

## **Improving Mathematics Problem Solving Ability through Team Assisted Individualization Learning Model**

**Arrahim<sup>1</sup>, Rini Endah Sugiharti<sup>1</sup>, Desinta Damayanti<sup>1\*</sup>**

<sup>1</sup>Program Studi Pendidikan Guru Sekolah Dasar UNISMA Bekasi, Indonesia

\*Corresponding author, email: [desintadamayanti08@gmail.com](mailto:desintadamayanti08@gmail.com)

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### ***Abstract***

*The purpose of this study was to improve students' problem-solving abilities using the Team Assisted Individualization (TAI) model in students grade IV of Bekasi Jaya II State Elementary School. This study was carried out because of the students' low problem-solving ability in Mathematics.*

*This study employed the Classroom Action Research approach, which was conducted in two cycles. Each cycle has four stages, namely, planning, implementation, assessment, and reflection stage. About 27 students from grade IV has participated in this study. Data collection was carried out through written tests and observation sheets. Data were analyzed with descriptive analysis. The criterion for success in this study is if 80% of students achieve a minimum score of 75.*

*Based on the results, the students' problem-solving ability in cycle I with classical completeness was 59%, and got an average score of 72. In cycle II with 89% classical completeness, and the mean score of students' problem-solving abilities increased to 88. Thus, it can be concluded that the Team Assisted Individualization model can improve the conceptual understanding of grade IV students of Bekasi Jaya II State Elementary School.*

**Keywords:** *problem-solving ability, Team Assisted Individualization learning model*



## **INTRODUCTION**

Mathematics plays a very important role in human life. It becomes one of the main subjects at all levels of education, from elementary to university (Susanto, 2013). Even mathematics is also taught in kindergarten informally. In the curriculum of Ministry of National Education 2004, the competency standard of mathematics in elementary schools that students must acquire after carrying out learning activities is not the mastery of mathematics, but what is needed is to be able to understand the world around them, to be able to compete, and to be succeeded in life.

Susanto also described that mathematics learning is a teaching and learning process to develop students' creative thinking skills that can improve their thinking abilities and increase their ability to construct new knowledge as an effort to increase good mastery of mathematics (Susanto, 2013). In the process of learning mathematics, both teachers and students should make an effort to implement the learning objectives. This learning objective will achieve maximum results if the learning process runs effectively. Generally, the purpose of learning mathematics in elementary schools is so that students are able and skilled to use mathematics.

Specifically, the objectives of learning mathematics in elementary schools, as presented by the Ministry of National Education, are as follows: (1) To understand mathematical concepts, explain the relationship between those concepts, and apply the concepts of algorithms. (2) To use reasoning on patterns and properties, performing mathematical manipulations in generalizations, compiling evidence, or explaining mathematical ideas and statements. (3) To solve problems, including the ability to understand the problems, to design mathematical models, to solve models, and interpret the solutions obtained. (4) To communicate ideas using symbols, tables, diagrams, or other media to explain the situation or problem. (5) To appreciate the use of mathematics in everyday life (Mariani, 2017).

Problem-solving is the main reason for studying mathematics (Mukti et al., 2017). It is even considered as the heart of mathematics learning (Susilawati et al., 2017). Mathematical problems should be used as a tool to help students expand higher-order thinking skills and strengthen basic skills in problem-solving, which also means solving social problems (Rusnilawati, 2016). The main problem is the students' low problem-

solving ability because they have not been able to solve mathematical problems related to the real world (Wirdaningsih et al., 2017).

The ability to solve mathematical problems is one of the abilities that students must have because it provides great benefits to students in seeing the relations between mathematics with other subjects, as well as in real life situation (Priyana, 2018; Wirdaningsih et al., 2017).

The main thing that must be considered by teachers is what problems are given to students that are in accordance with the material and are related to their activities (Cahyono & Rukayah, 2016). In teaching and learning activities in schools, many students who are good at solving problems often use intelligent methods beyond expectations and habits as they give short and accurate answers. However, not a few of them solve the problem by providing long arguments, but the result is less accurate, even though many students have difficulty finding ways to solve the problem (Usodo, 2012b).

Students are considered successful in solving math problems if they can understand, choose the right strategy, and then apply them to solve the problems. One of the factors for the low ability of students' mathematical problem solving is the lack of their desire to study mathematics because it is considered difficult, creepy, and so on (Susilawati et al., 2017; Usodo, 2012a; Wahyuddin, 2017).

Problem-solving skills are closely related to students' ability to read and understand the question's language, present them in a mathematical model, plan calculations from mathematical models, and solve calculations from non-routine problems. The students' low ability in problem-solving shows that they have not been able to identify the problems given in the question description, they keep silent when the teacher asks the question, they still have difficulty in solving the problem and do not formulate the solution using the right steps (Badjeber et al., 2018; Budiman & Jailani, 2014). Low problem-solving abilities make it difficult for them to solve a problem in mathematics (Azmi, 2017).

Mathematical problem solving is an activity to find solutions to mathematical problems faced by using all the mathematical knowledge that they have (Cahyani & Setyawati, 2016). Aisjah has mentioned the indicators of solving mathematical problems, they are (1) Understanding the problem, (2) Designing a mathematical model, (3)

Executing the model design, (4) Interpreting the results obtained by making conclusions from the answers to the problems (Juliani Noor & Norlaila, 2014). In comparison, the problem-solving solution involves understanding the problem, planning a solution, solving the problem according to the plan, and checking all the steps taken (Cahyani & Setyawati, 2016).

Based on the observations at grade IV of Bekasi Jaya II State Elementary School, it was found that students had difficulty solving math problems. This can be seen when the teacher provides questions in the form of stories on the multiplication material. They have not been able to identify the problem correctly, and they still have difficulty determining what is known and asked in these questions. They still have difficulty in solving the problem in the description questions. This can be seen when students cannot determine four apples and five oranges with a price of Rp. 750 and Rp. 1500, respectively, it must be multiplied into four apples x Rp. 750 and 5 pieces of oranges x Rp. 1500. Thus they cannot solve the problem correctly, and there are still some mistakes. And also, only a few of them who can conclude the results of these answers. The result of observation showed that the number of students who were able to solve math problems was six students or 22%, and those who were unable to solve math problems were 21 students or 77%.

The various problems above require the right solution and handling. One way to overcome this problem is to apply the Team Assisted Individualization (TAI) learning model. This kind of learning model is included in Cooperative learning. In the TAI learning model, students are placed in small groups of 4 to 5 people, and this is followed by individual assistance for students who need more help (Arrahim & Amalia, 2018a; Nurrizki et al., 2016).

Dayang explained that the cooperative learning model Team Assisted Individualization (TAI) is a learning model that forms small heterogeneous groups with different thinking backgrounds to help each other in the classroom (Arrahim & Amalia, 2018b). Team Assisted Individualization (TAI) combined cooperative learning and individual teaching. In this learning model, students help each other. For example, students who are good at are responsible for helping the low ability students. Besides, it can increase student participation in small groups as well.

TAI is more effectively used than Direct Instruction (DI). For students with moderate initial abilities, TAI learning is more effective when compared to direct learning (Widodo et al., 2017). According to Slavin, there are several benefits of TAI, including (1) minimizing teacher involvement in routine examinations and management; (2) involving teachers in teaching small heterogeneous groups; (3) making it easier for students to implement it because the operational techniques are quite simple; (4) motivating students to learn the material given quickly and accurately, without shortcuts; (5) enabling students to work with other students who are different from creating a positive attitude among them (Arrahim & Amalia, 2018a; Nurrizki et al., 2016; Zannah, 2017). This is in accordance with Suyitno's statement that TAI adapts to individual differences related to student ability and achievement (Nurrizki et al., 2016).

Therefore, based on the background and description above, researchers are encouraged to conduct research about "Improving Mathematical Problem Solving Ability through Team Assisted Individualization (TAI) Learning Model in grade IV of Bekasi Jaya II State Elementary School".

## **METHOD**

This research employed Classroom Action Research techniques. According to Arikunto, Classroom Action Research is an examination of learning activities in the form of an action, which is deliberately raised and occurs in a class simultaneously (Arikunto & Suhardjono, 2015).

This study is conducted in 3 cycles, and each cycle consists of two meetings. The learning model that will be used in this research is the cooperative learning model Team Assisted Individualization (TAI). Each cycle has four stages, namely, planning, implementing, observing, and reflecting.

In general, the procedures in this research are planning, implementing, observing, and reflecting. At the planning stage, the researcher refers to how the teaching and learning process is in line with expectations. The forms of the plan are 1) determining the topics that will be discussed in the mathematics learning process, 2) preparing the lesson plan using the Team Assisted Individualization (TAI) learning model, 3) arranging the teaching materials or learning materials according to the learning topics that will be

implemented, and 4) arranging questions to determine the students' problem-solving abilities.

At the implementation stage, the researcher uses the test questions that have been prepared, and the Team Assisted Individualization (TAI) type of cooperative learning model. With this kind of learning, it is expected that the students will be able to improve their problem-solving abilities, which will be tested using cycle tests that have been prepared in advance to find out the results obtained by students. At the observation stage, the researcher observes the ongoing classroom learning activities in order to obtain the data needed in the application of the learning model, which includes the observation of students' problem-solving abilities in the form of a descriptive written test. While in the reflection stage, the data obtained from the observations are then analyzed. The results of the analysis are used to reflect on the implementation of cycle I, and the results of the reflection are then used to plan the next cycle.

To determine the success of this Classroom Action Research, the authors set indicators of success, namely the average score of student learning outcomes that should be above the minimum standard criteria or KKM score, which is 65, and approximately 80% of the students must obtain the minimum score (Gayatri, 2009).

## **RESULTS AND DISCUSSION**

Based on the results, it is proven that the cooperative model type Team Assisted Individualization (TAI) can improve the problem-solving skills of students grade IV at Bekasi Jaya II state elementary school. It showed that there was an increase in students' problem-solving abilities from cycle I to cycle II, where this research was carried out for 2 cycles with 4 stages in each cycle, namely: the planning, the implementation, the observation, and the reflection stage.

The researcher prepares to learn instruments for an instant lesson plan, teaching materials, student worksheets, and evaluation questions at the planning stage. The learning instruments are first consulted with the teacher and lecturer. After these are considered as ready to use, the researcher starts to proceed with the second stage, which is the implementation stage. At the implementation stage, the researcher was accompanied by the observer to carry out learning activities. The observer is in charge of

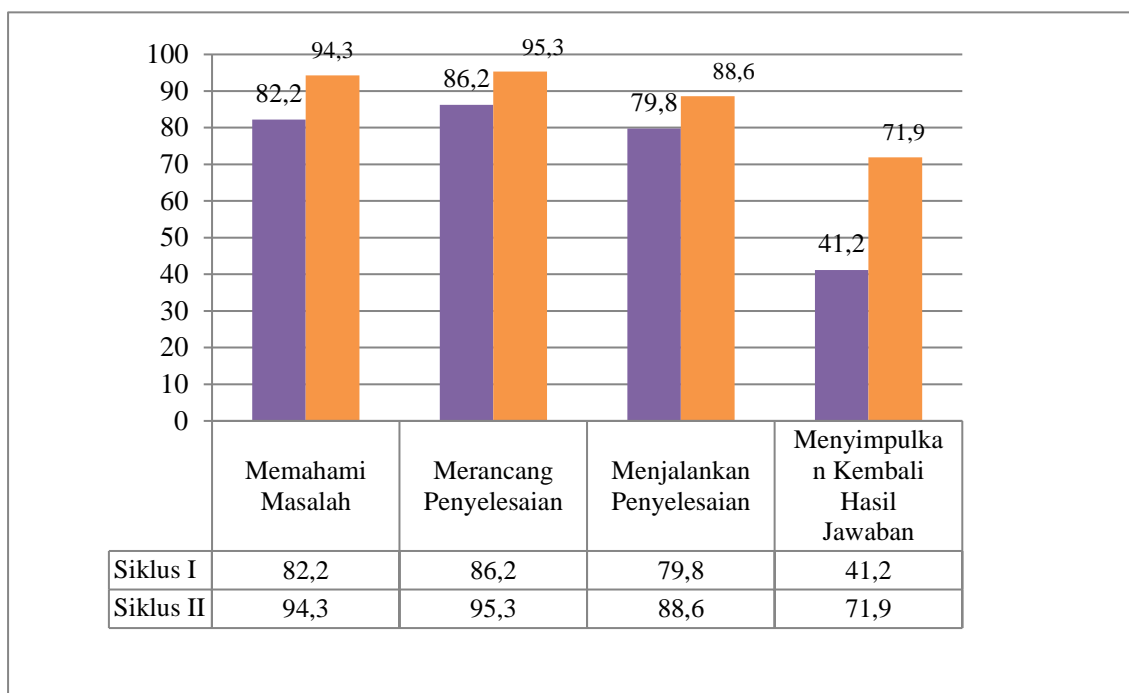
observing the implementation of learning using the observation sheet. What he observed was the implementation of learning and students' learning activities.

In the last part of cycle 1, the researcher reflected on the learning process. In this stage, the researcher conducted an analysis of the test from cycle 1, learning implementation, and learning activities. The results of the test of problem-solving abilities in cycle I showed that 16 students have successfully passed the minimum standard criteria with an average score of 72 with a percentage of 59%. The implementation of learning is still in the medium category meaning that there are several things that need to be improved, including time management, then lack of control over student discussion activities, and the teacher still missed many learning steps of the TAI model. Furthermore, the researcher conducted discussions with the teacher to find solutions in order to improve the learning process.

In cycle 2, the researcher worked more on the efficiency of the teaching material so that the time was sufficient to deliver the material. Then, to manage student discussion, the researcher more often went around to the groups and was more proactive in asking about the discussion. The steps of the TAI learning model were further simplified without reducing the essence of TAI learning itself.

Cycle II is carried out by considering the reflection in cycle I. The planning was done carefully. The lesson plan was improved to make it more efficient, and the less effective learning steps are fixed or eliminated. The test was adjusted to student learning conditions. As a result, learning in cycle II showed an increase compared to cycle I. In cycle II, the students' scores increased; about 24 students scored above the minimum standard criteria, and the average class score increased to 88 with 89% completeness. These results indicated that the learning outcomes in cycle II had reached success indicators, in which at least 80% of students reach the minimum score. Based on the results achieved in each cycle II, this classroom action research was enough and ended in cycle II.

Therefore, the study on this classroom action research was only carried out in two cycles. The increase in each cycle results proved that the Team Assisted Individualization (TAI) cooperative model could improve students' problem-solving abilities in mathematics among students grade IV in Bekasi Jaya II State Elementary School.



*Source: Research in 2020*

Figure 1. Diagram of Comparison of Value per Indicator of Problem Solving Ability in Cycle I and Cycle II

Based on the diagram above, it is found that the score of problem-solving ability in cycle II, namely, the indicator of understanding the problem, increased from 82.2 to 94.3. This indicated that students had increased their ability to understand the problem in the questions given. These results might be a trigger for positive results in the next stage. The ability to arrange solutions also increased from 86.2 to 95.3. This ability in the problem-solving stage is often neglected. The indicator of carrying out the completion increased from 79.8 to 88.6, and the indicator of concluding the answers increased from 41.2 to 71.9.

The results of the above showed that the Team Assisted Individualization (TAI) learning model could improve the problem-solving abilities of grade IV students of Bekasi Jaya II State Elementary School. In other words, this learning goal has been successfully achieved.

This research was conducted in 2 cycles. Based on the achievement of the learning success indicators that have been achieved in cycle 2 with a classification level of 89%; therefore, the research was not continued in cycle 3.



Based on the results, it was proven that the cooperative model Team Assisted Individualization (TAI) could improve the problem-solving skills of the students. The results showed an increase in students' problem-solving abilities from cycle I to cycle II, where this researcher was carried out for 2 cycles with 4 stages in each cycle, namely the planning stage, the implementation stage, and the observation, and the reflection stage.

The problem-solving test results in cycle 1 showed that 16 students successfully passed the minimum score, then in cycle II the student's score increased in that 24 students passed the minimum score. Based on the results that have been achieved in each cycle, this classroom action research was enough and was stopped in cycle 2.

This is because the success indicators have been achieved in cycle 2, so the research on this class action was only carried out in two cycles. The increase in each cycle results proved that the Team Assisted Individualization (TAI) cooperative model could improve students' problem-solving abilities in mathematics in grade IV students of Bekasi Jaya II State Elementary School.

## **CONCLUSION**

The results of the Classroom Action Research (PTK) that the researcher has done in class IV of Bekasi Jaya II State Elementary School on Mathematics using the cooperative model type Team Assisted Individualization (TAI) shows that this research is successful. Before the implementation of the TAI learning model in Mathematics subject, the students' problem-solving abilities were still low, where the average score of students was still below the minimum standard or KKM. After this classroom action research is carried out, the students' problem-solving abilities improve. They can understand problems, design the solutions, carry out solutions, and conclude the results as well. This can be seen from the value of problem-solving abilities in Mathematics for fourth-grade students of Negeri Bekasi Jaya II State Elementary School, which has increased. The result shows the average value of the first cycle is 72 or 59% of students who have reached the minimum standard or KKM, then in the second cycle, there is an increase with an average value of 88 or 89% of those who have reached the minimum standard. This research was stopped in cycle II because the students' results had reached the predetermined classical completeness, which is 80%.

Based on this explanation above, it can be seen that the percentage of classical completeness has increased by 30% from cycle I as much as 59% to cycle II by 89%, this indicates that the cooperative model type Team Assisted Individualization (TAI) can improve students' problem solving abilities in mathematics students grade IV of Bekasi Jaya II state elementary school.

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