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The Effect of Booklets Based on Project Based Learning on Solving Environmental Problems in Junior High Schools

Oleh:

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INTRODUCTION

In the 21st century educational transformation students are required to be able to master various skills in the fields of knowledge, information and technology (Maryani et al., 2022). In this transformation problem solving skills have a very important role for students. One of them is an important learning achievement in an education in Indonesia (Siswanto et al., 2018)

The well-known model in the problem-solving process is the Polya, where Polya's problem-solving skills train students not only to memorize and remember but also to train students to be able to solve problems that are presented in real conditions and situations (Supiyati et al., 2019).

There are several factors that affect students' problem-solving abilities

Internal factors such as prior knowledge abilities and logical intelligence (Noviastiwi, 2017).

Eexternal factors such as the learning model/method used, the learning environment created and the provision of motivation from the teacher (Hanifa et al., 2018).

INTRODUCTION

Students think that the science learning process is a rote lesson that tends to take notes and pay attention to the teacher's explanations (Pisaba, 2018).

So that →

In class, students feel bored and monotonous. This is also according to research (Wildani & Budiyono, 2022) that the low problem-solving ability of these students can be caused by several things, one of which is the lack of learning innovations carried out by educators.

Research (Rahayu et al., 2021) states that students' problemsolving abilities in science are still low, this can be seen from their ability to experience difficulties when studying environmental pollution material.

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This happens because teachers still use conventional learning methods, and students are less faced with concrete problems, because the problems given by students are not complex, monotonous, and less varied (Setyobudi & Marsudi, 2018).

From the observation results, it can be seen that the 42 students have not reached the Minimum Completeness Criteria for science subjects that have been determined, which is 65

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This shows that the level of students' problem-solving abilities is still very low.

INTRODUCTION

This issue of problem-solving ability needs to be carried out by various learning innovations to be repaired, With this innovation, it is able to trigger students' problem-solving abilities, one of which is by using Project Based Learning.

Project Based Learning is a learning model that uses projects as media. Students can explore, assess, interpret, synthesize, and collect information to produce various forms of learning outcomes (Santoso & Wulandari, 2020). Project Based Learning is carried out so that students are able to relate the various components of problem solving, link between materials, direct questions, hands-on, group work, and interactive group activities (Makrufi et al., 2018).

Project-based learning can also improve students' skills in solving problems (Kurniawati et al., 2017). Therefore, the teacher no longer acts as a learning resource but rather as a facilitator, meaning that the teacher helps students more to learn, the teacher also monitors students while studying (Muamar et al., 2017).

INTRODUCTION

Learning resources that are considered to be appropriate in supporting project based learning are learning resources in the form of booklets.

Booklet is one of the print media to convey messages in the form of interesting summaries and pictures

This is evidenced from the research which obtained from student learning outcomes achieving learning completeness ≥80% with a score of ≥80 and is suitable for use, with an average assessment result of material and media validators of 91.5%.

Based on the description above, this study aims to inquire about the effect of booklets based on Project based Learning on solving environmental problems in Junior High Schools. In this case, students are also expected to be more active and creative in the science learning process that they will learn later

METHOD

This research is a quantitative study that uses an experimental design type of research with the One Group Pretest-Posttest (Wahab et al., 2021). This research was conducted at SMP Nurul Huda Tulangan with a population of 67 students. Sampling used purposive sampling technique, namely the technique of determining a sample with certain considerations (Wulandari, 2016) . Based on this technique, the sample selected was 17 students of class VII SMP Nurul Huda Tulangan. The dependent variable in this study is the ability to solve environmental problems and the independent variable in this study is the booklet. In general, the research design is presented in figure 1 and research steps in Figure 2.

O_1	X	O_2

Gambar 1. *One Group Pre-test Post-test* [29]

Keterangan:
O_1 = Nilai pre-test
O_2 = Nilai post-test
X = Perlakuan dengan sumber belajar booklet berbasis project based lerning

METHOD

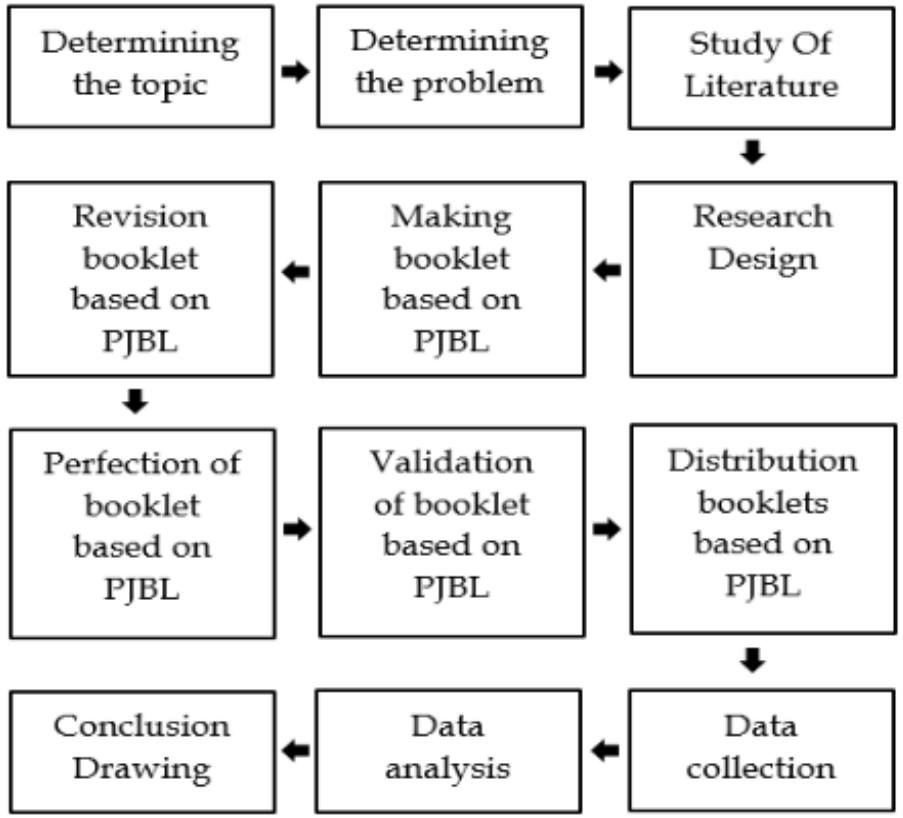

Figure 2. Research Steps

Data collection techniques in this study used pretest and post-test problem solving which were designed to measure problem solving indicators, namely understanding the problem, problem-solving planning, completing problem solving planning, and rechecking answers. In this study the instrument used was an environmental problem-solving test in the form of a description of twelve questions that had been tested for validity and reliability. Then students were grouped based on the level of problem-solving ability which was divided into five groups, namely: very good, good, good enough, not good enough and not good

METHOD

The percentage interval for solving environmental problems is presented in **table 1**.

Percentage Interval (%)	Criteria
81–100	Verry Good
61–80	Good
41–60	Good enough
21–40	Not good enough
0–20	Not good

Table 1. Criteria for the percentage of ability to solve environmental problems (Rohmah et al., 2022)

In this case, the next step is that the data obtained will be tested using a paired sample t-test assisted by SPSS 26 to find the sig score in the pre-test and post-test data.

RESULT

In order to review or see how much influence booklets based on Project Based Learning have on solving environmental problems

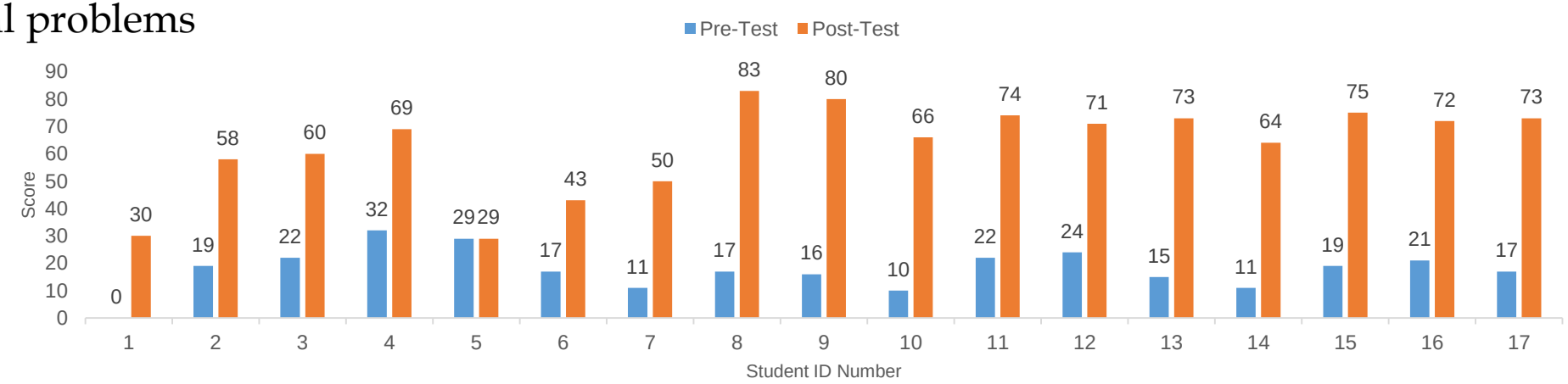

Figure 3. Students' Pre-test and Post-test Results

Figure 3 shows the pre-test and post-test scores which have increased. In the pre-test, the highest score was 32 and the lowest score was 0. Where at the time of the pre-test, no treatment was given at all, so that the score was classified as not good enough criteria. Meanwhile, in the post-test, the highest score was 83 and the lowest score was 30. This score has increased significantly and is classified as very good criteria. This can happen due to the existence of treatment in the form of providing learning resources in the form of booklets based on Project Based Learning.

RESULT

the average score of the pre-test and post-test can be presented with a bar chart in Figure 4

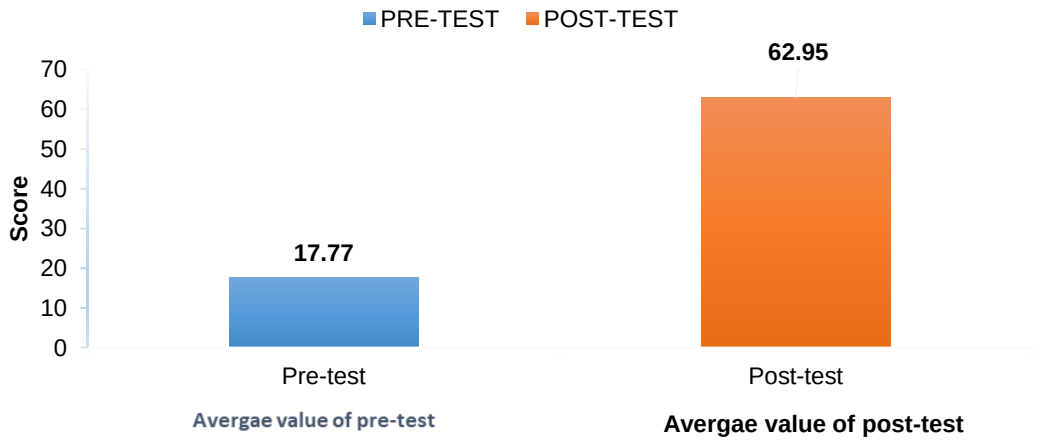

Figure 4. Average pre-test and post-test scores.

Based on Figure 4, the average score in the post-test has increased significantly. Where initially the pre-test average score was 17.77 in the post-test rose to 62.95

RESULT

The above data is strengthened by the results of the SPSSassisted paired sample t-test as shown in Tables 2, 3, and 4.

Table 2. Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PRE TEST	17.7647	17	7.48774	1.81604
	POST TEST	62.9412	17	16.18823	3.92622

Table 3. Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	PRE TEST & POST TEST	17	0.208	0.423

Tables 2, 3, and 4 above show the results of the paired sample t-test assisted by SPPS 26 with three outputs. The first output is in table 3 paired samples statistics. This output shows the results of the summary descriptive statistics of both samples or pre-test and post-test data. It can be seen that the pre-test which has not been given treatment in the form of a PJBL-based booklet gives an average score of 17.7647, whereas in the post-test that had been given treatment in the form of a PJBL-based booklet, it gave an average score of 62.9412. The second output is in table 4 paired samples correlations. This output shows the results of the correlation or data relationship between the two pre-test and post-test which shows a result of sig 0.423 as the basis for taking the correlation test where the significance results are > 0.05 which indicates there is no relationship between pre-test and post-test

RESULT

Table 4. Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PRE TEST - POST TEST	-45.17647	16.36015	3.96792	-53.58808	-36.76486	-11.385	16	0.000

This output is the most important thing in the paired sample t-test. Because in the third output there is data to find out how much influence the booklet based on project based learning has on solving environmental problems where the data produces a decision whether the data experiences a significant difference or does not experience a significant difference, if the sig score (2tailed) < 0.05 then there is a significant difference between the test results on the pre-test and post-test data, whereas if the sig score (2-tailed) > 0.05 then there is no significant difference between the test results on the pre-test and post-test data. It is known from these data that the sig (2-tailed) score is 0.000 <0.05, so it can be concluded that there is a significant difference between the test results on the pre-test and post-test data. So that the provision of learning resources in the form of booklets have effects on students' environmental problem-solving abilities.

RESULT

The data above is strengthened by the results of the analysis of problemsolving indicators as shown in Table 5.

Table 5. Achievement results of problem-solving indicators.

Indicator	Pre-test		Post-test	
	Percentage %	Criteria	Percentage%	Criteria
Understanding the problem	25 %	Not good	78 %	Good
Problem-solving planning	26 %	Not good	78 %	Good
Completion of problem-solving planning	17 %	Not good	69 %	Good
Rechecking answers	16 %	Not good	49 %	Good enought

RESULT

Based on table 5 the results of the problem-solving achievements can be summarized and presented in the form of a bar chart in Figure 4

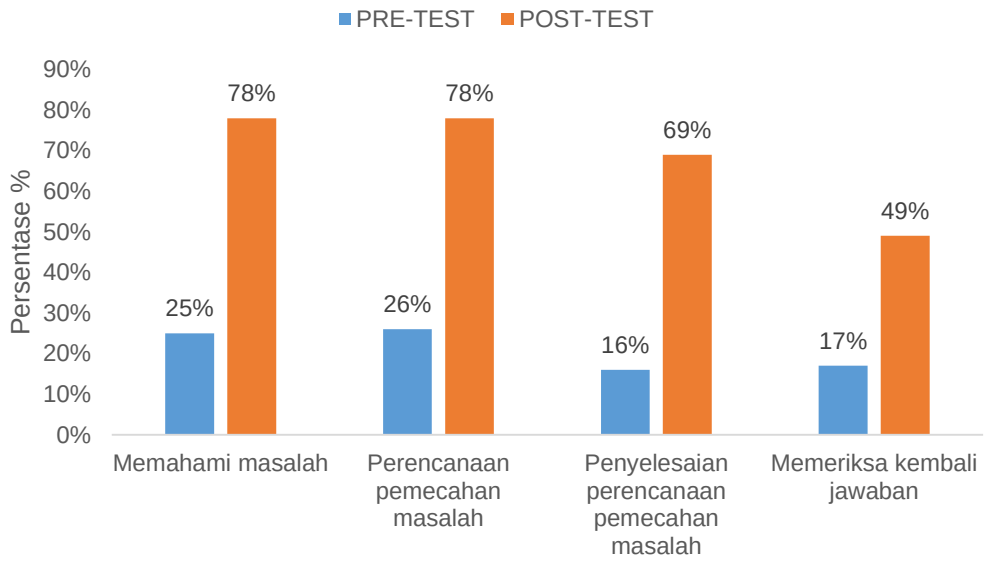

Figure 4. Sketch of achievement indicators for solving environmental problems in the form of a bar chart.

Description:
PU = Problem understanding
PSP = Problem solving planning
CPSP = Completing problem solving planning
RA = Rechecking answer

In figure 4 above, it shows the results of the pre-test in which initially the problem-solving abilities of students were classified as not good criteria. In contrast to the results of the post-test which shows problem

DISCUSSION

Thus, the provision of learning resources in the form of booklets based on Project Based Learning have effects on solving environmental problems in Junior High Schools.

Booklet teaching materials can increase student enthusiasm for learning, because the booklet teaching materials developed were in accordance with the curriculum used and had been adjusted to the characteristics of students and also interesting designs and the materials can increase students' enthusiasm for learning and capable of solving problems.

with booklet media the process of solving problems was easier to solve as evidenced by the results of the research post-test which increased significantly

DISCUSSION

The indicators for the problem understanding and problem-solving planning, get the same and the highest score among the other indicators. Whereas the indicator of rechecking answers, gets low scores both in the pre-test and post-test.

This can occur due to lack of thoroughness of students in answering, where the average student's wrong answers are for not rechecking the answers that have been written and feeling very confident about the answers (Fitriyana & Sutirna, 2022). This is also in line with research (Rini Husna Azzahra & Heni Pujiastuti, 2020) which states that on this indicator students have not been able to provide evidence that the solutions given are correct. Students only give solutions without providing evidence of the correctness of the solution. This is also according to research (Zakiyah et al., 2018) that the rechecking answers indicator is also included in the low category as evidenced by a percentage of 29.17%

CONLUSSION

Based on research data and data analysis that have been carried out by researchers, it can be concluded that providing booklet learning resources based on Project Based Learning has significant effects on students' environmental problem-solving abilities. Students who initially had difficulty understanding problems, planning problem solving, completing problem-solving plans and rechecking answers, were eventually able to improve these abilities, even though they were still in good or good enough criteria.

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