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APPLICATION OF THE PROBLEM BASED LEARNING MODEL ASSISTED WITH LEARNING VIDEOS TO IMPROVE MATHEMATICS LEARNING OUTCOMES FOR CLASS IX SMP

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***Abstract*—The aim of this research is to determine the implementation of the problem based learning model assisted by learning videos in improving student learning outcomes in each cycle, as well as to determine the learning motivation of students in class IX SMPN 1 Sukagumiwang. The research method used is Classroom Action Research (PTK). The research was carried out in three cycles, each cycle consisting of planning, implementing actions, observing and reflecting. The subjects of this research were 20 students in class IX of SMPN 1 Sukagumiwang. The data collection used in this research is qualitative and quantitative data. Qualitative data in the form of observation sheets on the implementation of the problem based learning model and student motivation questionnaire sheets. Meanwhile, the quantitative data is that students' learning results in the transformation material for each cycle have increased above the KKM value, namely 73, after implementing the problem-based learning model assisted by learning videos. Student learning outcomes in cycle I were 65% with an increase in N-gain learning outcomes of 92 (very good). Student learning outcomes in cycle II were 85% with an increase in N-gain learning outcomes of 95 (very good). This shows an increase from cycles I and II, 3) students' learning motivation through the application of the problem based learning model assisted by learning videos on reflection and rotation transformation with an average score of 75% in the very good category. The application of the problem based learning model assisted by learning videos can increase students' activeness in learning, and can help students stay focused and alert in various learning situations that are occurring so that there is an increase in the completeness of learning outcomes.**

Keywords— ***Problem based learning; learning videos; learning outcomes.***

I. INTRODUCTION

Mathematics learning outcomes are very important in a learning and teaching process [1] [2] [3] because they can measure changes in cognitive, affective and psychomotor aspects of abilities achieved or mastered by students after participating in the teaching and learning process. According to [4] learning outcomes are often used to find out how far someone has mastered the material that has been taught in accordance with educational objectives. Meanwhile, according to [5] learning outcomes are certain competencies or abilities, both cognitive, affective and psychomotor, that are achieved or mastered by students after following the teaching and learning process.

Likewise with mathematics learning outcomes, this is because mathematics has many benefits for humans [6] [7], because the way of thinking in mathematics is systematic, through regular and certain sequences. By learning mathematics, our brains get used to solving problems systematically [8]. So that when applied in real life, we can solve every problem more thoroughly, carefully, not carelessly and can train harder ways of thinking.

Based on the background of the problem above which is related to efforts to improve learning outcomes in

mathematics subjects, reflecting material through the Problem based learning model and learning video media, a problem formulation is prepared including, how to apply the Problem based learning model and learning video media to improve student learning outcomes in terms of reflection material mathematics lesson in class IX of SMP Negeri 1 Sukagumiwang in each cycle, what are the learning outcomes of students in the reflection material mathematics subject in class IX of SMP Negeri 1 Sukagumiwang after using the Problem based learning model and learning video media at the end of the cycle.

In accordance with the problem formulation above, this research aims to find out the extent of the influence of the application of the problem based learning model and learning video media to improve students' learning outcomes in mathematics subjects with reflection material in class IX of SMP Negeri 1 Sukagumiwang as well as students' responses to learning, whether with The application of the problem based learning model and learning video media can make students more motivated or not. The problem based learning strategy is said to be quite effective by looking at student learning outcomes and activities [9].

II. METHOD

This research design using a type of classroom action research (PTK) which consists of 2 cycles. This PTK refers to the research design according to Kemmis as follows [10];

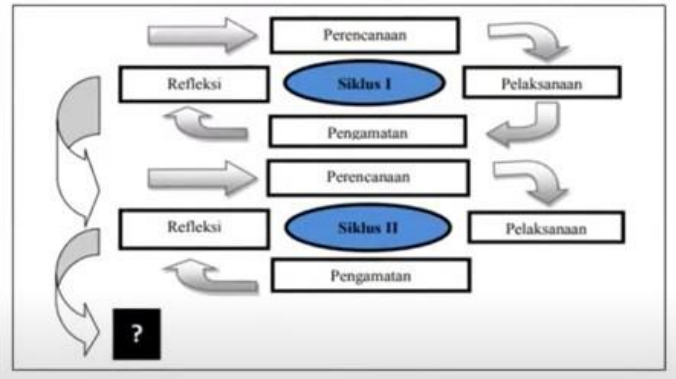

Figure 1. Design of Action Research

Figure 1 show that according to this design of action research, each cycle consists of 4 stages, namely planning, implementation, observation and reflection. Each action/activity consists of preliminary activities, core activities, and closing activities.

The location for this PTK research was carried out at SMPN 1 Sukagumiwang which is located at Jl. Raya Gunungsari, Sukagumiwang District, Indramayu Regency. The reason why SMPN 1 Sukagumiwang is a place for research is because when the researcher made observations, the researcher discovered problems that he wanted to use as research. The subjects of this research were teachers and students of class IX F at SMPN 1 Sukagumiwang, totaling 20 children consisting of 10 male students and 10 female students.

Research procedure.

Pra Cycle

This research designs several action plans, namely in the form of cycles, the sequence of actions is as follows [11] (a) Observation; Before the action begins, the researcher first observes with the class teacher, then the researcher also carries out direct observations during teaching and learning activities in class. At this stage the researcher observes the course of learning and supervises the teacher's teaching activities and student learning. (b) Reflection; In this stage, the researcher and the teacher discuss plans to follow up on learning problems or weaknesses found during the learning process in class

Cycle I

In cycle I, activities begin with activities **Planning**, Making a Daily Learning Implementation Plan regarding the material taught that day; (1) Determine the type of finger painting that will be done, (2) Determine the materials that must be used, (3) Arrange what will be observed and prepare observation sheets regarding children's creativity, (4) Prepare learning media that will be used in learning. Prepare tools to document learning activities carried out in the form of photos.

Implementation and Observation; Observations are made during the learning process, the teacher provides activities to the children according to their abilities, the teacher in the learning process only acts as a motivation and guide for the children to carry out their duties. In the learning process it must be in accordance with the daily activity plan that has been prepared, and in the learning process itself the researcher observes how children are creative in their respective tasks. Observations are carried out during the learning process. Researchers use observation sheets to assist observations made during the learning process. Observations are carried out during the learning process. Researchers use observation sheets to assist observations made during the learning process.

Refleksi; researchers reflect on the process and learning outcomes achieved in the action process based on the results of observations that have been made. The reflection referred to here is thinking again about what has been done, what has not been done, what has been achieved, what has not been achieved, what problems have not been achieved, and determining the next action to improve the quality and learning outcomes that will be continued or implemented. in the next cycle.

Cycle II

This cycle is a correction for deficiencies that occur in siklus I, **Plan**; The plan carries out several activities, including; (1) Create a Daily Learning Implementation Plan regarding the material taught that day, (2) Determine the type of finger painting that will be done, (3) Determine the materials that should be used, (4) Arrange what will be observed and prepare observation sheets regarding children's creativity, (5) Prepare learning media that will be used in learning, (6) Prepare tools to document learning activities carried out in the form of photos.

Implementation; Teachers provide activities to children according to their abilities, teachers in the learning process only act as motivation and guidance for children to carry out their duties. In the learning process it must be in accordance with the daily activity plan that has been prepared, and in the learning process itself the researcher observes how children are creative in their respective tasks. Observation; observations are carried out during the learning process. Researchers use observation sheets to assist observations made during the learning process.

Reflection; Reflection at the end of cycle II aims to identify progress and shortcomings that are still being faced. Based on the results of this reflection, it can be concluded whether the overall implementation of learning in the classroom was successful or not in developing/improving student learning outcomes.

To collect the necessary data, researchers used three data collection techniques, namely tests, observations, performance. tests are carried out to get students' knowledge scores, while observations are to find out attitude abilities, work performance is to find out skill scores, observations are carried out with the help of observers to get the results of observations as research material.

To obtain data on learning outcomes in this research, test/assessment questions as attached were used. Meanwhile, to obtain qualitative data on teacher activities in the learning process, instruments in the form of teacher activity observation sheets in the attached format were used. To obtain qualitative data about student activities in the learning process, an instrument in the form of an observation sheet on student activities in the attached format was used.

The instruments used in this research were student worksheets, observation sheets and tests. The process of collecting data in research is where the researcher must observe the situation in the research [12], Test is a data collection instrument that can be used to measure students' cognitive abilities or learning mastery [13].

Data analysis in this research was carried out by reflecting on the results of observations of the learning process in the classroom. Data analysis was carried out at each meeting in cycles I and II using descriptive quantitative percentage techniques. The formula used in data analysis using percentage quantitative descriptive techniques according to Anas Sudjiono is as follows:

$$P = \frac{f}{N} \times 100\%$$

Information :

P = percentage figure
f = the frequency the percentage is being searched for
N = Number of frequencies

If it has not reached the assessment scale, it will continue by improving learning based on reflection on the process and results of previous actions, to develop children's creativity. The validity of the data in this research is focused on students' mathematics learning outcomes through learning video media using three-way examination techniques, namely; (1) Perseverance of observation, (2) Triangulation, (3) Peer checking.

III. RESULTS AND DISCUSSION

Pre-Cycle Implementation

Data from the results of tests carried out at the end of pre-cycle mathematics learning contained students who had not completed their studies and had not reached the minimum completion criteria (KKM) of 70 that had been set. Of the 20 students who did not complete, 45% or 9 students, and 55% or 11 students who completed it. The highest score obtained is 90 and the lowest score is 20. The average class score is 70. The frequency distribution of pre-cycle learning outcomes is as follows:

Table 1 Pre-Cycle Learning Completeness Level

Range	Category	Pra Siklus		Information
		Frekuensi	Prosentase	
90 - 100	Tall	6	30%	Complete
70- 89	Currently	5	25%	
40 - 69	Low	8	40%	Not Completed
0 - 39	Very low	1	5%	
Total		20	100%	
Mark Max		90		
Mark Min		20		
Average		70		
KKM		70		

From Table 1, it can be found that 11 students (55%) have achieved learning completion of KKM 70, and 9 students (45%) have not achieved learning completion less than KKM 70. The low average score of the class is only 70. Seeing the level of incomplete learning which reaches 45%, the researcher will conduct a classroom action research (PTK) in accordance with the research design described in the previous chapter.

In this research, researchers will apply a problem based learning model which will be applied through two cycles, namely reflection and rotation material to improve the learning outcomes of class IX F students in first semester mathematics subjects. From the Table 1, it can be shown in a bar diagram the percentage of pre-cycle students' learning completion level:

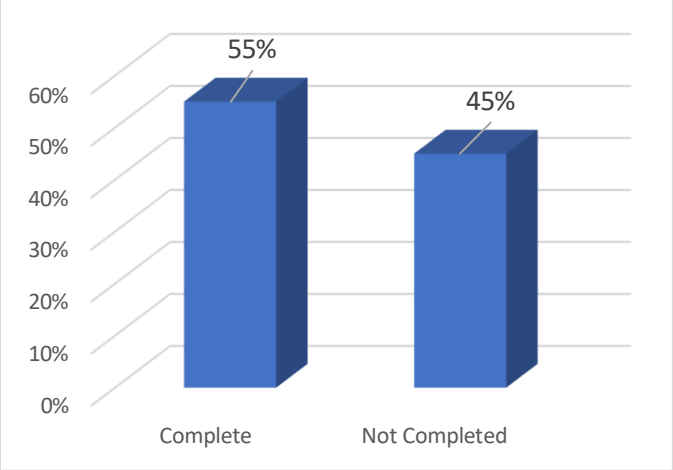

Figure 1 Pre-Cycle Students' Learning Completion Level

Implementation of Cycle 1

Planning

At this stage, researchers prepare several preparations or things will be carried out in the research, namely: (a) Determine the place that will be used in the research, namely SMPN 1 Sukagumiwang, Sukagumiwang District, Indramayu Regency, (b) Researchers identified data from observations and interviews of class IX teachers and the school principal, (c) Determine the focus point of research using the problem based learning model in class IX mathematics subjects, (d) Researchers determine Competency Standards (SK) that will be studied, namely; Explain geometric transformations (reflection, translation, rotation, and dilation) using contextual problems, and Resolve contextual problems related to geometric transformations (reflection, translation, rotation, and dilation). (e) Create a Learning Implementation Plan (RPP) using the Problem based learning model in class IX mathematics subjects in two meetings, (f) Prepare a grid of questions regarding reflection geometry transformation material, (g) Make a table of observation sheets for teachers and students during mathematics learning.

Meeting 1

The first cycle was carried out on Monday, November 28 2022, with the following series of activities: (1) **Activity**; The beginning of the activity begins with preparing the class, giving greetings, followed by praying before the lesson is carried out, then taking attendance to check the students' attendance. Next, ask students to prepare writing equipment and books that will be used in learning activities. Apperception and motivation aim to open students' thinking about daily activities that are themed according to the material to be studied. Next, the teacher conveys the learning objectives to be achieved.

(2) **Core activities**; The core activity begins with the teacher explaining the material to be studied, the use of learning media which aims to ensure that students can understand the material to be studied. In accordance with the teacher's directions, students are grouped between 4-6 students at one table, each group is given material to be discussed and guided by the teacher. After the students have finished discussing in their respective groups, the teacher shows one of the groups to present the results. discussion and other groups are asked to respond to the group making the presentation. The teacher directs the students to return to their seats. (3) End activities; In the final activity, the teacher and students conduct questions and answers and conclude the lesson material, noting important points from the lesson material. Assignment to students by making observations again at home, and ending the lesson.

Meeting 2

The first cycle implementation was carried out on Tuesday, November 29 2022, with the following series of activities: (1) **Activity**; The beginning of the activity begins with preparing the class, giving greetings, followed by praying before the lesson is carried out, then taking attendance to check the students' attendance. Next, ask students to prepare writing equipment and books that will be used in learning activities. Apperception and motivation aim to open students' thinking about daily activities that are themed according to the material to be studied. Next, the teacher conveys the learning objectives to be achieved.

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students by making observations again at home, and ending the lesson.

Observation Results

Cycle I In this research, researchers also observed the teaching and learning process between teachers and students. This observational research is in accordance with what was written by the researcher in accordance with the Learning Implementation Plan (RPP). However, there are still many obstacles experienced by researchers, including some students who are still passive, there are some students who do not want to collaborate in groups, there are still some students who are busy alone and don't pay attention and there are also several steps in the lesson plan. which has not yet been implemented.

The results of the analysis through learning observations from two meetings obtained a score of 97.61 with a very good predicate, as well as students' responses to learning after implementing the innovative learning model, the observation results obtained a score of 92.16 with a very good predicate.

Reflection results

The first meeting in cycle I showed that students in taking evaluation tests got quite satisfactory results. And don't forget the observation table, the majority of students are starting to be more active in learning, students are interested in the media used by the teacher [14], students are interested in participating in learning using the PBL model.

In the process of the first meeting there were still several shortcomings, this was because a small number of students did not understand the implementation of the problem based learning model itself. In the researcher's notes in the teacher and student observation sheet, it was stated that in this first meeting the students were not fully active in expressing their opinions and there were still some students who were still not willing to work together in their groups so that the steps of the PBL learning model were not implemented very smoothly.

Implementation of Cycle 2

Planning

At this stage, researchers prepare several preparations or things will be carried out in the research, namely: (a) Determine the place that will be used in the research, namely SMPN 1 Sukagumiwang, Sukagumiwang District, Indramayu Regency. (b) Researchers identified data from observations and interviews of class IX teachers and the school principal. (c) Determine the focus point of research using the problem based learning model in class IX mathematics subjects. (d) Researchers determine Competency Standards (SK) that will be studied, namely; Explain geometric transformations (reflection, translation, rotation, and dilation) using contextual problems and Resolve contextual problems related to geometric transformations (reflection, translation, rotation, and dilation). (e) Create a Learning Implementation Plan (RPP) using the problem based learning model in class IX mathematics subjects in two meetings. (f) Prepare a grid of questions regarding reflection geometry transformation material. (g) Make a table of observation sheets for teachers and students during mathematics learning.

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The first cycle implementation with the following series of activities: (1) **Initial Activities** ; The activity begins with preparing the class, giving greetings, followed by praying before the lesson is carried out, then taking attendance to check the students' attendance. Next, ask students to prepare writing equipment and books that will be used in learning activities. Apperception and motivation aim to open students' thinking about daily activities that are themed according to the material to be studied. Next, the teacher conveys the learning objectives to be achieved.

(2) **Core activities**; The core activity begins with the teacher explaining the material to be studied, the use of learning media which aims to ensure that students can understand the material to be studied. In accordance with the teacher's directions, students are grouped between 4-6 students at one table, each group is given material to be discussed and guided by the teacher. After the students have finished discussing in their respective groups, the teacher shows one of the groups to present the results. discussion and other groups are asked to respond to the group making the presentation. The teacher directs the students to return to their seats. (3) **End activities**; In the final activity, the teacher and students conduct questions and answers and conclude the lesson material, noting important points from the lesson material. Assignment to students by making observations again at home, and ending the lesson.

Meeting 2

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Research Results and Data Analysis

Analysis of Cycle I and cycle II Completion Data The increase in student learning outcomes seen from the cycle I test regarding material on maintaining skeletal health can be seen in the following table:

Table 2 Analysis of Completeness of Mathematics Results

No	Completeness	Pra Siklus		Presentase	
		Cycle 1	Cycle 2	Cycle 1	Cycle 2
1	Complete	13	17	65	85
2	Not Completed	7	3	35	15
Average		70	70		
Maximum		100	100		
Minimum		20	40		

From the Table 2, it can be shown in a bar diagram the percentage of students' completion in cycle I:

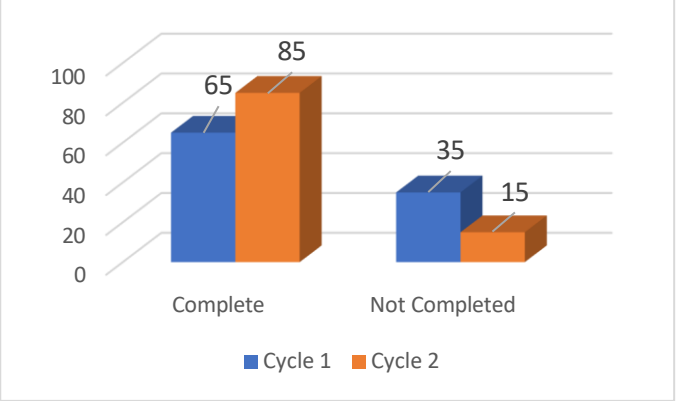

Figure 2. completeness based on cycles

Based on the completion graph above, there are 13 students who have achieved learning completeness more than KKM 70 or 65%, while those who have not achieved learning completeness less than KKM 70 are 7 children or 35%. There are 17 students who have achieved learning completeness more than KKM 70 or 85%, while those who have not achieved learning completeness less than KKM 70 are 3 children or 15%.

Comparative Analysis

Comparative Analysis is used after the use of the problem based learning (PBL) model. This analysis is also used to compare student learning outcomes starting from Pre-Cycle, Cycle I and Cycle II by paying attention to the achievement of indicators that have been determined by previous researchers.

Table 4 Completeness Analysis of Mathematics Results

No	Complateness	Pra Siklus		Siklus I		Siklus II	
		F	%	F	%	F	%
1	Not Complate	11	55	13	65	17	85
2	Complate	9	45	7	35	3	15
Average		70		70		70	
Maximum		100		100		100	
Minimum		20		20		20	

From table 4 the increase in learning outcomes can be seen from the percentage of completion from pre-cycle to cycle I and cycle II. Initial or pre-cycle conditions of the 20 students, 11 of them had reached the KKM 70 with a percentage of 55%, 9 students had not reached the KKM or were still below the KKM 70 with a percentage of 45%. After carrying out the first action or cycle I, 13 of the 20 students had reached the KKM 70 with a percentage of 65%, 7 students were still below the KKM 70 with a percentage of 35%. Then the researcher carried out a second action from 20 students, 17 of whom had reached the KKM 70 with a percentage of 85%, 3 students had not reached the KKM or were still below the KKM 70 with a percentage of 15%.

Based on the research described, the use of the Problem Based Learning (PBL) learning model assisted by learning videos for class IX F at SMPN 1 Sukagumiwang Semester I of the 2022/2023 academic year can improve Mathematics learning outcomes [18]. In line with previous research, this research has differences and advantages, namely: students are guided not only in groups but students are guided individually. This research also has the advantage of learning outcomes reaching 85% completeness and students' interest in learning based on students' learning observation sheets which increased from good to very good category, students looked enthusiastic in following the learning process well and were able to enjoy the learning process [19]. The learning process carried out by the teacher involves student activities during the learning process such as asking, answering, presenting, expressing opinions and others, so communication skills and self-confidence produce excellent mathematics learning outcomes [20].

IV. CONCLUSIONS

Based on the results of classroom action research which has been carried out through several actions, namely cycle I and cycle II, as well as based on discussions and assessments, it can be concluded that student learning outcomes have improved by using the Problem Based learning model assisted by learning videos. This increase in ability can be seen from the test results and observation results obtained each cycle. Learning outcomes before action reached 55% completeness. In cycle I the ability increased to 65%, in cycle II the child's ability increased by 85%. This shows that class XF students at SMPN 1 Sukagumiwang have achieved the abilities as expected. Learning to improve student learning outcomes is said to be successful, because of the 20 children who have reached the criteria of exceeding the KKM 70, 17 children (85%) while 3 (15%) children have not reached the specified criteria..

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