

## Problem-Based Learning in Elementary Schools: The Study of Curiosity and Mathematics Communication Ability

**Apdika Dwi Pramiasari\***

Universitas Muhammadiyah Purwokerto, Indonesia

**Arifin Muslim**

Universitas Muhammadiyah Purwokerto, Indonesia

**Supriatna**

Universitas Muhammadiyah Purwokerto, Indonesia

\*Corresponding Author: apdikadwipramiasari@gmail.com

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### Abstract

Curiosity and mathematical communication are important aspects that students must have in learning mathematics. However, many studies show that students' mathematical curiosity and communication are still low. For this reason, it is important to instil this ability in students from the time they take basic education. This study aims to increase students' curiosity and students' mathematical communication skills through the Problem Based Learning model for elementary school students. This research is a classroom action research conducted in 2 cycles, each cycle consists of 2 meetings. The subjects of this class action research were class IV students, totalling 32 students consisting of 13 male students and 19 female students. Data collection tools using tests and non-tests. The results of the observation of the curiosity of students in the first cycle are 69.05% with good criteria and in the second cycle is 84.95% with very good criteria. The results of the mathematical communication ability test of students in the first cycle were 74.06 with good criteria and in the second cycle, 84.2 with very good criteria. The results of observing teacher activities in the first cycle were 71.3% with good criteria and in the second cycle, 90.45% with very good criteria. The results of observing student activities in the first cycle were 63.5% with good criteria and in the second cycle 89.75% with very good criteria. The results of this study indicate that using the Problem Based Learning (PBL) model can increase the curiosity and mathematical communication skills of students in statistical material in class IV SD Negeri 1 Contributing.

### INTRODUCTION

In Indonesia, 18 cultural characters have been developed which are applied in education in Indonesia. According to Ismail (Samrin, 2016), these characters come from religion, Pancasila, culture, and the goals of national education are religion, honesty, tolerance, discipline, hard work, creativity, independence, democracy, curiosity, national spirit, and love of the land. water, appreciate achievement, friendly/communicative, love peace, love to read, care for the environment, care about society, and responsibility. These characters are developed in the world of education through character education. Based on 18 cultural characteristics that must be developed in schools, one of which is the character of curiosity. Curiosity is a way of thinking, attitudes and behaviour that reflects curiosity and curiosity about everything that is seen, heard, and studied in more depth (Fauzi, 2017). In developing one's curiosity, one must always look for something that makes his curiosity come true. A person's persistence in seeking information, and knowledge continuously so that his curiosity in him can be fulfilled. However, several studies show that students' curiosity in elementary schools is still low, as revealed in the research of Fauziah et al. (2022), Hadi et al. (2021), Oktaviani et al. (2021), Praseto (2017), and Yantoro (2017).

Another important aspect that students have is mathematical communication skills. This is as explained in the purpose of learning mathematics, namely so that students have the ability to communicate ideas with symbols, tables, diagrams, or other media to clarify situations or problems (NCTM, 2000). Mathematical communication ability according to Prayitno (Hodiyanto, 2017: 11) is a way for students to express and interpret mathematical ideas orally or in writing, either in the form of pictures, tables, diagrams, formulas, or demonstrations. The ability of mathematical communication according to Lestari (2015: 83) is the ability to convey mathematical ideas/ideas, both orally and in writing as well as the ability to understand and accept other people's mathematical ideas/ideas carefully, analytically, critically and evaluatively to sharpen the understanding. However, several studies also show that students' mathematical communication skills are still low, so efforts need to be made to improve them (Andini et al, 2018; Hotimah et al, 2021; Nasution & Ahmad, 2018; Robiana & Handoko, 2020)

The low curiosity and mathematical communication are also experienced by students at SD Negeri 1 Contributing. Based on the results of observations during the mathematics learning process, the curiosity of students was still low. Obtained when the teacher is teaching students to dare to ask questions but it is not in accordance with the material being taught. From the results of observations in class, there are only a few students who often ask questions and respond to questions from the teacher. Some students often chat with their friends instead of listening and listening to the lesson. The results of interviews with teachers at SD Negeri 1 Sumbang revealed that students' mathematical communication skills were still low. Students are still lacking in expressing mathematical ideas both orally and in writing in real form, pictures, diagrams, tables and others such as in statistical data collection material.

Based on the existing background, this classroom action research aims to increase students' curiosity and mathematical communication skills through the Problem Based Learning model.

## **METHODS**

This research is Classroom Action Research (CAR). CAR is research-oriented to improve both the process and results to solve problems that exist in learning in the classroom. CAR is a corrective action to solve a problem through real action, not just looking at a particular phenomenon and then describing what happened to the phenomenon in question.

This research was conducted in the fourth grade of SD Negeri 1 Sumbang, located in the village of Sumbang, Sub-District, Banyumas Regency. The subjects of this study were class IV students with a total of 32 students consisting of 13 males and 19 females. The research design used is the Kemmis and Mc. Taggart consists of four stages of research, namely planning, action, observation, and reflection.

This study uses instruments, namely teacher activity observation sheets, student activity observation sheets, curiosity observation sheets, mathematical communication skills grids and mathematical communication skills test sheets. Data collection techniques are through test techniques and non-test techniques. The test technique uses a description of the questions given to students while the non-test technique is in the form of observation and documentation during the research. Analysis of the data used in the study to obtain the data obtained, both research data through a test or non-test techniques. Analysis of the data obtained includes analysis of students' mathematical communication skills, analysis of teacher activity observation sheets, student activity observation sheets and curiosity observation sheets.

## **RESULTS AND DISCUSSION**

Classroom Action Research is carried out in Class IV SD Negeri 1 Sumbang, Kec. Donate, Kab. Banyumas in the 2019/2020 school year. This Classroom Action Research was carried out in two cycles, each cycle having two meetings. Each lesson takes 3 x 35 minutes (3 hours of lessons). The results of this study were calculated using test data. The test data is in the form of a description question consisting of 5 questions to determine the mathematical communication skills of students with Basic Competencies in statistical material.

## Curiosity

The data on the results of student curiosity testing can be seen in table 1.

**Table 1.** Recapitulation of curiosity observation cycle I

Code	Observed aspects	Class meeting	
		1	2
A	Have a questioning attitude	23	26
B	Read or discuss with friends	22	22
C	Looking for information from other books	20	26
D	Dare to ask about the new material being taught	17	26
E	Ask about something you don't know	18	21
Amount		100	121

The curiosity of students can increase from the first class meeting to the second class meeting. This is based on the fact that initially, not many students dared to ask questions when learning took place, but at the second meeting class, there were students who had the courage to ask. The increasing curiosity of students is also influenced by the teacher who always motivates them. Observations of self-confidence in the first cycle of the meeting obtained an average of 62.5%, while for the second meeting an average of 75.6% was obtained. The average obtained in meeting 1 and meeting 2 is 69.05% with Good criteria.

**Table 2.** Recapitulation of curiosity observation cycle II

Code	Observed aspects	Class meeting	
		1	2
A	Have a questioning attitude	25	29
B	Read or discuss with friends	25	29
C	Looking for information from other books	26	30
D	Dare to ask about the new material being taught	25	30
E	Ask about something you don't know	24	29
Amount		125	147

The curiosity of students can increase from meeting 1 to meeting 2. Observation of curiosity in the first cycle of the meeting obtained an average of 78.1%, while for the second meeting an average of 91.8% was obtained. The average obtained in meeting 1 and meeting 2 is 84.95% with very good criteria.

According to Daryanto (2013: 147) there are several indicators of curiosity, namely; 1) Asking or reading sources outside of textbooks about material related to the lesson, 2) Reading or discussing recent natural phenomena, 3) Asking about some natural, social, cultural, economic, political, and technological events that have just been heard, 4) Asking about something related to the subject matter but outside what is discussed in class.

Based on the results of observations, the curiosity of students in the first cycle has increased with an average curiosity aspect observed of 69.05% with good criteria, while in the second cycle students have begun to believe in their actions and themselves so that they get an average of 84.95% with good criteria. There was an increase from cycle I to cycle II with an average of 69.05% to 84.95%, which was 15.9%. Learning using the Problem Based Learning model has an effect on the results of student curiosity in cycle I and cycle II and has an impact on increasing student curiosity. The achievement of success indicators means that the curiosity of students is increasing in every learning process. The increased curiosity of students is also due to the encouragement or motivation of the teacher.

Curiosity in education makes students look for things they want to know more about. According to Ardiyanto (Puspitasari, 2015: 34), that curiosity will make students become active thinkers, and active observers, which will then motivate students to study more deeply so that it will bring satisfaction to themselves and eliminate boredom to learn. It can be interpreted that the character of curiosity is one of the

characteristics that must be developed in the learning process. Because the character of curiosity can motivate students to be more active in learning, make students more active in learning and make student learning outcomes even better.

Problem Based Learning according to Arends (2008:41) is a presentation of authentic and meaningful problem situations to students which is the basis for investigation and inquiry. Problem-based learning is used to support higher-order thinking in problem-oriented situations.

### **Mathematical Communication Ability**

Student learning test results are measured using tests at each meeting. Mathematical communication ability tests are arranged according to basic competencies and indicators in statistical material. The mathematical communication ability question sheet consists of 5 questions. The results of the mathematical communication ability test can be seen in table 3.

**Table 3.** Recapitulation of Mathematical Communication Ability Cycle I

No.	Indicator	Class Meeting	
		1	2
1	Highest score	76	100
2	Lowest Value	40	52
3	Mean	68	80,12
5	Number of Completed Students	20	21
6	Criteria	Good	Good

The results of the value of mathematical communication skills in the first cycle of the first meeting of students who completed learning were 20 students who did not complete learning totaling 9 students. The highest score is 76, the lowest score is 40 with an average of 68. Meeting 2 the number of students who completed 21 students who did not complete the score was 11 students. The highest score at meeting 2 was 100 and the lowest score was 52 with an average of 80.12.

**Table 4.** Recapitulation of Mathematical Communication Ability Cycle II

No.	Indicator	Class Meeting	
		1	2
1	Highest score	100	100
2	Lowest Value	60	64
3	Mean	81,07	85,33
5	Number of Completed Students	21	26
6	Criteria	Very Good	Very Good

This increase is evidenced by the evaluation in the second cycle of the first meeting of students who finished studying as many as 26 students who did not complete learning, totaling 5 students. The highest score is 100, the lowest score is 60 with an average of 81.07. Meeting 2 the number of students who completed 30 and incomplete scores amounted to 4 students. The highest score at meeting 2 was 100 and the lowest score was 64 with an average of 85.33.

Increasing students' mathematical communication skills, especially in Mathematics subjects, statistical material is expressed in the form of numbers. The mathematical communication skills of students in this study used evaluation questions which were carried out at the end of the meeting. The learning process using the Problem Based Learning model can improve mathematical communication skills. In the first cycle of Mathematics, the average score was 74.06% and the second cycle had an increase of 83.2%. The results of increased mathematical communication skills were obtained from students' understanding of the material presented using the Problem Based Learning model. The learning process of students' communication skills is obtained from the learning experience. This is in accordance with the opinion expressed by Lestari (2015:

83) is the ability to convey mathematical ideas/ideas, both orally and in writing as well as the ability to understand and accept other people's mathematical ideas/ideas carefully, analytically, critically and evaluatively to sharpen the understanding. In addition, the results of students' mathematical communication skills are in accordance with indicators of mathematical communication skills, namely; 1) Connecting real objects, pictures, and diagrams into mathematical ideas, 2) Explaining mathematical ideas, situations and relations orally or in writing, with real objects, pictures, graphs and algebra, and 3) Expressing everyday events in mathematical language.

Based on the results of students' communication skills obtained from the evaluation carried out, each cycle has increased. This is inseparable from the optimal learning process of the teacher using the Problem Based Learning model. The learning process is optimal and can run smoothly so that students can easily understand what is conveyed by the teacher.

## CONCLUSION

Based on the results of classroom action research that has been carried out for two cycles in an effort to increase curiosity and mathematical communication skills using the Problem Based Learning model for Statistics material in grade IV SD Negeri 1 Contributing; 1) The results of observing the curiosity of students from cycle I to cycle II have increased. This increase is due to teachers being able to use the Problem Based Learning model when teaching. This increase is evidenced by the results of the observation of the curiosity of students in the first cycle, namely 69.05% with good criteria and 84.95% in the second cycle with very good criteria. 2) The results of evaluation scores using the Problem Based Learning model can improve students' mathematical communication skills. The increase in mathematical communication skills is evidenced by the results of the student evaluation tests increasing each cycle. In the first cycle of Mathematics subjects got an average score of 74.06 and in the second cycle it increased by getting an average score of 83.2.

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