



## THE EFFECTIVENESS OF *THE TALKING STICK*-ASSISTED PROBLEM-BASED LEARNING MODEL ON SELF-EFFICACY AND MATHEMATICAL CONTEXTUAL PROBLEM-SOLVING SKILLS

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### Abstract

*The aim of this study was to determine the effectiveness of the Talking Stick Assisted Problem Based Learning learning model in the subject matter of Data Presentation on Self Efficacy and Contextual Mathematical Problem Solving Ability for class VII students of SMPN 19 Tegal City. This research is a quantitative research. The population used in this study were all class VII students of SMP N 19 Tegal City for the 2022/2023 Academic Year. The sample used is using purposive sampling. Data collection techniques using tests and questionnaires. From the results of the study it was found that the Self Efficacy of students who were taught using the Talking Stick Assisted PBL model was better than those taught using the Conventional model and obtained an increase before and after treatment in the moderate category. For mathematical contextual problem solving abilities, the results of students' solving abilities taught using the Talking Stick Assisted PBL model were better than those taught using the Conventional model and the value of mathematical contextual problem solving abilities taught using the Talking Stick Assisted PBL model reached KKM.*

**Keywords:** *Mathematical Contextual Problem, Problem Based Learning, Self Efficacy Talking Stick.*

### INTRODUCTION

Education is one of the efforts taken to improve the quality of human resources. In the world of education, especially in Indonesia, mathematics is one of the subjects that has an important role. Mathematics is a basic *science* subject that has an important role in the development and continuity of science and technology (Yunita, Surya & Syahputra, 2019).

Mathematics is one of the compulsory subjects in the world of Indonesian education which is regulated in a structured manner by the government where it is closely related to human life and beneficial to human life. One of the goals of mathematics learning outcomes is that students can master problem-solving skills. As explained the purpose of mathematics learning according to the *National Council of Teachers of Mathematics*, students must have five standards of mathematical proficiency, namely *problem solving*, communication skills, *connection* skills, *reasoning* skills, and *representation skills* ( Ali, 2022).

Problem-solving skills are used by students as the first step to develop ideas in building new knowledge and developing mathematical skills, this ability is very useful for students when studying mathematics and in the interpretation of daily life (Nasution et al.

2023). Problem-solving skills are a very important aspect in the process of learning and developing mathematics (Dewi, Isnani & Ahmadi, 2019). Because the problem-solving skills obtained by students in the mathematics learning process can mostly be used in solving other problems. Another thing that is no less important in the mathematics learning process is that there is a psychological aspect which is also an important factor in supporting mathematics learning. This psychological aspect is *self-efficacy*. *Self-efficacy* is very important for students to master, because with *self-efficacy*, students' motivation and interest in learning mathematics will increase (Sujarwo, 2020).

Based on the results of the Programme for International Student Assessment (PISA) report in 2018, Indonesia obtained an average score of 379 with an average OECD score of 489 and ranked 73rd out of 79 participating countries in the mathematics proficiency category, this shows that mathematics proficiency in Indonesia is relatively low. From the PISA report, the alleged cause of students' low mathematical proficiency is the low quality of teachers and the quality of education in Indonesia. Other causes include the learning process and students' interest and motivation in participating in the learning activity process are low. In addition, there are still many Indonesian students who have difficulty dealing with situations where problem-solving skills are required (Andhini, Wanabuliandari & Purwaningrum, 2023).

Teachers can make efforts to support the achievement of mathematics learning, namely by designing and implementing learning models that are able to shape students' curiosity, scientific and social behavior. Based on (Permendikbud of 2016 Number 22, n.d.) there are 3 learning models that can be used as references, namely: *Discovery/Inquiry Learning* (Discovery Learning Model), *Problem Based Learning* (Problem-Based Learning Model) and *Project Based Learning* (Mulianti et al. 2023).

The Problem Based Learning *learning model* is a learning model that students need to face real-world challenges, skills in dealing with novelty and complexity (Amalia & Isnani, 2019). In its stages, the PBL Model is able to develop students' skills to answer in solving contextual problems. These stages include presenting a problem, forming several small groups, answering the problem and reviewing the results of the work again (Fadil & Isnani 2018). Talking Stick is a learning method that can train students to dare to express their opinions (Nurhidayat, Sina & Isnani, 2020). This learning method is carried out with the help of a stick, who holds the stick must respond to questions from the teacher after students are given the opportunity to learn the material (Kamarudin, Irwan & Daud, 2021).

Based on the results of observations and interviews held at SMPN 19 Tegal City on Tuesday, January 10, 2023, it is known that the learning carried out still uses a conventional learning model. Learning is still teacher-centered so that students tend to be passive in the learning process.

From the results of the interview with Mrs. Tasripah S.Pd as a mathematics teacher at SMPN 19 Tegal City, it was concluded that teachers have tried to make improvements in the learning process. However, students' mathematical achievement is still low. Many students of SMPN 19 Tegal City are easily discouraged in working on problems in the form of solving problems in story problems, especially in Data Presentation materials. Students tend to lack confidence in their own work, so they tend to choose to wait for other friends to ask for answers. These attitudes and actions of

students show a lack of confidence and inconfidence in their abilities. In another case, it can be said that students of SMPN 19 Tegal City still feel problems in solving problems. Students have difficulty in understanding the order of the question and lack understanding in determining the method that must be used to solve the problem.

Based on the description above, a study is needed on "The Effectiveness of the Talking Stick-assisted *Problem Based Learning* Model on *Self Efficacy* and the Ability to Solve Mathematical Contextual Problems (Research Study on Data Presentation Materials for Grade VII Students of SMP N 19 Tegal City for the 2022/2023 Academic Year)".

## RESEARCH METHODS

In this study, the quantitative approach method used in answering the problem formulation in the first study was used, namely the effectiveness of the Talking Stick-assisted PBL model on *self-efficacy* and the ability to solve mathematical contextual problems. The quantitative approach used in the study uses an experimental approach with a *true experimental design* in the form of *pretest-posttest control group design*. The research was conducted on grade VII students in the second semester of the 2022/2023 Academic Year at SMP N 19 Tegal City. The sampling technique uses a *purposive sampling technique*, so that class VII samples are designated as experimental class, class VII B as control class and class VII C as trial class.

The data collection techniques used are tests, questionnaires and documentation. Test instruments are used to obtain data on students' problem-solving skills. The test in the form of description questions amounted to 6 questions, the questions presented were in the form of problems related to the Data Presentation material. Before being used as a research instrument, the questions were tested in a trial class to obtain validity by calculating the correlation of product moment, reliability with alpha cronbach, level of difficulty and differentiation. So that 5 questions were obtained which were subsequently used as research instruments as posttests given to the experimental class and the control class. The questionnaire is used to collect *data on students' self-efficacy*. In this study, a questionnaire with a *Likert scale* was used with the response format being Strongly Agree (SS), Agree (S), Disagree (TS) and Strongly Disagree (STS). Similar to the test intreumen, previously the questionnaire was given to the trial class to be tested for validity and reliability so that 20 questionnaires were obtained that were declared valid out of 25 questionnaires. The questionnaire that will be carried out is a pretest-posttest for the experimental class, and a posttest for the control class.

Data Analysis techniques in the study include prerequisite tests before research, prerequisite tests after research and hypothesis tests. Prerequisite tests before the study were normality tests using the Liliefors test, homogeneity tests with Bartlett tests and sample equivalence tests using one-way anova tests to determine the initial ability of students in test, experiment and control classes. Then the prerequisite test after the research is a univariate and multivariate normality test and a univariate and multivariate homogeneity test. Hypothesis tests were used to determine (1) the effectiveness of the Talking Stick-assisted PBL model on *self-efficacy* using the right-party t-test, the paired sample t-test and the gain test. (2) the effectiveness of the Talking Stick-assisted PBL model on problem-solving skills using proportion tests, one-sample t-tests and right-

party t-tests. (3) the effectiveness of the Talking Stick-assisted PBL model on *self-efficacy* and problem-solving skills using the one-way manova test and the  $\tau^2$ -hotelling test.

## RESULTS AND DISCUSSION

Implementation of prerequisite tests before the study meet the normality, homogeneity and equality of the sample to be further conducted and data obtained on *self-efficacy* and ability to solve mathematical contextual problems. Based on the results of *self-efficacy* and problem-solving data management, the data is declared to be distributed normally and homogeneously univariate, multivariate. So that the data can be continued for hypothesis testing. The results of the hypothesis analysis as a result are:

1. The questionnaire data was calculated using the t-test, the paired sample t-test, and the N-Gain test. The t-test of one right party was obtained  $t_{count} = 6.0712 > t_{table} = 1.9990$  then  $H_0$  was rejected meaning that *the self-efficacy* of students who were given the PBL model assisted by *Talking Stick* was better than that given by the conventional model, then the *paired sample t-test* was obtained  $t_{count} = 46.0254 > t_{table} = 2.0395$  then  $H_0$  was rejected meaning that there was a difference or increase in *the value of self efficacy* before and after being treated with the PBL model assisted by *Talking Stick*. and the gain test to determine the increase, the results of the gain test calculation obtained N-Gain = 0.5034, meaning that there was an increase in self-efficacy in the moderate category. So it can be interpreted that the Talking Stick rock-based PBL model is effective on the *self-efficacy* of students.
2. This second hypothesis test uses a right-party proportional test, a *one-sample t-test* and a *right-party t-test*. Before calculating the t-test of one right party, a proportion test of one right party and a one-sample t-test were carried out first to ensure the ability to solve problems using the PBL model assisted by *Talking Stick* to reach the KKM. From the results of the analysis of the proportion test of one right party and the one sample t-test, it was obtained that  $z_{hcount} = 3.5355 > z_{table} = 1.6448$  and  $t_{hcal} = 4.7277 > t_{table} = 1.6955$ , then  $H_0$  was rejected, meaning that the problem-solving skills taught using the PBL model assisted by *the Talking Stick* reached the target and reached a value of 70. Furthermore, the results of the analysis of the t-test of one right party obtained  $t_{hcount} = 5.2378 > t_{table} = 1.9990$ , then  $H_0$  was rejected, so the problem-solving skills of students who were taught using *Problem Based Learning* with *Talking Stick* rocks were better than using the conventional model. So it can be interpreted that the Talking Stick rock-based PBL model is effective in solving mathematical contextual problems
3. Judging from the results of *the one way manova test*, it was obtained  $\partial_{count} = 0.5828 < \partial_{table} = 0.903$  then  $H_0$  was rejected, then there was a difference in *self-efficacy* and problem-solving skills of students who used the PBL model with *Talking Stick* rocks using the conventional model and in the  $\tau^2$ -Hoteling test obtained  $\tau^2_{count} = 45.6738 \geq \tau^2_{table} = 6.413$  then  $H_0$  is rejected, meaning that the level of *self-efficacy* and problem-solving skills using the Talking Stick-assisted PBL

model is better than using the Conventional model. So it can be found that the Talking Stick rock-based PBL model is effective in *self-efficacy* and the ability to solve mathematical contextual problems.

Based on the results of data analysis conducted at SMPN 19 Tegal City for the 2022/2023 Academic Year grade VII semester 2 with Data Presentation material, it was obtained that *the self-efficacy* and ability to solve mathematical contextual problems of students who were given the PBL model assisted by *the Talking Stick* showed positive or good results because at the time of providing treatment, students were trained to work together in doing group assignments, Students feel enthusiastic and enterprising, improve their ability to give opinions, and increase *self-efficacy*.

Based on the results of the questionnaire, it shows that *the self-efficacy* of students who are taught using the Talking Stick-assisted PBL model is more effective than those who are taught using the conventional learning model. This is because the implementation of the PBL model learning assisted by *Talking Stick* can encourage students to dare to express opinions, make students active during the learning process, and with learning in the form of games can increase students' interest in learning. This is also strengthened in previous research by Halnas, Kusasi & Sholahuddin (2022) stating that the application of *the problem-based learning* model can increase *the self-efficacy* of students from the category of good enough to good with improvements in every aspect. Based on the results of the cognitive test, *the problem-based learning* model was able to increase students' classical completeness from 51.43% to 88.57%.

Based on the test results, it was shown that the ability to solve contextual mathematical problems of students using the PBL model assisted by *Talking Stick* was more effective than using the conventional defense model. This is because the PBL model assisted by *Talking Stick* in the learning process can guide students to think critically, creatively, systematically, analytically, and logically so as to improve their ability to solve their mathematical contextual problems. It was strengthened in previous research conducted by Pratiwi & Trisni (2022) stating that the PBL model can improve students' mathematical problem-solving skills. The results of the study obtained an increase in problem-solving skills of grade VII students in the One-Variable Linear Equation material from cycle I and cycle II by 16.67% with a high category. In line with Sipayung's previous research, Manurung & Sauduran (2022) stated that if you want to improve students' mathematical problem-solving skills, the *Problem Based Learning* learning model can be considered during the learning process.

Judging from the analysis of the one-way multivariate variety or *Manova One Way* and the  $\tau^2$ -Hoteling test, it was proven that there was a significant difference between *self-efficacy* and the ability to solve mathematical contextual problems in students who were taught using the Talking Stick-assisted PBL model and those who were taught using the conventional model. The PBL model assisted by *Talking Stick* can arouse student participation in more dominant learning activities, students have a high interest in participating in learning, each student is responsible for himself and his group. This makes the Talking Stick-assisted PBL model quite effective to be used during teaching and learning activities. This was also strengthened in a previous research conducted by Nikmatul Karima (2021) who stated that the use of the PBL model on the circumference

and circle area material was effective for *Self-Efficacy* and solved the problems of Class VIII students of SMP N 20 Semarang.

From the above discussion, it was found that the Talking Stick-assisted PBL model is effective on *self-efficacy* and the ability to solve mathematical contextual problems. In line with the research of Irfan & Susanti (2022), namely obtaining a positive effect from the PBL model in students' mathematical problem-solving skills and *self-efficacy*, and increasing mathematical problem-solving skills to obtain high category criteria and *self-efficacy* obtaining medium category criteria

In the application of the PBL model assisted by *Talking Stick*, both in the approach and the method are inseparable from the weaknesses. In the implementation of the Talking Stick-assisted PBL model, it takes a long time, including in learning preparation, students when participating in mathematics learning still experience confusion when obtaining problems or answering questions given to be solved with the group as well as supervisors or teachers in applying the Talking Stick-assisted PBL model. This must be able to manage the classroom with a high level of ability because there are some students who are passive in groups and when *the Talking Stick game* is carried out, students are very enthusiastic about the implementation so that the classroom conditions are not so conducive.

### CONCLUSION

The results of the study showed that the *self-efficacy* and ability to solve mathematical contextual problems of students who were taught using the Talking Stick-assisted PBL model were better than those taught using the conventional model. So, it can be concluded that the *Problem Based Learning* model assisted by *Talking Stick* is effective on *self-efficacy* and the ability to solve mathematical contextual problems in the data presentation material of Grade VII students of SMPN 19 Tegal City. *The Problem Based Learning* model is able to improve and develop students' *Self Efficacy* and ability to solve mathematical contextual problems in the classroom. Mathematics learning needs to be designed to train *the participants' self-efficacy* and problem-solving skills. This ability is very substantial in mathematics learning and is able to influence students in dealing with problems in the daily environment.

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