or open-ended through learning stimuli. This research aims to determine whether there is an increase in the quality of the process and learning outcomes of respiratory system material in class.

METHOD

In this research, action research methods are used. Action research is a combination of substantive actions and research procedures. Action research is research that functions to help carry out work (need to do) (Sugiono, 2015). This Classroom Action Research aims to solve problems that occur in the classroom. Each meeting refers to the action research model developed by Kurt Lewin based on the main concept that action research consists of

stages, namely (1) planning (2) action, (3) observation, (4) reflection. These four steps are cycles or repetitive activities, that is, they must be carried out in a cyclical form, not just one intervention (Arikunto, 2010). This research was conducted in class XI MIPA 2, SMA Negeri 2 Mataram in semester 2 of the 2022/2023 academic year. The preparation stage to reporting the research results was carried out over 3 months, namely December 2022 to February 2023. The research subjects were students in class XI MIPA 2, totaling 36 students consisting of 19 women and 17 men. This Classroom Action Research was carried out in two cycles, where each cycle consisted of two meetings. The types of data collection techniques used in this research are observation, and cognitive learning outcomes tests and documentation.

RESULTS AND DISCUSSION

Based on the initial ability test of learning results that have been carried out, the following results were obtained: 15 students (41.67%) had their scores reaching the minimum completeness criteria (above the KKM), while 21 students (58.33) had scores that were still low. under KKM. The highest score for cognitive learning outcomes obtained was 78, and the lowest score was 45 with an average of 68.97. Meanwhile, based on initial observations, there were 17 students (47.22%) who had high learning motivation and actively participated in activities. So it is hoped that in cycle I the quality of the learning process and completion will increase. Based on the results in cycle I, there were 20 students who had high motivation (motivated) in learning activities (55.56%), 16 students whose motivation was still low (44.44%), students who were visible There were 25 students (69.44%) who were active in learning, and 11 students (30.56%) were not active. The average class score in cycle I was 73.86 with the highest score being 80 and the lowest score being 60. Classical completion in cycle I reached 66.67% (24 students), while 12 students (33.33%) had not yet completed it. , so it still needs action in the next cycle with some improvements.

Cycle II is a continuation of cycle I, which in cycle I had not yet reached the predetermined indicators. The final results obtained in cycle I are used as a reference in carrying out cycle II. In cycle II, the average score of students was 77.95 with the highest score being 85 and the lowest score being 65. Classical completion at the end of cycle II reached 80.55% (29 students), while 7 students had not yet completed it (19.44%). Based on the results of observations, there were 31 students who had high motivation (86.11%), 5 students (13.89%) who were not yet motivated, while 32 students (88.89%) were active. and those who were not active in learning were 4 students (11.11%).

Based on the results of observations of the teaching and learning process regarding the respiratory system material in cycle I, there are still shortcomings and weaknesses. Cycle II in this research is the final cycle. Cycle II was carried out to overcome the weaknesses and deficiencies in cycle I. In this cycle the teacher and researchers tried to minimize the weaknesses that occurred during the learning of the respiratory system material. In cycle II, the group division was carried out by teachers heterogeneously based on grades and gender.

With heterogeneous group members, the discussion process to solve problems becomes smoother and can be completed on time. Based on the increase in learning outcomes that occurred in cycle II, it is proven that the application of the PBL learning

model can improve the quality of the process and the quality of learning outcomes for respiratory system material in Class XI MIPA 2 students at SMA Negeri 2 Mataram. The success of learning using the PBL model in an effort to improve the quality of the process and the quality of learning outcomes regarding respiratory system material can be seen in the indicators that have been determined. Improving the quality of the learning process can be seen from the results of cognitive tests, motivation and student activity. Determining the percentage of motivation and activity is calculated from the number of students who get a minimum KKM score of 78 on each indicator during learning activities. The improvement in the quality of the learning process in implementing cycle I actions compared to cycle II can be illustrated in the data recapitulation in the form of graphs below (Figure 1).

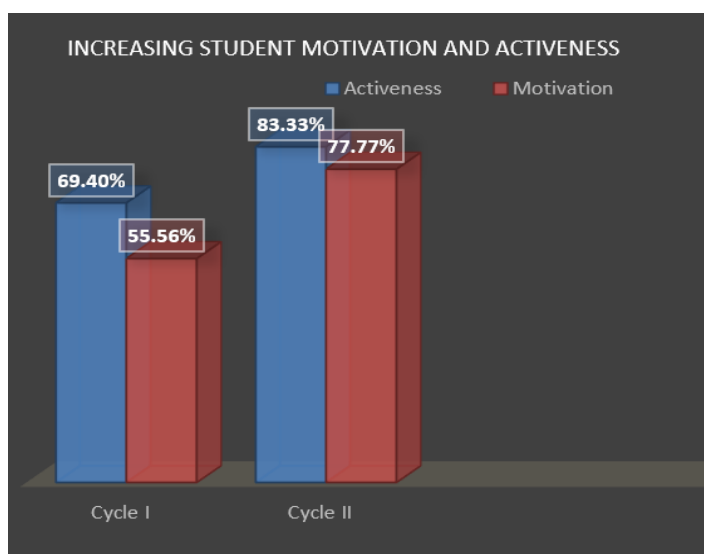


Figure 1. Increased Student Motivation and Activeness in Pre-Cycle, Cycle I and Cycle II

Student learning outcomes in learning respiratory system material in this study increased after students participated in learning using the PBL learning model (**Figure 2**). In learning, students seem to pay attention to the explanations made by the teacher, and understand and answer questions well.

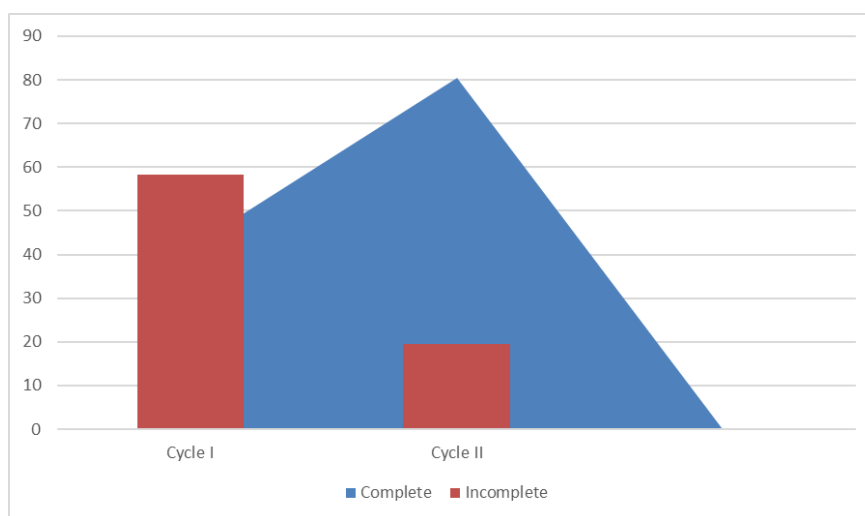


Figure 2. Improvement Students Learning Outcomes for Cycle I and Cycle II

Based on observations during the actions of cycles I and II, the average learning outcome value was 73.86 with a learning completeness of 66.67%, then in cycle II the average learning outcome increased to 77.95 with a learning completeness of 80.55%. The results of the actions in cycle I and cycle II were better when compared to the learning outcomes during the pre-cycle, namely with an average learning outcome of 68.97 with learning completeness of 41.67%. Judging from the data obtained from the research results, a comparison can be seen by obtaining different percentages from each study towards increasing student learning outcomes. Improving the quality of learning is an important factor that supports the achievement of progress in the field of education. Learning quality indicators are determined by student creativity and learning outcomes (Irawaty, 2021). This is in line with research conducted by Lestari (2022) that based on the results of the data analysis carried out it can be concluded that the application of the problem based learning (PBL) learning model can improve students' cognitive learning outcomes by obtaining a classical completion percentage in cycle I of 72.4% and in cycle II it was 96.5%. Apart from that, Widya, et al (2023) said that the biology learning outcomes of students who used the Problem Based Learning (PBL) learning model were higher when compared to the learning outcomes of students who used the Student Team Achievement Division (STAD) learning model.

According to Sri Mulyani (2020), the PBL learning model is a learning model that gives students problems to solve. The processes in solving these problems can provide students with the means to carry out investigations and inquiries. Through this investigation, students gain learning experience and knowledge. This is relevant to Bruner's learning theory that discovery learning will provide truly meaningful knowledge. This meaningful learning is also in accordance with Ausubel's learning theory. Dahar (2011) suggests that meaningful learning is a process of linking new information to relevant concepts contained in a person's cognitive structure.

Based on observations made by researchers, the cycle implemented by teachers by applying the PBL learning model in learning respiratory system material can improve students' abilities, making learning more interesting and enjoyable. Student motivation and activity, as well as student learning outcomes, have increased. This is in line with Sri Mulyani's (2020) conclusion, that the application of the PBL model in biology learning can improve the quality of the learning process and student learning outcomes. Increased learning outcomes occur because the PBL model is trained to solve problems (Fauzan et al., 2017). Apart from that, the application of the PBL learning model is able to facilitate students' understanding of concepts and their application because in learning the emphasis is on the application of techniques and procedures (Haniyya et al., 2017).

CONCLUSION

Based on the results of classroom action research which has been carried out for two cycles by applying the Problem Based Learning (PBL) learning model to Biology material about the respiratory system in class XI MIPA 2 SMAN 2 Mataram, it can improve the quality of learning and student learning outcomes. This can be seen in increased motivation and activeness of students, and the completeness of learning outcomes. Motivation in cycle I (55.56%) and in cycle II (86.11). Meanwhile, for activity in Cycle I (69.44%) and in Cycle II (88.89%). For completeness of learning outcomes in Cycle I (66.67%) and in Cycle II (80.55%). This shows that the application of the PBL learning model can improve learning outcomes in biology learning in high school.

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