

## **Efforts to Improve Students' Mathematical Understanding Ability in Social Arithmetic Materials through Problem-Based Learning Models**

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### **Abstract**

The purpose of this study was to improve students' mathematical understanding skills with social arithmetic material through problem-solving integrated into the Problem Based Learning learning model. This research method is classroom action research that follows the model of Kemmis and Taggart. This research includes 3 cycles; each cycle includes 4 stages, namely planning, implementation, observation, and reflection. The participants in this study were 27 grade VII students of SMP Nahdlatul Ulama Megamendung Bogor. Data was collected through tests, interviews, and observations. The results showed that there was a significant increase in the ability of seventh-grade students to understand mathematics. This is evidenced by the increase in the average math test results in each cycle, cycle 1 = 63.15; cycle 2 = 75.00; cycle 3 = 81.48, and the results of the interviews concluded that learning mathematics through integrated problem-solving model Problem-Based Learning is fun for students. This study concludes that this model can improve students' mathematical understanding skills on social arithmetic material in class VII SMP Nahdlatul Ulama Megamendung Bogor in the 2021/2022 school year.

Keywords: mathematics understanding, problem based learning, social arithmetic.

## **1 INTRODUCTION**

Mathematics is one of the fields of study that plays an important role in education, but in reality, the ability to understand mathematics is still relatively low. There are still many students who do not like learning mathematics. One of the causes is the lack of understanding of the concept that causes students difficulty in solving problems on the material. Based on the observations found from the results of the Mid-Semester Assessment (PTS) of class VII students for the 2021/2022 academic year with a total of 27 students, it was found that 52% of students who scored met the Minimum Completeness Criteria (KKM), while 48% of other students still did not meet the KKM. From the results of observations in the classroom, it was found that there were several shortcomings in learning, including learning that was still teacher-centered so that students were not actively involved in the learning process. In addition, in the learning process, several problems were found including students having difficulty solving problems that were slightly different from the examples given by the teacher, especially on problems related to real-life problems. Students tend to wait for the information provided by the teacher, so students find it difficult to understand the concepts contained in the problem. Bloom classifies understanding (Comprehension) into the second cognitive level which describes an understanding so that students are expected to be able to understand mathematical ideas if they can use some relevant rules. At this level, students are expected to know how to communicate and use their ideas to communicate. Understanding is not only understanding information but also objectivity, attitude, and meaning contained in the

information. In other words, a student can change the information in his mind into another more meaningful form.

Mathematical understanding is important for meaningful learning of mathematics, of course, teachers expect the understanding achieved by students is not limited to connecting understanding. According to Ausubel, learning is meaningful if the information to be learned by students is arranged according to the cognitive structure of the student so that students can relate the new information to the cognitive structure they have. This means that students can relate the knowledge they have with other conditions so that they learn by understanding. Learning outcomes are essentially a form of behavioral formulation as stated in the learning which is about mastery of learning materials. Learning outcomes can be interpreted as the actual level of ability in the form of behavioral changes in individuals that are measurable in the form of mastery of knowledge, skills, and attitudes achieved by students as a result of what has been learned in school.

Social arithmetic material is material that is taught in seventh-grade junior high school in even semesters. The concept of social arithmetic is often encountered in everyday life, for example in buying and selling, calculating taxes, interest in banks, and so on. We find a lot of everyday problems related to this material. To teach this material, it is very necessary for the teacher's ability to manage the learning process so that it can instill the concept of social arithmetic well and can apply it in everyday life. One of the learning models that need to be considered and able to improve students' mathematical understanding skills is the Problem Based Learning (PBL) learning model.

Problem Based Learning (PBL) learning model is a real problem-based learning model. While social arithmetic material is material that is often encountered in everyday life. So, the purpose of the Problem Based Learning (PBL) learning model is very influential on the success of students in developing learning materials, because they have diversity in solving problems together. Each opinion is combined into problem-solving which is a shared responsibility to find common ground for problems so that each problem can be solved and there is a solution. Therefore, the authors assume that the Problem Based Learning (PBL) learning model is a learning model that is suitable for social arithmetic material.

Based on the description above, we can understand together that the Problem Based Learning learning model is one of the cooperative learning models that contribute to increasing student activity in critical thinking skills in understanding the material and solving problems that exist in the learning process, creativity, and working together in groups. during the learning process, which is expected to improve understanding of learning mathematics. Therefore, in this case, the researcher took the title "Improving Students' Mathematical Understanding Ability of Social Arithmetic Materials Through Problem Based Learning Models for Class VII SMP Nahdlatul Ulama Megamendung Bogor".

## **2 RESEARCH METHODS**

This research was conducted in class VII SMP Nahdlatul Ulama Megamendung Bogor, which is located at Jalan Babakan Cipayung Village, Megamendung District, Bogor Regency, with 27 students studied.

This research uses Class Room Action Research, which is a form of reflective research by taking certain actions to improve and improve learning practices in the classroom in a more professional manner. The research model used is in the form of a cycle which refers to the Kemmis and McTaggart model.

This classroom action research is said to be successful if the average test results for each cycle of understanding of mathematics increase and 85% of students have achieved a test score of 70 which is the KKM of class VII at SMP Nahdlatul Ulama Megamendung Bogor.

### 3 RESULT AND DISCUSSION

#### 3.1 Pre Cycle

Pre-cycle test results data from 27 students showed that 4 students who completed with a percentage of completeness were only 14.81% and students who had not completed (KKM <70) were 23 students or 85.19%.

Table 1. Test scores and completeness in Pre-Cycle

Instrument	Results
Test Score	39,07
Complete (%)	14,81
Not Completed (%)	85,19

Pre-cycle learning outcomes data show that there are still many students who have low grades so completeness in learning has not been achieved because there are not yet 85% of students have achieved a KKM score of 70. This can be a reflection for researchers to try to use effective learning models and activate students so that it can affect the ability to understand mathematics obtained by students.

#### 3.2 Cycle I

It is known that the initial ability of students in solving social arithmetic material problems has only reached an average value of 39.07%. Then that is still relatively low.

Table 2. Test scores and completeness in Cycle I

Instrument	Results
Test Score	63,15
Complete (%)	48,14
Not Completed (%)	51,85

Meanwhile, in the results of the understanding ability test in the first cycle in table 2, there is an increase in the average value which reaches 63.15%. These data show that 13 students completed a complete presentation of 48.14%. Students who have not completed (KKM <70) totaling 14 students or 51.85% in reflection are also recommended for some corrective actions. This can be a reflection of researchers making improvements to learning in cycle II.

#### 3.3 Cycle II

The results of the second cycle test of 27 students showed that 21 students completed a completeness presentation of 77.78%. Students who have not completed (KKM<70) are 6 students or 22.22%. Based on these data, it can be concluded that the results of students' mathematical understanding of social arithmetic material through problem-based learning models can increase students' KKM numbers.

Table 3. Test scores and completeness in Cycle II

Instrument	Results
Test Score	75,00
Complete (%)	77,78
Not Completed (%)	22,22

With the results of student tests in cycle II, an average score of 75.00 was obtained with learning completeness of 77.78% in reflection and some corrective actions were also recommended. This shows an unsatisfactory result because it is still below the standard of learning completeness, which is 85% of the number of students, thus the research must continue in cycle III by making changes according to the results of the reflection.

### 3.4 Cycle III

Based on the results of the third cycle test, showed that the average score of the student's ability test results reached 81.48 (KKM $\geq$ 70). From 27 students, it is known that there are 24 students in the complete category with a completeness presentation of 88.89% while only 3 students have not completed or 11.11% have completed.

Table 4. Test scores and completeness in Cycle III

Instrument	Results
Test Score	81,48
Complete (%)	88,89
Not Complete (%)	11,11

The student's ability to understand mathematics in cycle III has experienced a significant increase, it can be seen that the student's mastery presentation reached 88.89%. This shows the success of learning by using the Problem Based Learning model. The increase in students' mathematical understanding abilities can be seen in Figure 1.

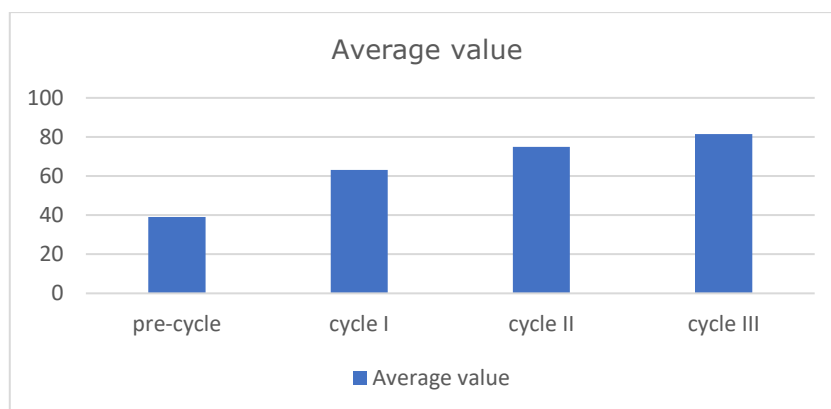


Figure 1. Graph of Increasing Students' Mathematics Comprehension Ability

The increase in student activity from cycles I, II, and III in thi study can be seen in Figure 2.

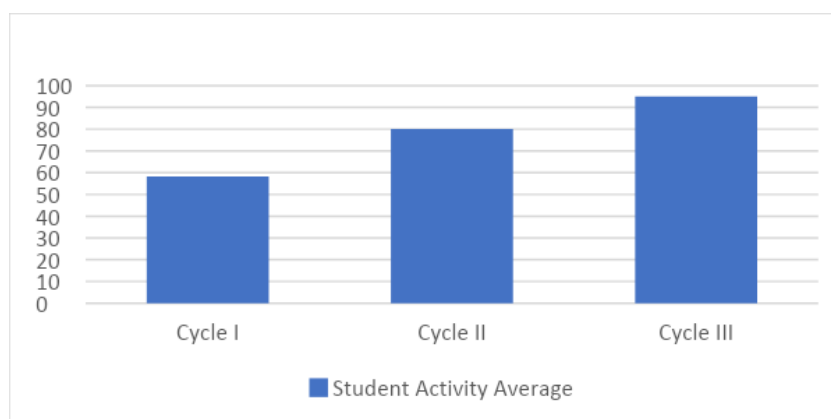


Figure 2. Graph of Student Activity Average Score

Figures 1 and 2 graphs show that there is a fairly large cycle progress in students' cognition, which means that the application of the Problem Based Learning model to class VII students of SMP Nahdlatul Ulama Megamendung Bogor can improve students' mathematical understanding abilities, as evidenced by the increasing number of students who get the above scores. KKM. This is reinforced by the results of the research findings

of Sabina (2019) which states that the increase in the ability of mathematical understanding of students who receive discovery learning with a scientific approach is better than students who receive conventional learning, and Nuralam & Eliyana (2017) which states that problem-solving abilities Mathematics of students who are taught with the Scientific Approach model of problem-based learning is higher than the problem-solving ability of students who are taught using conventional or lecture approaches.

#### 4 CONCLUSION

Given the results of the data analysis of class action research that has been carried out on class VII students of SMP Nahdlatul Ulama Megamendung Bogor, it can be concluded that applying learning through problem-based learning models can improve students' mathematical understanding abilities of social arithmetic material in the even semester of the 2021/2022 academic year. This can be seen from the evaluation of cycle I, cycle II, and cycle III there are changes and improvements, especially in the evaluation of the success rate of the cycle I the average value is 63.15 and the success rate is 48.14%, there is an increase in cycle II which has an average value the average is 75.00 and the success rate is 77.78%, as well as the third cycle there is an increase in the average value of 81.48 and the success rate of 88.89%.

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