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Implementation of LKPD-Assisted Problem-Based Learning Models as an Effort to Improve Students' Mathematical Reasoning Ability at Percut Sei Tuan State Junior High School

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ABSTRACT

This study aims to improve students' mathematical reasoning abilities at SMP Negeri 1 Percut Sei Tuan with a problem-based learning model. This type of research is class action research. The research was conducted in Class VII-1 of SMP Negeri 1 Percut Sei Tuan with a total of 32 students. This study uses data reduction and exposure. Based on the results of the study, it can be concluded that the application of a problem-based learning model using LKPD can improve students' mathematical reasoning abilities in SMP Negeri 1 Percut Sei Tuan. This is based on the achievement of predetermined success indicators, where the average percentage of classical mastery of students' mathematical reasoning abilities has reached 85%, the results in cycle II are 90.6%, and student absorption is 68. Furthermore, the learning process by applying the approach of problem-based learning using LKPD is at least in the "good" category, where the score is > 2.5. In the results of this study, the average learning process in the second cycle was at a value of 3.52, which is in the "good" category.

A. INTRODUCTION

In learning mathematics, reasoning abilities can be useful for sharpening students' cognitive abilities at a higher level. Students' numeracy skills in mathematics are not enough; students also receive demands to solve problems logically and critically through reasoning skills (Kusumawardani et al. 2018). Students' mathematical reasoning thinking processes should be repeated in various contexts on mathematical material so that students become proficient in mathematical reasoning.In line with Turmudi (Sumartini, 2015), the development of different concepts consistently by utilizing brain routines is also known as "mathematical reasoning ability." Therefore, through learning mathematics, students' reasoning abilities will be better trained. In line with Sumartini (2015), in every mathematics class, mathematical reasoning abilities must always be habituated and developed.Based on the results of interviews that the researchers conducted with a mathematics teacher at SMP Negeri 1 Percut Sei Tuan named Mrs. Riefni Diana Lubis, M.P.D. stated that many students had difficulty solving math problems due to a lack of reasoning and that if the questions given varied slightly, it was even harder. This is due to the students' lack of understanding of the concept of the lesson and the way they learn (by memorizing problem-solving procedures), which is not good.Observation results obtained by researchers in class VII-1 SMP Negeri 1 Percut Sei Tuan by giving questions to 32 students showed that 6 students were able to achieve the minimum completeness criteria (KKM), while 26 students had not yet reached the KKM school set.According to Afandi et al. (2013), problem-based teaching is a learning approach in which students work on authentic problems with the intention of constructing their own knowledge, developing inquiry and higher-order thinking skills, and developing independence and self-confidence. Yusdila et al. (2019) explained that problem-based learning is a learning model with a learning approach that exposes students to authentic problems so that students can construct their own knowledge, develop higher skills and inquiry, become independent, and increase self-confidence. This model is characterized by the use of real-life problems as something students must learn and where the teacher's task must focus on helping students. Furthermore, Solihaturohmah (2014) explains that problem-based learning is learning that is carried out by giving problems to students that are appropriate to the context of their living environment so as to provide experience that can be used as material to gain understanding and can be used as guidelines and learning objectives to improve achievement. optimal learning.In implementing the teaching and learning process using a problem-based learning model, you can use student worksheets (LKPD). LKPD is often used in schools because it is a type of aid used to complement or support the implementation of lesson plans. LKPD is presented in the form of sheets of paper containing information and questions

that students must answer.LKPD is very good for involving students in learning.Because LKPD is designed to guide students in learning topics, it can be used in teaching and learning activities at the stage of instilling the concept (delivering a new concept) or at the stage of understanding the concept (the advanced stage of instilling the concept). Hamdani (2011) says that LKPD is used to learn about what has been studied, in this case the planting of concepts.

B. RESEARCH METHODS

Research Design

This research includes classroom action research (CAR). Classroom action research, according to Salahudin (2015), is research carried out during classroom learning with the aim of improving the quality of learning. Classroom Action Research: systematic and empirical thinking activities in an effort to resolve obstacles encountered by teachers (Sanjaya, 2012) Researcher learning will be carried out in as many as two (II) cycles, namely cycles I and II. The procedure for carrying out the research for each cycle goes through the stages of the problem, the stages of planning, implementing actions, making observations and collecting data, and giving reflection.

Research Instruments

A test of the participants' ability to reason was administered as part of this research. The procedure is an instrument that is used to find out or measure something in an environment according to certain ways and rules that have been set. A test is "a sequence of questions or exercises and other tools used to measure the skills, knowledge, intelligence, abilities, or talents possessed by individuals or groups," as stated by Suharsimi (2013). The type of examination that was used in this research was an essay test, and its purpose was to evaluate the level of mathematical reasoning that pupils possessed.

The act of making firsthand observations of the subject of research in order to take a detailed look at the processes that are being carried out is known as observation. Researchers, who will also serve in the capacity of instructors, will conduct the observations. The investigator makes use of a tool in the shape of an observation sheet on the management of learning that is geared at the acquisition of mathematical skills through the application of a problem-based learning paradigm.

Data Analysis Technique

Research data is collected either through student reasoning sheets, teacher activity observation sheets, or student activity observation sheets. The data was thoroughly reviewed from the beginning, when it was collected, until all the research data was collected. Data reduction is done after the data is collected. After data has been reduced and mathematical calculations have been performed, it is neatly presented in the form of narration, tables, or graphs.

The data analysis in this study was carried out in several stages, namely:

a. Calculating the Level of Reasoning Ability for each indicator
   Haikal suggests that to determine the level of students' reasoning ability on each indicator, consider the following:

$$NP_k = \frac{R_k}{SM_k} \times 100$$

with the following criteria:

Table 1. Level of Mastery of Reasoning Ability for Each Indicator

Value Range	Qualitative Value
$\mathbf{90} \leq \boldsymbol{NP_k} < 100$	Very High
$\mathbf{80} \leq \boldsymbol{NP_k} < 90$	High
$\mathbf{70} \leq \boldsymbol{NP_k} < 80$	Currently
$\mathbf{60} \leq \boldsymbol{NP_k} < 70$	Low
$\mathbf{0} \leq \boldsymbol{NP_k} < 60$	Very Low

b. Calculating the percentage of scores in mathematical reasoning abilities with the following calculations:

$$KB = \frac{T}{T_k} \times 100\%$$

with the following criteria:

Table 2. Level of Mastery of Reasoning Ability

Value Range	Criteria
90% – 100%	Very High

80% – 89%	High
70% – 79%	Currently
60 – 69%	Low
≤59%	Very Low

Individually, students are said to have been able to reason in mathematics lessons if the reasoning ability scores obtained have reached the minimum completeness criteria (KKM) at school, namely ≥ 68 in the moderate category.

c. Percentage of Classical Mastery
The percentage of classical completeness is formulated by:

$$DSK = \frac{M}{N} \times 100\%$$

with the following criteria:
DSK ≥ 85% : The class has finished reasoning
DSK < 85% : The class has not finished reasoning

C. RESULT AND DISCUSSION

Description of Research Results in Cycle I

In cycle I, the researcher acted as a teacher. Because of that, the researcher was assisted by the mathematics teacher to observe the teacher's activities during the lesson. The results of observing teacher activity in cycle I can be seen in Table 3 below.

Table 3. Description of the results of observing teacher activities in cycle I

No	Observed Activities	Meeting			
		1	2	3	4
1	Do apperception	2	2	3	4
2	Demonstrate mastery of learning material	2	3	3	3
3	Associate material with relevant knowledge	3	3	3	2
4	Deliver material clearly, according to the learning hierarchy and student characteristics	2	3	3	2
5	Carry out learning according to the competencies (objectives) to be achieved and the characteristics of students	3	2	2	3
6	Carrying out learning in a coherent manner, namely: (1) Providing contextual problems, (2) Solving contextual problems by discussing (3) Presenting the results of the discussion, (4) Drawing conclusions	3	3	3	3
7	Master class	3	2	2	3
8	Implement learning that enables positive habits	3	2	2	3
9	Do the learning due to the planned time allocation	2	2	2	3
10	Use media effectively and efficiently	2	3	3	2
11	Demonstrate an open attitude to student responses	2	3	3	2
12	Carry out a final assessment according to competence (objectives)	2	3	2	2
13	Use spoken and written language clearly, well, and correctly	2	2	2	2
14	Reflect or make a summary by involving students	2	3	2	2
15	Carry out follow-up by providing directions, or activities, or assignments as remedial/enrichment materials	2	3	2	2
Total		35	39	37	38
Average		2,33	2,60	2,47	2,53
Total Average		2,48			

Based on Table 3 above, it can be seen that the average rating of each indicator observed in managing learning from four friends in cycle I was at a value of 2.48, which is in the poor category. This shows that researchers are not good at teaching integer material using a problem-based learning model using LKPD.Students are given a mathematical reasoning ability test at the end of the first cycle of implementation in order to see the outcomes of the actions taken. The details can be seen in the attachment. Based on the test scores of students' mathematical reasoning abilities, by applying a problem-based learning model using LKPD on integer material, the following data is obtained:

Table 4: Completeness Data on Students' Mathematical Reasoning Ability in Cycle I

No	Completeness Level	Many Students	Percentage of Number of Students
1	Complete	20	62,5%
2	Not Completed	12	37,5%
Jumlah		32	100%

Based on Table 4 above, it can be concluded that there are 12 students who fall into the category of incomplete learning and there are 20 students who fall into the category of complete learning. Because the total percentage of student learning completeness is 62.5%, it does not meet the classical learning completeness criteria, which state that a class is said to have completed learning if 85% of the students have an absorption power of 68, and thus the results of cycle I have not been completed. Therefore, it is necessary to re-do learning improvements that can improve students' mathematical reasoning abilities in the teaching and learning process, then continue with the implementation of Cycle II.

Description of Research Results in Cycle II

In cycle II, the researcher acts as a teacher. Therefore, the researcher was assisted by the mathematics subject teacher to observe the learning process, including the teacher's activities during the lesson. The results of observing teacher activity in cycle II can be seen in Table 5 below.

Table 5. Description of the results of observing teacher activities in cycle II

No	Observed Activities	Meeting			
		1	2	3	4
1	Do apperception	3	4	4	4
2	Demonstrate mastery of learning material	3	4	4	4
3	Associate material with relevant knowledge	4	4	4	3
4	Deliver material clearly, according to the learning hierarchy and student characteristics	3	3	3	3
5	Carry out learning according to the competencies (objectives) to be achieved and the characteristics of students	3	3	4	4
6	Carrying out learning in a coherent manner, namely: (1) Providing contextual problems, (2) Solving contextual problems by discussing (3) Presenting the results of the discussion, (4) Drawing conclusions	3	3	3	4
7	Master class	4	4	4	3
8	Implement learning that enables positive habits	4	3	4	4
9	Do the learning due to the planned time allocation	4	4	4	4
10	Use media effectively and efficiently	4	4	4	2
11	Demonstrate an open attitude to student responses	4	4	4	4
12	Carry out a final assessment according to competence (objectives)	3	3	4	4
13	Use spoken and written language clearly, well, and correctly	3	3	2	3
14	Reflect or make a summary by involving students	3	3	4	4
15	Carry out follow-up by providing directions, or activities, or assignments as remedial/enrichment materials	3	3	3	3
Total		51	52	55	53
Average		3,40	3,47	3,67	3,53
Total Average		3,52			

Based on Table 5 above, it can be seen that the average rating for each indicator observed in managing learning from the four meetings in cycle II was at a value of 3.52 in the "good" category. This shows that the researcher is good at teaching integer material by using a problem-based learning model that uses worksheets. Based on the results of observations, two things can be analyzed, namely as follows:

Teacher Factor

1) Teachers have used LKPD effectively and efficiently
2) The teacher has attracted the focus of the students' attention so that each individual student is involved in every step of the planned learning activities..

Student Factor

1) Students appear to pay close attention to the teacher's explanation, respond to the outcomes of the discussion, ask questions if they don't understand something, and express their opinions to other groups.
2) Students are able to summarize the results of the discussion well.

At the end of the implementation of the second cycle, students are given a math reasoning ability test II, which aims to see the results of the actions given. The data from the results of mathematical reasoning abilities in cycle II can be seen in the appendix. Based on the test scores of students' mathematical reasoning abilities in cycle II obtained by applying a problem-based learning model using worksheets on integer material, the following data is obtained:

Table 6. Completeness Data of Students' Mathematical Reasoning Ability in Cycle II

No	Completeness Level	Many Students	Percentage of Number of Students
1	Complete	29	90,6%
2	Not Completed	3	9,4%
Jumlah		32	100%

Based on Table 6 above, it can be concluded that of the 32 students who took the test, 29 (90.6%) were declared complete and had reached the predetermined criteria of classical learning completeness; that is, a class was said to have completed learning if there were 85% of the students in the class, which has an absorption capacity of 68. So the number of students who have completed learning individually has increased by nine.From the data obtained above, it can be concluded that students' mathematical reasoning abilities have increased and they have achieved classical learning mastery. The writer does not continue the research to cycle III because the learning completeness criteria have been met.This shows that the application of a problem-based learning model that uses LKPD can improve students' mathematical reasoning abilities in SMP Negeri 1 Percut Sei Tuan.The results showed that the application of a problem-based learning model using LKPD could improve students' mathematical reasoning abilities in SMP Negeri 1 Percut Sei Tuan.Yusdila et al. (2019) explained that the problem-based learning model has the following advantages: (1) challenges students' abilities and provides satisfaction in discovering new knowledge for students; (2) improves student learning activities; (3) assists students in understanding how to transfer their knowledge to understand problems in real life; (4) stimulates the development of students' thinking progress in order to solve the problems they face appropriately; and (5) students will be accustomed to dealing with problems (problem solving) and will be challenged to solve problems not only recurrently but also infrequently.

Because LKPD is intended to guide students through learning topics, it can be used in teaching and learning activities at the instilling (delivery of a new concept) or understanding (the advanced stage of instilling the concept) stages.Lestari (Hamdani, 2011) says that LKPD is used to learn about what has been studied, specifically the planting of ideas.Yunita (2021) showed that using LKPD can help students get better at math reasoning. She did this by saying that student activity sheets can help students get better at math reasoning.

D. CONCLUSION AND SUGGESTIONS

The application of a problem-based learning model that uses LKPD can improve students' mathematical reasoning abilities in SMP Negeri 1 Percut Sei Tuan. This is based on the achievement of predetermined indicators of success, where the average percentage of classical completeness of students' mathematical reasoning abilities has reached 85%, where the results in cycle II amounted to 90.6%, and students' absorption ability is below ≥ 68. Furthermore, the learning process that applies problem-based learning using LKPD is at least in the "good" category, where the score is > 2.5. In the results of this study, the average learning process in cycle II was at a value of 3.52 in the good category. It is hoped that this research can make students actively participate in learning mathematics, and this does not only occur in integer material. This is because students can continue to improve their mathematical reasoning abilities.

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