

## Improving Collaboration Skills through *Problem Based Learning* in Elementary School Mathematics

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### 1. Abstract

The problem that arises during classroom learning is the low collaboration skills of students. Collaboration skills in students are accustomed to working in groups, division of tasks, arguing in groups, and dependence on friends during the learning process in class. This is because the teacher is only guided by companion books, teacher books and student books without involving the surrounding environment or concrete objects. The purpose of this research is to analyze the impact of problem based learning to improve collaboration skills in mathematics. The model used in the core research of Stringer E.T. Stringer's research is in the form of a cycle consisting of three aspects, namely look, think, and act. This data collection technique uses observation in grade 2 SD Negeri Bantul district. The research instrument is an observation sheet that is used, in which there are points to be assessed in collaborative activities during the learning process. The analysis technique used is quantitative and qualitative analysis. The results of the study showed that the average collaboration between students in cycles I and II increased by 6.77. The average collaboration between students in cycle I was initially at 82.25, then increased in cycle II, namely 89.02. The PBL model can increase students' collaboration skills. The implications of this research are that teachers are expected to be able to improve their ability to design PBL learning, so that they can improve students' collaboration skills.

**Keywords:** *Collaboration, Cooperation, Problem Based Learning, Mathematics*

## **2. Introduction**

Mathematics is a science that comes from the process of reasoning, literally. According to Ahmad Susanto (2015: 183), Mathematics is a field of study that exists at all levels of education, from the elementary school level to university. Mathematics is a science that studies abstract structures and patterns of relationships within them (Giarti, 2014). Elementary Mathematics learning should be done by learning through discovery and meaningful learning as well as learning in a constructivist way or students building their own knowledge (Heruman, 2007: 5). To achieve learning objectives, the learning system must be structured with a combination of facilities, infrastructure, materials, people, and appropriate procedures (Zainal Aqib, 2010: 41). In the process of learning Mathematics it is carried out continuously, therefore learning Mathematics must be diligent and diligent so as not to disturb the learning process so that students do not understand the Mathematical concepts being studied. It is said that there is a process of learning Mathematics in a lesson, a person does a pattern of reasoning accompanied by activities related to mental. Mathematics subjects are given to students to help students to organize their reasoning, form their personality and be skilled at using Mathematics and their reasoning in implementing it in everyday life and in the future.

Collaboration skills are a process of working together, coordinating, in groups to help each other and understand each other in a group with different backgrounds. According to Johnson & Smith (Lelasari, 2017: 170) indicators of collaboration skills are 1) positive interdependence, 2) face-to-face interactions, 3) Accountability and individual personal responsibility, 4) communication skills, 5) skills to work in groups.

However, in reality, collaboration skills are one of several skills that are still relatively under-mastered in Indonesia. Based on learning observations in class II semester II, teachers are only guided by companion books, teacher books and student books. In the learning process the teacher uses the Problem Based Learning model. During the question and answer activity with the teacher, 75% of students did not answer the questions given. Students do not pay attention and listen to the questions given by the teacher. The problem that arises during classroom learning is on students' collaboration skills with the division of tasks that are still not balanced or equal. Students' collaboration skills are accustomed to working in groups, dividing tasks, arguing in groups, and depending on friends. If these problems are not addressed, they will have an impact on the quality of education and individuals.

The solution to overcome these problems is to apply a learning model. one of them is the problem based learning (PBL) model. The Problem Based Learning (PBL) model teaches students to collaborate with others in solving problems (Ariani, 2020; Fauzia & Kelana, 2021; Yuniarti & Radia, 2021). The PBL model is a learning model that uses problems around students as the beginning of the learning process, then these problems are analyzed by students in groups, in order to train students to think critically and have skills to solve problems (Garnjost & Brown, 2018; Hendriana et al., 2018; Irwanti & Zetriuslita, 2021). So that students can gain an understanding of the subject matter.

Several previous findings stated that the PBL model can improve understanding of concepts (Suriana et al., 2016; Yulianti & Gunawan, 2019). Wati, M., Syamsuddin, A., & Rukli, R. (2022). The Effect of Problem Based Learning Model Assisted by Mobile Learning

Media on the Mathematical Collaboration Ability of Grade IV Elementary School Students. Indonesian Journal of Educational Science (IJES), 5(1), 56-64. Ilmiyatni, F., Jalmo, T., & Yolida, B. (2019). Effect of Problem Based Learning on Collaboration Skills and Higher Order Thinking. Bioterdidik Journal, 7(2). From previous research PBL is a learning that trains students' skills based on problems that require analysis, critical thinking, and self-regulation in participating in groups. Learning design with the PBL model to improve collaboration skills with the steps of identifying problems, finding problems, forming groups, guiding research, and analyzing problem-solving processes. Mathematics learning for second grade elementary school students is designed using Theme 8 Safety at Home and Travel Sub-theme 3 Rules for Safety on Learning Travels 6. Not much research has been done on applying problem-based learning, so in this study it was used with a focus on collaboration skills. This study aims to analyze the impact of problem based learning to improve collaboration skills in mathematics.

### **3. Methods**

The subjects of this study were class IIB students at SD Negeri Bantul district as the class that would experience treatment. Class IIB students totaled 24 students consisting of 11 male students and 13 female students. This action research uses test and non-test techniques. This test technique uses evaluation questions at the end of learning to find out student learning outcomes. This evaluation question is prepared based on the indicators that have been made. While the non-test technique uses data collection techniques. The

data collection technique used is observation, observation is used to obtain data from research results.

The data analysis technique in this PTK is a quantitative descriptive analysis by calculating the percentage of student collaboration with a formula

$$\frac{\sum \text{indicator score acquisition}}{\sum \text{maximum indicator score}} \times 100\%$$

This type of research uses the Stringer procedure, E.T. the implementation of the research has a two-cycle procedure. Stinger's research stage consists of three aspects, namely Look, Think, Act. Stringer's research is in the form of a cycle consisting of three aspects, namely *look*, *think*, and *act*. The observation method is used to observe the course of PBL learning, to measure students' skills in collaboration skills with the help of assessment instruments.

#### 4. Results and Discussion

##### Results

Students' skills in collaboration in class II are improved by giving action in the form of using the PBL model. The results of the collaboration skills research cycle 1 and cycle 2 can be seen in Table 2.

Table 2. Collaboration Skills Research Results

No	Indicator	Siklus I	Siklus II
1	Positive interdependence	79,72	86,95
2	Face to face interaction	82,06	89,26
3	Individual personal responsibility	83,15	90,45
4	Communication skills	83,97	88,60
5	Group work skills	82,37	89,86
<b>Average student collaboration</b>		<b>82,25</b>	<b>89,02</b>
<b>Increased success percentage (%)</b>		<b>6,77</b>	

Based on table 2, the percentage of student collaboration, there was an increase in each observed student collaboration indicator. Student collaboration has increased by 6.77 in cycle II. Cycle I reached 82.25 and increased in cycle II, namely 89.02. This shows that there is an increase in cycle II, this is because students already understand and understand their assignments and their role in learning. The percentage of observations of collaboration skills has increased. The indicator of positive interdependence in the first cycle was 79.72, and the second cycle increased to 86.95. The face-to-face interaction indicator increased from 82.06 in cycle I and cycle II to 89.26. The individual personal responsibility indicator experienced an increase from cycle I 83.15, and cycle II increased to 90.45. The communication skills indicator has increased from 83.97 in cycle I and 88.60 in cycle II. The indicator of working skills in groups has increased from 82.37 in cycle I and

89.86 in cycle II.

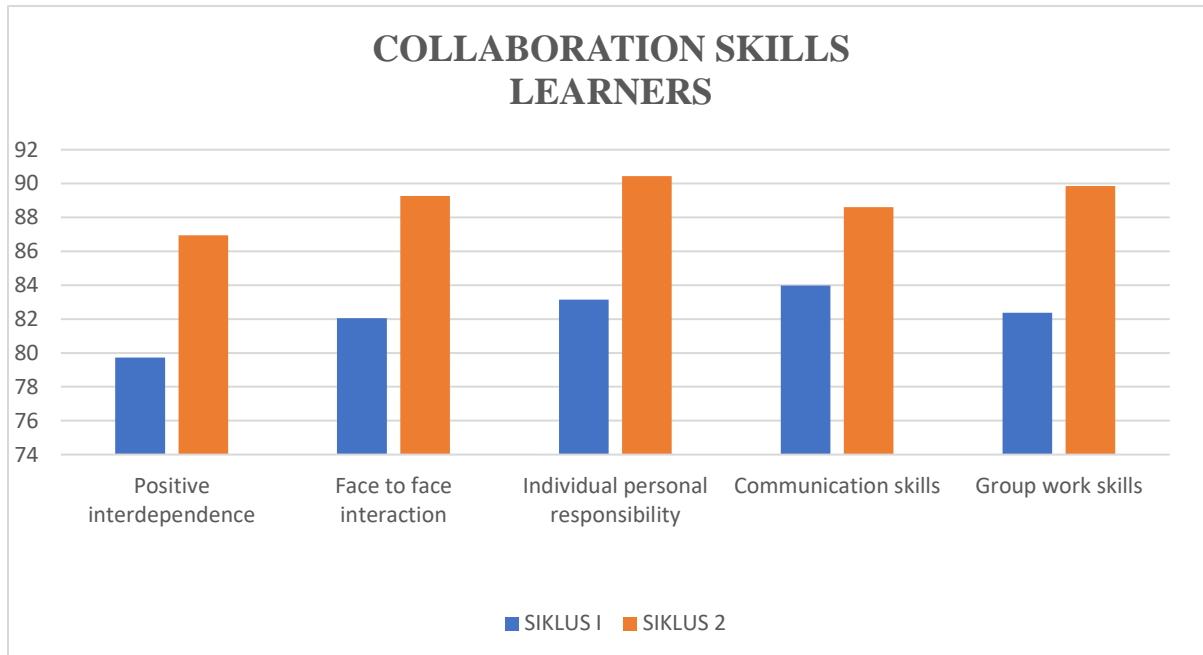


Figure 4.1 Graph of Collaboration Skills

Based on the observed data in Figure 4.1, all indicators of student collaboration have achieved the success criteria. The average increase in collaboration between students in cycles I and II increased by 6.77. The average collaboration between students in cycle I was initially at 82.25, then increased to 89.02 in cycle II. The results of observations of classroom action research that have been carried out show that there is an increase in students' collaboration skills in class II SD Negeri Bantul Regency Tema 8 by using the *Problem Based Learning* learning model.

## **Discussion**

Implementation of the action using the PTK model from Stringer E.T. The study used a two-cycle procedure, namely cycle one and cycle two. Each implementation of the cycle consists of 3 stages, namely: the look stage, the Think stage, and the Act stage. The first stage is the look stage. At this stage, observations were made on collaboration in class II, Theme 8 Safety at Home and Travel, Sub-theme 3 Rules for Safety on the Learning Journey 6. During the discussion activities, 4 groups were formed, only one group went well in the division of tasks. Two groups have not gone well, namely 1 group is still working on it individually, while there is 1 group only one student is working on it. The second stage is Think. At this stage the content of learning mathematics is about determining the unit of time in the day. At this stage what needs to be prepared is to make learning tools including; Learning Implementation Plans (RPP), learning materials, learning media, student activity sheets (LKPD), observation and evaluation sheets. Thus, the application of the problem-based learning model can improve student learning outcomes (Effendi et al., 2021; Farisi et al., 2017).

The third stage is Act (action). At this stage carry out the implementation of learning that has been designed. Observation activities are carried out to find out the activities carried out by students in the collaboration process. When the teacher's core activity stage describes learning material, in the implementation of learning students are able to carry out learning with collaboration skills with indicators of positive interdependence, face-to-face interaction, individual personal responsibility, communication skills, skills working in groups.



## **5. Conclusion**

Problem based learning (PBL) learning succeeded in improving collaboration skills as seen from the increase in the results of observations of collaboration skills in the pre-cycle, cycle I, and cycle II. Through the problem-based learning model, students learn to gain knowledge and concepts that are the essence of each learning material previously owned by students, students become more active in participating in the learning process, help increase student confidence in learning and increase self-awareness in dividing tasks into groups to work well together.

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