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Application of the Problem Based Learning Learning Model to Improve the Mathematical Problem Solving Ability of State Junior High School Students 4 Hilissekai for the 2021/2022 Academic Year

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Abstract
The Problem Based Learning learning model is an innovative learning model that can provide active learning conditions to students. The distinctive feature of this learning model is that it involves students to solve a problem through the stages of the scientific method so that students can learn knowledge related to the problem and at the same time have the skills to solve problems. The research objectives were: (1) to describe the quality of learning mathematics through the Problem Based Learning model at SMP Negeri 4 Hiliserangkai. (2) Describe student learning outcomes in mathematics, especially problem solving through the Problem Based Learning model at SMP Negeri 4 Hiliserangkai. This research was conducted in class VIII of SMP Negeri 4 Hiliserangkai semester 1 of the 2021/2022 academic year with a total of 20 students. Based on the results of this study, the average quality of student learning in cycle I was 57.35%, which was classified as poor, while in cycle II, 79.41% was classified as good. And the average student learning outcomes in the first cycle is 62.5% in the sufficient category, and in the second cycle is 81.61% in the good category, this has reached the target set at 75%.
Keywords: Problem Based Learning Learning Model, Mathematical Problem Solving Ability

INTRODUCTION

Mathematics is one of the very important subjects to be taught in educational circles which is useful as a field of knowledge in terms of helping students to achieve the goals of mathematics material. This is in line with Respati, et al (2016) who stated that "Mathematics is a field of knowledge which is a tool for thinking, communicating, a tool for solving various practical problems, the elements of which are logic and intuition, analysis and construction, generality and individuality, as well as has branches including arithmetic, algebra, geometry and analysis.

As'ari (2017) added about mathematics that "Mathematics is a universal science that is useful for human life and also underlies the development of modern technology, and has an important role in various disciplines and advances human thinking. The development of mathematics in the fields of number theory, algebra, analysis, probability theory, and discrete mathematics." Mudhiah and Shodikin (2019), stated that "mathematics has abstract properties consisting of facts, operations or relations, concepts and principles so that to study mathematics requires a good understanding of concepts".

Of the several subjects taught at school, mathematics is a subject that always gets into trouble in teaching. Most students feel afraid of mathematics because according to them mathematics is a subject that is difficult to understand and learn. As a result, mathematics is one of the subjects that students avoid, fear, and hate. Many students who only hear the word mathematics immediately react negatively. There are those who complain that math is difficult and even bring their fierce teachers along when teaching. Therefore, students feel reluctant to study mathematics more deeply. This can be seen in the teaching and learning process, the

questions raised by the teacher are not answered by students and students rarely ask the teacher. One of the weaknesses is the method, strategy and approach as well as the learning model used during the teaching and learning process is the lecture method.

Based on the results of initial observations during the integrated field experience program (PPLT) at SMP Negeri 4 Hiliserangkai, several problems were found: the learning process carried out was still dominated by the teacher, the lack of students' desire to learn mathematics, the learning activities carried out by the teacher tended to only transfer science only. From the results of interviews with mathematics teachers, several problems were also found, namely: teachers experienced difficulties in teaching mathematics because students considered that mathematics was difficult. The teacher stated that there were still many students who had difficulty solving problem solving questions in the form of story questions, such as analyzing what was known, asked, as well as how to solve problem solving questions correctly. In addition, students' difficulties in understanding the questions cause students not wanting to solve the problem solving questions that have been given. Facilities and infrastructure in schools are still inadequate, as well as the results of interviews with several students. Students feel bored and difficult in learning mathematics, students have difficulty applying concepts to solve non-routine problems. Based on the results of interviews with math subject teachers, it was stated that: if most students were given homework, they would just do it when they arrived at school, the average student test score in mathematics was classified as a low criterion.

This happens because teachers do not train students to do problem solving. The teacher focuses more on mastering mathematical concepts. In the classroom, the teacher usually starts the learning process by explaining mathematical concepts, giving examples of how to do a problem, then asking students to work on a problem that is similar to the problem that was explained by the teacher earlier. So the learning process is still dominated by the usual learning model which is only teacher-centered. By paying attention to the objectives of learning mathematics and the characteristics of the problems above, relevant learning models must be used in an effort to develop problem solving abilities, so researchers predict using the Problem Based Learning model. According to Oktaviani, et al (2018) stated that "Problem Based Learning is a learning model that teaches students to solve a problem critically and creatively". This is supported by As'ari (2017), who states that: "Problem Based Learning is a learning model designed so that students gain important knowledge, which makes them proficient in solving problems, and has their own learning model and has the skills to participate in teams. The learning process uses a systemic approach to solving problems or facing challenges that will be needed later in everyday life.

Sofyan and Komariah (2016), state that "PBL is an approach that is oriented towards a constructivist view that contains contextual, collaborative characteristics, metacognitive thinking and facilitates problem solving. Ideally, these problems can be found or obtained in real life, and are not quickly resolved but can be resolved easily. This learning model provides opportunities for students to be able to provide training and abilities to each individual to be able to solve the problems they face, so that it can motivate students to be active and creative and can solve problems in the learning process. It is on this basis that the researcher wants to find out whether learning mathematics using the PBL learning model can improve mathematical problem solving skills, so the researcher is interested in conducting research with the title: "Implementation of the Problem Based Learning Model to Improve Mathematical Problem Solving Ability of Students of SMP Negeri 4 Hiliserangkai for the 2021 Academic Year /2022".

Problem Formulation: What are the student learning outcomes in mathematics, especially in problem solving through the Problem Based Learning model at SMP Negeri 4 Hiliserangkai?

What is the quality of learning mathematics through the Problem Based Learning model at SMP Negeri 4 Hiliserangkai? As for the research objectives in carrying out this research, namely: To describe the quality of learning mathematics through the Problem Based Learning learning model at SMP Negeri 4 Hiliserangkai. Describe student learning outcomes in mathematics, especially problem solving through the Problem Based Learning learning model at SMP Negeri 4 Hiliserangkai

RESEARCH METHODS

Based on the objectives to be achieved, this research was carried out by implementing classroom action research (CAR). In carrying out this research, researchers collaborated with subject teachers. Researchers as executors of research activities, while subject teachers function as observers. The types of actions studied (objects of action) in this study are: Application of the Problem Based Learning learning model in the learning process. By using the Problem Based Learning teaching method, students' mathematical problem solving abilities will increase. The location for the classroom action research was SMP Negeri 4 Hiliserangkai which is located in Lolowua Village, Hiliserangkai District, Nias Regency. In accordance with the plan, the action will be carried out in the odd semester of the 2021/2022 school year. The implementation of the actions in this study was adjusted to the schedule at school. The research subjects were class VIII students of SMP Negeri 4 Hiliserangkai for the 2021/2022 academic year. The implementation of the action is carried out for approximately two months, and each cycle is planned for 2 meetings and 1 time for administering the test. To collect data in this study used several research instruments. The research instrument used is:

1. Observation Sheet. Observation sheets are used to observe the learning process in class. As for the observation sheets that researchers use as research instruments, namely:
   a. Observation sheet for teachers. This observation sheet is used to find out the steps used by researchers when conducting classroom learning according to the stages of the Problem Based Learning learner model.
   b. Observation sheets for students who are actively involved in the learning process. This observation sheet is used to find out how student activities are during the learning process, especially students who are active in learning.
2. Interview Guide Sheet. The interview guide sheets are questions that are arranged based on the problems in the research. Before being designated as a research instrument, the interview guide sheets were validated for outstanding lecturers/teachers. The validation of the interview guide sheet aims to examine the language domain.
3. Questionnaire. Questionnaire is a data collection technique that is carried out by distributing a list of questions to students to answer. The questionnaire used in this study are: Learning quality questionnaire, used to obtain information about the implementation of the components of the learning process.

Research Design

This study planned 2 cycles and each cycle consisted of 4 stages, as follows:

1. Planning, includes: At each meeting the researchers prepare: RPP according to the PBL model. Teaching material on the subject matter of the System of Two Variable Linear Equations. Prepare question papers and answer keys. Observation sheet for: Observation of students in learning activities. Teacher/researcher respondents. Documentation. At the end of each cycle, the researcher prepares: Learning achievement tests are arranged based on the test grid and answer keys. Interview guide sheets, and questionnaires about the quality of the learning process

2. Action. Guided by the planning above, the researcher carried out the action according to the plan (Plaining).
3. Observation. During the learning process, the mathematics subject teacher acts as an observer, namely paying attention to the implementation of learning carried out by researchers by applying the Problem Based Learning learning model.
4. Reflection. At this stage, the researcher as a teacher, ponders the results of the observations made by the observer regarding the research instruments which consist of: At the end of each meeting, the researcher reflects on the results of: Observation sheets for students who are not actively involved in the learning process. Observation sheets for students who are active in the learning process. Observation sheet of the learning process of the teacher or researcher respondent. At the end of each cycle, the researcher reflects on the results of: Problem solving test questions. Learning quality questionnaire. Interview guide sheet.

RESEARCH RESULTS AND DISCUSSION

Cycle I Reflection

1. Reflection on Cycle I Meeting I. The learning process at meetings I and II cycle I was still not optimal and unsatisfactory. The learning conditions at the first meeting of cycle I which were still not as expected were caused by several factors, namely the researcher had sufficient experience to teach, the application of the Problem Based Learning learning model was a new thing for researchers so that it still did not show a significant effect of change on learning outcomes which is expected to improve. The condition of the class has not been fully mastered by the researcher, this is because the researcher is a new person who needs adaptation to the student learning environment at the school. It is this factor that makes students need new adjustments in a short period of time to receive learning in a method that is quite different from the conventional learning style that they have been doing together with their teachers at the school. To improve the learning conditions at the first meeting of cycle I, at the second meeting of cycle I the researcher prepared himself better. Some of the ways that researchers do, include: building good interactive communication with students, researchers try their best to create a fun and interesting learning atmosphere for students, thereby reducing student boredom, and providing good motivation to students to arouse students' learning desires become more enthusiastic by giving praise (gifts and rewards) to active students, as well as researchers building good cooperation with subject teachers to direct/facilitate students who do not care about the learning process.
2. Reflection on Meeting II cycle I. The learning process at meeting II cycle I, showed results that were still not optimal and unsatisfactory, but had begun to show a good effect of change on student learning outcomes. Therefore there are a number of things that must be corrected and reviewed in the learning process through evaluating student learning outcomes and observing notes on the findings of observations from subject teachers who were previously asked for help by researchers to provide assistance and observation of the process of implementing learning. Another thing that affects the imperfection of the implementation of the application of this learning is that researchers still do not fully master the steps of the Problem Based Learning learning model, especially in group guidance, and students are still not serious in carrying out discussions with their group mates. Cycle I held two meetings, after meeting II cycle I, then after that it was continued by giving a learning quality questionnaire for reflection materials, where students were given tests on the results of problem solving questions, the researcher gave feedback with several students and finally reflected on the end of cycle I.

3. Final Reflection of Cycle I. At the end of cycle I, the last thing the researcher did after the process of cycle I (first) was completed was to calculate/process the data in the form of numbers to find the average observation results at each meeting. The results show that the average percentage of students who are active from meeting I to meeting II cycle I is 54.69% and is categorized as sufficient. This has not met the set target, which includes high learning interest, high student learning motivation, and at least good student active learning attitudes. By paying attention to the achievement targets determined previously, with the result that in order to achieve student learning outcomes at least achieve a percentage of student learning completeness of 75% but the results of the average value of student learning outcomes in cycle I is only 70%, it can be concluded that student learning outcomes in cycle I is classified in the sufficient category. The gap in not achieving the predetermined 75% student completeness target occurs due to several factors. Judging from the information and statements submitted by students that their students are basically very happy with this Problem Based Learning learning model, but because this is something new for them, it still requires further action to get used to participating in learning with this method, as well as students more willing to build a more intimate relationship with researchers so that students do not feel foreign to researchers who act as their teachers. For this reason, the researcher responded to this student's desire, by trying to be more cooperative with students so that students can freely and confidently explore their ideas and opinions in the learning process. And finally the reflection of cycle I, the researcher concluded that the expected target of Cycle I had not been achieved, so the research was continued in cycle II. In cycle II, several improvements were made to the learning process by increasing students' abilities and creating a more conducive, comfortable, and innovative classroom situation. Researchers are optimistic that the learning process in cycle II is better because the researcher who acts as a teacher has more in-depth knowledge about the application of the problem-based learning model taxis as additional information, also students are getting used to the Problem Based Learning learning model. Another thing that can convince researchers to really believe that Problem Based Learning can improve student learning outcomes is that researchers and students already know each other and also students already have learning experience about what is done in this Problem Based Learning learning model. This description of the situation allows for good interaction/learning environment in the learning process in Cycle II.

Reflection on Cycle II

1. Reflection on Meetings I and II Cycle II. The implementation of the learning process at meetings I and II cycle II is getting better and reaching a good category where the results of reflection at meetings I and II cycle II can be described as follows: Weaknesses in the results of teacher (researcher) observations at meetings I and II of the first cycle are no longer found in the second cycle, where in the first cycle it was found that students still did not have an interest in learning, students were still not motivated in learning, and students had not found a comfortable learning environment for them and still did not have the courage to explore their ideas and opinions in public so slowly this has changed drastically after researchers applied the Problem Based Learning learning model. As a result students have shown an active learning attitude, high learning interest, and good learning motivation and this is evidenced by the final results of student learning which show satisfactory grades, and all components that are used as observation material for teachers have been carried out properly. The results of observations of students found that students in groups were more active, worked seriously, and followed the procedures explained by the teacher. Students are

able to interact well with their group mates and try to master the material discussed together. Students' interest, motivation and active learning attitude were improved by applying the Probel Based Learning learning model so that there was an increase between the first cycle and the second cycle, so the researcher no longer continued in the next cycle.

2. Final Reflection of Cycle II. At the end of cycle II, the average observation results at each meeting were calculated. The average percentage of students who were not actively involved from meetings I and II cycle II was 77.35%. This means that the ability of researchers who act as teachers in applying the Problem Based Learning learning model is maximized. This was confirmed by the results of the learning quality questionnaire in cycle II which had reached 90% which was classified as very good. The average student learning outcomes in cycle II was 79.68 which was still classified as good and the percentage of student learning completeness in cycle II reached 90%. This has met the target set for a minimum good student learning outcomes and a minimum percentage of student learning completeness of 75%. From the results of interviews with several students, researchers obtained information that students were very happy with the learning carried out by researchers who acted as teachers using the Problem Based Learning model. So that students expect that the learning process like this is maintained. From the reflection of cycle II, it turns out that the expected target has been achieved. Therefore, the researchers concluded that the quality of learning mathematics using the Problem Based Learning learning model was good and students' mathematical problem solving abilities were also good.

CONCLUSION

Based on the research findings, it can be concluded that the Problem Based Learning Learning Model is able to improve: The quality of learning mathematics by applying the Problem Based Learning learning model, in the first cycle is 57.35% (enough), and the second cycle becomes 79.41% (good). Student learning outcomes in cycle I, especially in problem solving, were 62.5% (enough), and in cycle II, the average learning outcomes became 81.61% (good).

Based on research findings, discussion and conclusions in this study, some suggestions from researchers are as follows: In carrying out the learning process, teachers should use learning models that involve students actively. The teacher should apply the Problem Based Learning learning model in learning mathematics. The results of this study should be used as comparison material for the next researcher.

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