

The Application of Project-Based Learning Model to Improve Mathematical Communication Skills

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Abstract: This research is motivated by the low mathematical communication skills of students in the fourth grade of elementary school 20 Kalumbuk. This study aims to describe the application of the Project Based Learning (PjBL) model to improve mathematical communication skills in the presentation of data in Grade IV Elementary School. The type of research is Classroom Action Research (CAR) using qualitative and quantitative approaches. The research subjects were teachers and 24 students in the fourth grade of elementary school 20 Kalumbuk. The results showed an increase. In the first cycle the results of the RPP observation from 82.1% to 92.9% in the second cycle. The implementation in the aspects of teachers and students in the first cycle was 71.9% to 93.8% in the second cycle. The average assessment of mathematical communication skills of students in the first cycle of 73.82 to 90.00 in the second cycle.

Keywords: project-based learning, mathematical communication skills, mathematics learning, elementary school

I. INTRODUCTION

Mathematics lessons are given at all levels of education from elementary to tertiary institutions [1]. Mathematics is one of the fields of study that exists at all levels of education, ranging from elementary to tertiary level. Even mathematics is taught in kindergarten informally [2].

By learning mathematics hopefully, mathematical abilities can be realized in students. Mathematics has five basic abilities as a standard of mathematical ability, namely problem solving, reasoning and proof, communication, connection, and representation. Mathematical learning is not only about delivering material and receiving the material (concepts, formulas, examples), but it must have mathematical abilities to achieve success in mathematics.

One of the abilities that must be mastered and developed by students when learning mathematics is mathematical communication skills. Communication is an essential part of mathematics education [3]. Mathematical communication skills determine success in learning mathematics. Mathematical communication is a central force for students in formulating mathematical concepts and strategies, success capital for students on approach and completion in scientific exploration and investigation, and a means for students in communicating with their friends to obtain information, share thoughts and inventions, brainstorm, appraise and sharpen ideas to convince others [4]. The learning process requires smooth communication between teacher and students [5].

The role of communication in learning mathematics is to help students in stimulating critical thinking, measuring development tools and reflecting students' mathematical understanding. Communication between students in learning mathematics plays a role in constructing mathematical knowledge, developing problem-solving, increasing reasoning, fostering self-confidence, and increasing students' social skills [6].

Learners already have mathematical communication skills if they have achieved mathematical communication skills indicators [7]. Indicators of mathematical communication skills are mathematical writing, mathematical drawing, and mathematical expression [8].

In reality, many students experience difficulties in mathematical communication skills. From the results of observations and interviews conducted by researchers on 7, 10, 11 January 2019 in fourth grade Elementary School 20 Kalumbuk, Padang City, researchers found several problems in learning including: (1) learning is still teacher-centered, (2) teachers in carrying out learning to begin by giving material, practice questions, and closed by giving conclusions and assignments, (3) the teacher has not implemented a learning model that can develop students' mathematical abilities, and (4) the teacher has not applied the Project Based Learning (PjBL) model in mathematics learning.

The problems have an impact on students, namely: (1) students tend to imitate the steps of problem-solving taught by the teacher so that students have difficulty communicating the purpose of the problem, (2) students do not play an active role in learning that makes students unfamiliar in communicating their understanding, (3) learners do not construct their knowledge of the concept of learning, (4) most students who are intelligent in mathematics are often less able to convey their thoughts, as if they do not want to share knowledge with others, (5) students are unable to state mathematical ideas correctly, (6) students are confused, lack of confidence in communicating ideas and opinions to answer questions.

The problem found by the researcher is that mathematical communication ability of students is still low. To overcome the above problems, it is necessary to choose the right learning model. In this study, researchers used the Project Based Learning (PjBL) model.

Innovative models of schooling such as those described as project-based or design-based learning [9].

The PjBL model is a learning model that allows teachers to manage to learn in the classroom by involving project work that contains complex tasks [10]. The PjBL model encourages students to develop and practice communication skills and to make the learning atmosphere enjoyable by having the project work done [11]. Thus, this PjBL model can make students become more active and develop critical thinking skills to improve mathematical communication skills [12].

Based on the background stated above, the general problem of this study is how to apply the PjBL model to improve mathematical communication skills in the presentation of data in the fourth-grade students of Elementary School. Following the formulation of the problem, the purpose of this study, in general, is to describe the application of the PjBL model to improve mathematical communication skills of the fourth-grade students at Elementary School.

II. METHOD

This is a Classroom Action Research [13]. Classroom Action Research is research conducted by teachers in their classrooms through self-reflection to improve performance as a teacher so that the learning process can run well and student learning outcomes improve [14]. The approach used in this study is qualitative and quantitative approach. The qualitative approach describes the research with words about what is experienced by the research subject while the quantitative approach uses numbers in describing the research subject [15].

This research was conducted in the second semester of the 2018/2019 academic year in Elementary School number 20 Kalumbuk, Padang City. This research was conducted in 2 cycles, where the first cycle consisted of 2 meetings namely on Thursday 28 March 2019 and Friday 29 March 2019, the second cycle consisted of 2 meetings namely on Thursday 04 April 2019 and Friday 5 April 2019.

The study was conducted using a cycle model with four stages, namely planning, implementation, observation, and reflection. The research used observation and test methods. The data is related to (1) Learning Plan Assessment (2) Observation of teacher activities and student activities, (3) Mathematical Communication Capability Assessment. Research data sources are teachers and students in fourth grade at Elementary School 20 Kalumbuk, Padang City.

III. RESULT AND DISCUSSION

A. Cycle I

The learning process was carried out in two meetings, the first meeting was the implementation of activities in the PjBL model step which included determining the project, designing the steps to complete the project, and preparing the project implementation schedule. Furthermore, at the second meeting, the implementation of activities continued with the steps of the PjBL model which included completing the project by facilitating and monitoring the teacher, preparing reports

and presentation of project results, and evaluating the process and results of the project.

1. Planning

The preparation of the planning cycle I consisted of two meetings arranged based on the Project-Based Learning (PjBL) model in the second semester of the 2018/2019 school year. Learning is carried out in two meetings with an allocation of three lesson hours per meeting. The planning is outlined in a form of lesson plans arranged collaboratively between researchers and fourth-grade teachers.

2. Implementation

The implementation of actions is divided into three stages, namely preliminary activities, main activities, and final activities following the steps of the activities prepared in the Learning Implementation Plan. The learning is carried out according to the PjBL steps, namely the determination of the project, the design of project completion steps, the preparation of the project implementation schedule, the completion of the project with teacher facilitation and monitoring, the preparation of reports and the percentage of project results, and the evaluation of project processes and results.

3. Observation

Based on observations in the first cycle, the Learning Implementation Plan obtained a score of 82.1%, the implementation of the aspects of teachers and students was 71.9%, and the average mathematical communication ability was 73.82.

4. Reflection

The results of observations on the planning and implementation of learning with the PjBL model for mathematical communication skills in cycle 1 shows that the learning process has not been maximized. The results of observations on the assessment of mathematical communication skills note that some students get low grades with sufficient qualifications (C). Thus it is necessary to plan the implementation of actions in the next cycle by focusing on improving all the deficiencies and obstacles encountered during the first cycle of action.

B. Cycle II

The implementation of learning is carried out as many as two meetings, namely on Thursday, April 4, 2019, and Friday, April 5, 2019. Implementation of learning in cycle II is based on reflection in cycle I.

1. Planning

The preparation of the second cycle planning consisted of 2 meetings arranged based on the PjBL model in the second semester of the 2018/2019 school year. Learning is carried out in 2 meetings with an allocation of 3 lesson hours per meeting.

2. Implementation

The implementation of the action is divided into three stages, namely preliminary activities, main activities, and final activities following the steps of the activities compiled in the Learning Implementation Plan. The learning is carried out according to the PjBL steps, namely the determination of the project, the design of project completion steps, the preparation of the project implementation schedule, the completion of the project with teacher facilitation and monitoring, the preparation of reports and the percentage of project results, and the evaluation of project processes and results.

3. Observation

Based on observations in the second cycle, the Learning Implementation Plan scored 92.9%, the implementation of the teacher and student aspects was 93.8%, and the average mathematical communication ability was 90.00

4. Reflection

Cycle II is the last cycle carried out in the learning of data presentation using the PjBL model. With this second cycle, the application of the PjBL model to improve mathematical communication skills can be said to be successful. The assessment results show an increase in cycle II with an average of 90.00 with a very good qualification. Improvements were also seen in the Learning Implementation Plan with a value of 92.9%, teacher and student activities with a value of 93.8%. Thus the PjBL Model can improve mathematical communication skills in the presentation of data in fourth grade at Elementary School 20, Kalumbuk, Padang City.

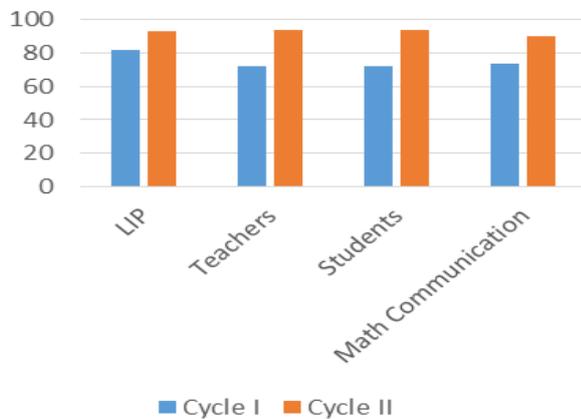


Figure 1
Observation Result

All of the result stage is depicted in Figure 1. The PjBL model makes students motivated to learn because they do work activities that involve students actively, make students more active, and increase collaboration with groups. Also, the PjBL model encourages students to develop and practice communication skills, and make the learning atmosphere enjoyable by having the project work done.

IV. CONCLUSION

Based on observational data, research results, and discussion in Chapter IV there are several conclusions that can be drawn from this study. First, learning planning to improve mathematical communication skills by applying the Project Based Learning (PjBL) model in fourth grade at Primary School 20, Kalumbuk, Padang City in the form of lesson plans following the steps of the PBL model. Observation of the Learning Implementation Plan in cycle I obtained a percentage of 82.1% with good qualifications. Furthermore, the results of observations in the second cycle were 92.9% with very good qualifications. It can be concluded that the results of planning observations have increased by 10.8%.

Second, the implementation of Mathematics learning with the PjBL model is carried out in two cycles. Based on observations in the first cycle obtained an

average value of 71.9% in the aspects of teachers and 71.9% in aspects of students. Then in the second cycle, the value obtained was 93.8% in the teacher aspect and 93.8% in the student aspect.

Last, mathematical communication skills with the application of the PjBL model to fourth grade in elementary school 20, Kalumbuk, Kota Padang have increased. This can be seen from the recapitulation of students mathematical communication skills in the first cycle is 73.82 increased to 90.00 or about 16.18.

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