Integrated Science Education Journal
Vol. 4, No. 1, January 2023, pp. 19~22
ISSN: 2716-3725, DOI: 10.37251/isej.v4i1.292

Implementation of Problem Based Learning Model as an Effort to Improve Student Activities and Outcomes in Temperature and Heat Materials

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Article Info

Article history:

Received Dec 11, 2022
Revised Jan 21, 2023
Accepted Jan 30, 2023

Keywords:

Activities
Learning Outcomes
PBL Learning Model

ABSTRAK

Purpose of the study: This study aims to determine whether learning using the Problem-Based Learning model can increase student activity and learning outcomes in class X heat and temperature material, especially class XB SMA Xaverius 2 Jambi.

Methodology: This research is a classroom action research carried out in three cycles. The types of data in this study were qualitative and quantitative data collected through formative tests and observations of teacher and student activities through observation sheets.

Main Findings: The results showed that using the Problem-Based Learning learning model increased student learning activities and resulted in each cycle. In cycle I, the average proportion of student activity was 69.07%. In cycle II, it was 79.85%, and in cycle III, it was 86.88%.

Novelty/Originality of this study: Research by applying the Problem-Based Learning learning model in physics learning to increase student activity and learning outcomes on the subject of temperature and heat in class X SMA Xaverius 2 Jambi.

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1. INTRODUCTION

School is a place that has a very important role in improving the quality of human resources. If education in a school has good quality, then the human beings produced will also have good quality too. According to the Directorate of Educational Development for Education Personnel and Higher Education Personnel in Taniredja et al [1] Improving the quality of education in schools can be achieved in various ways, including increasing the initial provision of new students, increasing teacher competency, improving curriculum content, improving learning quality and research on learning outcomes. Based on the results of observations and interviews that have been conducted by researchers with physics teachers who teach in class XB, information is obtained that most students think physics is a difficult subject because there are many formulas that are not easy to understand, so most students find it difficult to work on questions or problems given by the teacher [2]-[4].

During the teaching and learning process, student activities in learning only record and do the assignments given by the teacher, in fact there are still many students who do not take notes and do not do the assignments given [5]-[7]. When the teacher gives the opportunity to ask questions and give opinions, students prefer to be silent and there are only a few students who play an active role in learning. Students who are always active in learning are the same students in every learning activity. Even though many of the students did not understand the material explained by the teacher [8-11]. This is due to the lack of feedback given by students during the learning

process. Lack of student activity in learning, one of which is because the methods used by teachers are less varied [12-14]. In addition, the learning process that takes place is still in the form of knowledge transfer from teacher to student, so students just sit, listen and take notes. This factor causes the learning outcomes obtained by students to be unsatisfactory.

According to Sani [15] Problem-based learning can make students learn through efforts to solve real-world problems in a structured way to construct student knowledge. This learning requires students to actively carry out investigations in solving problems and the teacher acts as a facilitator or guide. Students are required to solve the problems presented by digging up as much information as possible, then analyzing and looking for solutions to existing problems. The importance of this research is because there has been no research conducted at the Xavier 2 Jambi school regarding the implementation of the PBL model as an effort to increase student activity and learning outcomes on temperature and heat.

Based on the description above, the writer is interested in conducting research by applying the Problem Based Learning learning model in physics learning to increase student activity and learning outcomes on the subject of temperature and heat in class X SMA Xaverius 2 Jambi.

2. RESEARCH METHOD

This research uses mixed methods research. Where the research used is a combination of the types of quantitative and qualitative methods. Qualitative data collection was carried out using observation sheets of student activities during teaching and learning activities [16]. Quantitative data used to observe the assessment of student learning outcomes in each cycle. Qualitative analysis for observational data regarding student learning activeness. This research was conducted at Xaverius 2 Jambi High School in the 2014-2015 academic year. The subjects of this research were students of class XB SMA Xanerius 2 Jambi even semester of 2014-2015 academic year. This research was conducted in the even semester of the 2014-2015 academic year.

This research is Classroom Action Research (PTK) which is conducted in three cycles. Where in each cycle there are certain stages according to the stages as stated by Ekawarna (2009), as follows: (1) Planning (Planning), (2) Implementation of Actions (Acting), (3) Observation (Observation) and Evaluation, (4) Analysis and Reflection (Reflecting) [17].

Data about student learning outcomes are taken through tests (formative tests) which are held at the end of each learning cycle. Before the test items are used in research, it is necessary to conduct trials and analyzes to obtain the validity of the questions, the difficulty level of each item, the differential power of each item, and the reliability of each item that meets certain criteria.

Data collection techniques in this study using simple random sampling. In this technique the researcher will select a random and simple sample by obtaining the same opportunities [18]. Students from class X SMA Xavier 2 Jambi. will answer the questionnaire questions according to what is felt. Later on from these answers the scores answered by students will be seen. So that researchers can process the results of the data to the next stage.

After the data has been obtained, it enters the data analysis stage. In quantitative research, researchers used descriptive statistical tests. In this test the researcher will see how the assessment of each class is. After obtaining the results of the descriptive statistical test, the next step is to test the assumptions to see whether the data is normally distributed or not. In addition, if the data is normally distributed, it can use hypothesis testing, including the T test and correlation test. After testing, the results of these data can be supported by the results of interviews so that conclusions are obtained.

3. RESULTS AND DISCUSSION

Based on the results of observations and the results of the final test for each cycle that has been carried out, it shows that there is an increase in each cycle. In SPSS testing, the first step is testing assumptions. Assumption testing is carried out to see whether a data is said to be normal, linear and homogeneous. With the stipulated condition that the resulting significant value must be more than 0.05. Furthermore, testing on the hypothesis, to see whether a variable has differences and relationships between variables. The following are the results obtained from the SPSS test.

Table 1. Normality Test

Tests of Normality							
		Kolmogorov-Smirnova			Shapiro-Wilk		
	Class	Statistic	df	Sig.	Statistic	df	Sig.
PBL	X B	.051	30	.200*	.982	30	.771
Learning outcomes	X B	.058	30	.200*	.972	30	.521

The results obtained for the PBL and Learning outcomes variables show that the significant value for the Kolmogorov-Smirnov is 0.200. The results of testing the hypothesis on the T test and correlation test are as follows.

Table 2. Homogeneity test

Test of Homogeneity of Variances					
		Levene Statistic	df1	df2	Sig.
PBL	Based on Mean	.456	1	52	.401
	Based on Median	.207	1	52	.550
	Based on Median and with adjusted df	.207	1	50.189	.551
	Based on trimmed mean	.395	1	62	.431
Learning outcomes	Based on Mean	.427	1	62	.415
	Based on Median	.308	1	52	.480
	Based on Median and with adjusted df	.308	1	50.803	.480
	Based on trimmed mean	.383	1	52	.438

In testing the homogeneity of the significant value of the PBL and learning outcomes variables, it was obtained based on a mean of 0.401 for PBL and 0.415 for learning outcomes. The results of the T test are as follows.

Table 3. Uji T

Variabel		Sig.	Sig. (2-tailed)
X B	PBL	0.238	0.032
	Learning outcomes		

The test results obtained in this test show that the resulting significant value is 0.032. In the Assumption test, the data used is normally distributed because of the significant results obtained, the value is more than 0.05. The last test on the assumption test is that the data is homogeneously distributed which has a significance value of 0.05. Followed by hypothesis testing where the test found that there was a difference between the application of PBL and student learning outcomes in physics learning in class X B. And there was a relationship between PBL and student learning outcomes in physics learning in class X B. This was due to the significant value generated no more than 0.05.

Table 4. Correlation Test

Variabel	School	N	Pearson Corelation	Sig. (2-failed)
PBL	X B	30	0.590	0.002
Learning outcomes	X B	30	0.546	0.011

The test results obtained showed that the significant value was not more than 0.05. As for the results of the interview. This explains that the data used has a relationship where the PBL model has a relationship with learning outcomes so that the better the application of the PBL model, the better the desired learning outcomes. This has been explained in the results of the following table. The significant results obtained in the PBL model were 0.002 and the significant results obtained in the learning outcomes were 0.011.

Table 5. Cycle results from CAR and learning outcomes

Variable	Cycle I	Cycle II	Cycle III
CAR	69.07%	79.85%	86.88%
Learning outcomes	46.88%	71.9%	84.4%

Based on the results of the classroom action research that has been carried out, it can be seen from the average percentage of student activity in cycle I was 69.07%, cycle II was 79.85%, and cycle III was 86.88%. This shows that student activity increases in each cycle. The increase in the average value of learning outcomes in cycle I was 64 with the number of students who succeeded as many as 15 people (46.88%), cycle II 73.36 with the number of students who succeeded as many as 23 people (71.9%) and for cycle III increased to 81.20 with the number of students who succeeded in achieving the Minimum Completeness Criteria score of 70 as many as 27 people (84.4%) but there were 5 people (15.3%) who had not succeeded in achieving the Minimum Completeness Criteria score.

4. CONCLUSION

Based on the results of the application that has been obtained, it can be concluded that the application of learning with the Problem Based Learning model can increase the activity and results of student physics learning in the subject of Temperature and Heat in class XB SMA Xaverius 2 Jambi. However, this research has limitations, namely researchers only examine the activities and learning outcomes of students. researchers have not examined the characters obtained from students so it is suggested for readers to read other references regarding student characters that are relevant to this study.

ACKNOWLADGEMENT

The researcher would like to thank all stakeholders who have given permission to the researcher to do service and those who helped with this research.

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