Proceedings of International Conference on Teacher Profession Education Yogyakarta, 29 July 2023

ISSN : 3025-020X

Improving Mathematical Communication Skills Through PBL Class III A Elementary School Students

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1. Abstract

One of the skills needed in the 21st century is being able to solve problems that can be done through mathematical communication skills, especially in mathematics. The purpose of this study was to improve the mathematical communication skills of class III A students through the Problem Based Learning (PLB) model about types of angles. The PBL model is able to create fun and meaningful learning for students in solving problems. This research is a Collaborative Classroom Action Research (PTKK) which was carried out in two cycles with 4 meetings. Each meeting consists of planning, implementing, observing, and reflecting. The subjects of this study were 19 students in class III A. Data collection techniques using tests and non-tests in the form of observation. Data analysis was carried out through qualitative and quantitative descriptive to calculate the test results. The results of this study indicate that the use of the Problem Based Learning model can improve students' mathematical communication skills as evidenced by the increase in the average mastery of the results of students' mathematical communication abilities in cycle I, namely 76.35% and cycle II, 86.85%, an increase of 13.5%. and has reached the target of 80%.

ISSN : 3025-020X

Keywords: *PBL , mathematical communication skills , elementary school*

2. Introduction

Education is one of the efforts to educate the nation's children which is Indonesia's goal. Education is currently experiencing an extraordinary increase in knowledge acceleration. Teaching materials that are made must contain challenges through student collaboration to create solutions regarding solving learning problems. The 21st century learning paradigm emphasizes the ability of students to find out from trusted sources, formulate problems, think analytically, collaborate, and collaborate to solve problems (Kemendikbud, 2013). The PBL model is present in the midst of student demands to be able to solve problems through collaboration with groups or individuals. In accordance with the opinion of Soleh, Setiawan, and Haqi (2020: 4) that Models problem based learning *helps students to develop student activities and provide challenges to students to be able to work together in a group in solving a problem problem .*

Mathematics is one of the subjects that exist at every level of school including elementary school as a science that is found in all disciplines. Meanwhile, according to Rahmawati, Dorisno, and Frasandy (2023:) states that mathematics is a science that is obtained through reasoning, using clearly defined terms, careful, accurate, representation using symbols that have meaning and can be used in solving problems related to numbers /number. Suherman, et al (2003: 298) stated that NCTM (National Council of Teachers of Mathematics) recommends 4 (four) the principles of learning mathematics, namely (a) Mathematics as problem solving, (b) Mathematics as reasoning, (c) Mathematics as communication, and (d) Mathematics as a relationship . This means that one of the important aspects of learning mathematics is the improvement of students' mathematical

ISSN : 3025-020X

communication skills. This is in accordance with the fourth point of mathematics learning objectives listed in Permendiknas number 22 of 2006 so that students are able to communicate ideas with symbols, tables, diagrams, or other media to clarify situations or problems. Thus, it is clear that mathematical communication is one of the important skills that must be developed in student self. Communication skills student mathematics is the ability possessed by someone in giving messages to others in the form of conveying mathematical concepts or ideas in an coherent and clear (Ningsih, Rohantizani, and Marhami, 2021: 21) . Communication skills math is a basic skill must have someone in order can lead a better life in problem solving (Usman, 2019: 161). Meanwhile, according to Nasution and Ahmad (2018: 190) Communication Skills Mathematical (KKM) is a student's proficiency in conveying mathematical messages written that can be measured through interpreting images into ideas mathematics , expressed ideas mathematics in the form of pictures , and expressing mathematical ideas in own statement . It can be concluded that mathematical communication ability is one of the mathematical abilities that can assist students in solving problems both in groups and individually through indicators of providing answers with use your own language , reflect real objects, pictures and diagrams into mathematical ideas ; and express mathematical concepts by expressing everyday events in mathematical language or symbols .

Based on initial observations through interviews with the homeroom teacher in class III A, it is known that students are not active in learning, students play more and become less focused, students lack self-confidence which makes them not dare to give opinions or presentations without being appointed by a teacher. Students are also still individual in doing group assignments, due to the conventional learning process and teacher-centered tendencies. Therefore the teacher as a facilitator is tasked with

ISSN : 3025-020X

facilitating the needs of students in learning optimally by determining a learning model that suits the needs of students. One model that suits these students is the Problem Based Learning (PBL) Model. There is interaction in the discussion students do during learning going on will get students used to it express his opinion, with so slowly deep student skills think and express opinions will develop (Fauziah, Maarif, and Pradipta, 2018: 93). The results of students' mathematics learning can be seen in answering students who are less clear in understanding the questions, meaning that students have not mastered communication skills, especially in mathematics.

The previous research stated that learning using the PBL model had a significant effect on students' mathematical communication abilities (Hafely, et al, 2020: 203). This means that the PBL model can have a positive impact on students' mathematical communication skills. In accordance with the research results of Nubatonis, Koeswanti, and Giarti (2019: 2014) that there is an increase in the ability to communicate in Mathematics 47.7% in cycle 1 and 79.5% in cycle II.

It is important for students to have mathematical communication skills in dealing with problems, especially regarding mathematics, so through the Problem Based Learning model the researchers hope to be able to improve students' mathematical communication skills. Some researchers focus on the ability to count, while the results of these calculations must be presented in written form that everyone can understand. Therefore, this research is aimed at analyzing the improvement of mathematical communication skills through the PBL model.

3. Method

This study uses Collaborative Classroom Action Research (PTKK). According to Arikunto, S., Suhardjono, & Supardi (201 4: 3) classroom action research is an

ISSN : 3025-020X

examination of learning activities in the form of an action, deliberately done in a class together. PTKK means PTK which is carried out in collaboration or collaboration with class teachers, tutors, and DPL to discuss the problems under study and provide input on solutions that will be carried out by researchers. Actions taken by applying the PBL model to determine the increase in mathematical communication skills of class III A students . The research subjects were 19 students in class III A , who, based on the observations, some students had not completed in mathematics . The research instrument was in the form of student activity observation sheets and students' mathematical communication ability test sheets. The research test instrument for students' mathematical communication skills is in the form of 5 essay questions based on the indicators of mathematical communication ability determined by the researcher, namely giving answers with use your own language , reflect real objects or pictures into mathematical ideas , and express mathematical concepts by expressing everyday events in mathematical language or symbols .

This classroom action research procedure consisted of two cycles with four meetings, each cycle consisting of four stages including planning, implementing, observing, and reflecting. In detail, the procedure for this research is as follows (1) Planning, planning the learning process and preparing teaching modules with the PBL model, preparing teaching materials, LKPD, and questions on students' mathematical communication ability tests; (2) Implementation of the action, the stages of the PBL model according to Sani (Zany, Laihat, and Toybah, 2018: 60) include a) Student orientation to problems; b) Organizing students to study; c) Guiding individual and group investigations; d) Develop and present results; and e) Analyze and evaluate the problem solving process; (3) Observation, making observations during learning to find out the learning process and students' mathematical abilities; and (4) Reflection, holding discussions between researchers and collaborators to analyze the results of observations that have been made.

Data obtained from research results were analyzed using qualitative and quantitative descriptive techniques. The data analyzed were data on the results of tests of mathematical communication skills and observation sheets of learning activities using

ISSN : 3025-020X

PBL. The indicators for the success of this classroom action research are in accordance with the table of research achievement indicators below.

Table 1. Research Achievement Indicators

Aspects Measured	*Target*	***How to measure***
1. *Improvement of mathematical communication skills through models Problem Based Learning (PBL).*	*80%*	*Through a sheet of mathematical communication ability test. Students are declared complete if the test result value is ≥ 60.*
2. *Implementation learning using models Problem Based Learning (PBL) .*	*80%*	*Through the observation sheet of the implementation of learning using the Problem Based Learning (PBL) model.*

4. Results and Discussion

Table 1 shows the results of the recapitulation of students' mathematical communication abilities in cycle I.

Table 2 Results of Students' Mathematical Communication Ability Cycle I

No	***Mark***	***Meeting 1***		***Meeting 2***		***Criteria***
		F	***(%)***	***F***	***(%)***	
1	*80-100*	*9*	*47,4*	*10*	*52,6*	*complete*
2	*60-79*	*4*	*21,1*	*6*	*31,6*	*complete*
3	*40-59*	*5*	*26,3*	*3*	*15,8*	*Not Completed*
4	*0-39*	*1*	*5,2*	*0*	*0.0*	*Not Completed*
Amount		*19*	*100*	*19*	*100*	
The highest score		*95*		*100*		
Lowest Value		*35*		*40*		

ISSN : 3025-020X

Average	*72,7*		*76,6*	
complete	*13*	*68.5*	*17*	*84,2*
Not Completed	*6*	*31.5*	*3*	*15,8*

Based on table 2, it shows that the mathematical communication ability of class III A students after giving action in the form of learning using the Problem Based Learning model is known that the percentage of student completeness at meeting I was 68.5% and meeting II was 84.2%. While the percentage of students who have not completed at the first meeting is 31.5% and the second meeting is 15.8%. Based on these results it can be seen that there is an increase in the results of mathematical communication skills from meeting I to meeting II in cycle I but has not met the target of 80%, so it is necessary to make improvements in cycle II.

Following are the results of students' mathematical communication skills in class III A cycle II

Table 3 Results of Mathematical Communication Ability of Grade III A Students Cycle II

No	***Mark***	***Meeting 1***		***Meeting 2***		***Criteria***
		F	***(%)***	***F***	***(%)***	
1	*80-100*	*11*	*57,9*	*14*	*73,7*	*complete*
2	*60-79*	*5*	*26,3*	*3*	*15,8*	*complete*
3	*40-59*	*3*	*15,8*	*2*	*10.5*	*Not Completed*
4	*0-39*	*0*	*0.0*	*0*	*0.0*	*Not Completed*
Amount		*19*	*100*	*19*	*100*	
The highest score		*100*		*100*		
Lowest Value		*50*		*55*		
Average		*81.3*		*84.9*		
complete		*16*	*84,2*	*17*	*89.5*	
Not Completed		*3*	*15,8*	*2*	*10.5*	

ISSN : 3025-020X

Based on table 3, it shows that the mathematical communication abilities of class III A students after giving action in cycle II in the form of learning using the Problem Based Learning model , it is known that the percentage of student completeness at meeting I was 84.2% and meeting II was 89.5%. While the percentage of students who have not completed the first meeting is 15.8% and the second meeting is 10.5%. Based on these results it can be seen that there is an increase in the results of mathematical communication skills from meeting I to meeting II in cycle II.

After the second cycle of action and reflection, the results of the second cycle of action have reached a research performance indicator of 80%, the average result is 86.85% completeness. Thus the corrective action stops in cycle II.

the Problem Based Learning (PBL) model in improving the mathematical communication skills of class III A students is in line with the research results of Nubatonis, Koeswanti, and Giarti (2019: 2014); Ningsih, Rohantizani, and Marhami (2021: 25); and Nasution, Irvan, and Batubara (2020: 62). Determining the learning model has a role in improving students' abilities, in line with the results of research by Rahmalia, Hajidi, and Ansari (2020: 143) that improving students' mathematical communication skills is taught with the learning model problem based learning is better than learning conventional (meaning that the learning factor has a significant effect).

5. Conclusion

The conclusion from the results of this study is that students' mathematical communication abilities increase through the Problem Based Learning (PBL) model. This can be seen from the test results which increased from cycle I 76.35% to 86.85% in cycle II. The steps for using the Problem Based Learning model are a) student orientation to

ISSN : 3025-020X

problems; b) Organizing students to study; c) Guiding individual and group investigations; d) Develop and present results; and e) Analyze and evaluate the problem solving process. The PBL model is suitable for use in 21st century learning which requires students to think critically by solving problems both individually and in groups. In accordance with the opinion of Ningsih, Rohantizani, and Marhami (2021: 22) that the problem based learning *model is a learning model that presents a real-world problem so that can stimulate students to learn more critical thinking, communication and skills solution to problem. The obstacle in this study was that some students were not careful in determining the type of angle based on the size of the angle. The solution to overcome these obstacles is that the teacher provides an explanation through examples with clock media, so that when students encounter questions about determining the type of angle with a certain angle size they are able to answer correctly.*

6. Confession

I thank the principal of the school for the permission and support that has been given. Thank you also to my collaborators, namely class III A homeroom teachers, tutors, and DPL who have provided support, guidance and input so that research can be carried out smoothly. Not forgetting those who have supported me so far, my parents, brothers, sisters, and friends for their good prayers and positive support.

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