ANALYSIS OF *SELF EFFICACY* AND CONTEXTUAL MATHEMATICAL PROBLEM SOLVING ABILITIES OF STUDENTS THROUGH A *MODEL PROBLEM BASED LEARNING* WITH *TALKING STICK*

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Abstract

This research is based on the low *self-efficacy* and contextual mathematical problem solving abilities of class VII students at SMPN 19 Tegal, especially in Data Presentation material. The aim of this research is to determine the increase in *Self Efficacy* and Contextual Mathematics Problem Solving Ability of Class VII students at SMPN 19 Tegal through the *model Problem Based Learning with Talking Stick* on the main subject of Data Presentation. This research is a quantitative research. The population in this study were class VII students at SMP N 19 Tegal 2022/2023. Sampling using *purposive sampling technique* . Research data was collected by test and questionnaire methods. The analysis used is the Manova one way test and the τ^2 –Hoteling test which have been tested for normality and homogeneity. The research results showed that *the self-efficacy* and contextual mathematical problem solving abilities of students who were taught using the *model PBL with Talking Stick* were better than those taught using the conventional model.
Keywords : PBL, *Talking Stick* , *Self Efficacy* , Problem Solving.

INTRODUCTION

One effort to improve the quality of human resources is through education. Mathematics is one of the subjects that has an important role in education in Indonesia. Mathematics is a *basic* science subject which 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 Indonesia which is regulated in a structured manner by the government where this part is closely related to human life and is beneficial for human life. One of the objectives of learning mathematics in education in Indonesia is to master problem solving skills. As explained by the objectives of mathematics learning according to *the National Council of Teachers of Mathematics* , students must have five standards of mathematical ability, namely problem solving ability, communication ability, connection ability, reasoning ability, and representation skills (Ali, 2022) .

Problem solving ability is a very important aspect in the process of learning and developing mathematics (Dewi, Isnani & Ahmadi, 2019) . because the problem-solving abilities acquired by students in the process of learning mathematics can mostly be used in solving other problems. Another thing that is no less important in the process of learning mathematics is that there is a psychological aspect which is also an important factor in supporting the learning of mathematics. 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) .

However, *self-efficacy* and problem-solving abilities are abilities that are still a concern in Indonesia, because these two things are still relatively low in mathematics learning. The low *self-efficacy* and problem-solving abilities of students are caused by several factors, one of which is that the learning model applied by teachers is less varied and less interesting.

The Problem Based Learning learning model is a learning model that is needed to face real world challenges, the ability to face novelty and complexity (Amalia & Isnani, 2019) . In its stages, the PBL model is able to develop students' abilities to solve contextual problems. These stages include presenting a problem, forming small groups, resolving 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 opinions (Nurhidayat, Sina & Isnani, 2020) . This learning method is implemented with the

help of a stick, whoever holds the stick must respond to questions from the teacher after students are given the opportunity to study the material (Kamarudin, Irwan & Daud, 2021) .

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

From the results of an interview with Mrs. Tasripah S.Pd as a mathematics teacher at SMPN 19 Tegal, it was concluded that the teacher had tried to make improvements in the learning process. However, students' mathematics achievement is still low. Many students at SMPN 19 Kota Tegal easily give up when working on problems in the form of problem solving on story questions, especially on Data Presentation material. Students tend to be less confident in the results of their own work, so they tend to choose to wait for other friends to ask for the answer. The attitudes and actions of these students show a lack of self-confidence and are unsure of their abilities. In other cases, it can be said that students at SMPN 19 Tegal still experience obstacles in solving problems. Students have difficulty understanding the question instructions and lack understanding in determining the method that should be used to solve the problem.

Based on the description above, a study is needed on " Analysis of *Self Efficacy* and Contextual Mathematical Problem Solving Abilities of Students through a *Model Problem Based Learning* with *Talking Stick* (Research Study on Student Data Presentation Material for Class VII Students of SMP N 19 Tegal 2022/ 2023).

METHODOLOGY

This research is a quantitative research, used to answer the formulation of the problem in research analyzing *self-efficacy* and contextual mathematical problem solving abilities of students through the *model PBL with Talking Stick*. The research method to be carried out is experimental research with a *true experimental design* in the form of *a pretest-posttest control group design* . The population in this study were students in class VII semester II of the 2022/2023 at SMP N 19 Tegal. Using a *purposive sampling technique* , the research sample was selected, namely class VII as the experimental class, class VII B as the control class and class VII C as the trial class.

The data collection techniques used are tests, questionnaires and documentation. Test instruments are used to obtain data on students' problem solving abilities. The test is in the form of descriptive questions with a total of 6 questions, the questions given are problems related to Data Presentation material. Before being used as a research instrument, the questions were tested in a trial class to obtain validity by calculating product moment correlation, reliability with Cronbach's alpha, level of difficulty and difference power. The results of the trial obtained 5 questions which were used as research instruments as a posttest given to the experimental class and control class. Questionnaire instruments are used to collect student *self-efficacy data. In this study, a Likert* scale questionnaire was used with the response formats being Strongly Agree (SS), Agree (S), Disagree (TS) and Strongly Disagree (STS). As with the test instruments, previously questionnaires were given to the trial class to be tested for validity and reliability so that 20 questionnaires out of 25 were declared valid. The questionnaire that will be implemented is a pretest-posttest for the experimental class, and a posttest only for the control class.

The data analysis techniques used are prerequisite tests before research, prerequisite tests after research and hypothesis testing. The prerequisite test before the study was carried out by a normality test using the Liliefors test, homogeneity test with the Bartlett test and Sample Equality Test using a one-way ANOVA test to determine the initial abilities of students in the trial, experimental and control classes. The data used for the prerequisite test before the research were even semester PTS Mathematics scores. Prerequisite tests after the research were carried out using a multivariate normality test and a multivariate homogeneity test. The hypothesis tests used in this research are the one way MANOVA test and the τ^2 - Hotelling test.

RESULTS

Implementation of the prerequisite tests before the research fulfills normality, homogeneity and sample equality so that further research is carried out and data on *self-efficacy* and mathematical contextual problem solving abilities is obtained. Before testing the hypothesis, the prerequisites are first tested after the research with a multivariate normality test and a multivariate homogeneity test.

Table 1. Multivariate normality test for experimental class

Correlations

		Mahalanobis Distance	qi
Mahalanobis Distance	Pearson Correlation	1	,986 **
	Sig. (2-tailed)		,000
	N	32	32
Qi	Pearson Correlation	,986 **	1
	Sig. (2-tailed)	,000	
	N	32	32

**. Correlation is significant at the 0.01 level (2-tailed).

The results of the calculation of the multivariate normality test in the experimental class with the help of SPSS obtained a sig value <0.05, so the data for the Self Efficacy and Problem Solving Ability of the Experiment Class had a normal multivariate distribution.

Table 2. Multivariate normality test for control class

Correlations

		Mahalanobis Distance	qi
Mahalanobis Distance	Pearson Correlation	1	,982 **
	Sig. (2-tailed)		,000
	N	32	32
Qi	Pearson Correlation	,982 **	1
	Sig. (2-tailed)	,000	
	N	32	32

**. Correlation is significant at the 0.01 level (2-tailed).

The results of the calculation of the multivariate normality test in the control class with the help of SPSS obtained a sig value <0.05, so the data for the Self Efficacy and Problem Solving Ability of the Control Class has a multivariate normal distribution.

Table 3. Multivariate homogeneity test

Box's Test of Equality of Covariance Matrices [a]

Box's M	7,068
F	2,274
df1	3
df2	691920,000
Sig.	,078

The results of the multivariate homogeneity test with the help of SPSS obtained a significant value of 0.078 > 0.05, meaning that the population has multivariate homogeneous diversity.

Because the data has a multivariate normal distribution and is multivariate homogeneous, the data can be continued to carry out calculations for the one-way MANOVA test and the τ^2-Hotelling test. The following describes the calculation results of the one way Manova test.

Table 4. One Way Manova Test Results

∂_{count}	∂_{table}	Conclusion

0.5828	0.903	Rejected

Based on the calculation results of the One Way Manova Test, it was obtained $\partial_{count} = 0,5828$. These results are then compared with ∂_{table} with a response variable of 2 numerators 1 and dk denominator 64 and a significance level of 5%, we get $\partial_{table} = 0,903$. Because $\partial_{count} < \partial_{table}$ H$_0$ is rejected, it means that there is a difference in *self-efficacy* and problem solving abilities between those taught using the model PBL with *Talking Stick* and those taught using the conventional model.

After the One Way Manova Test was carried out and it was stated that there were differences in *self-efficacy* and problem solving abilities between the experimental class which was treated using the model PBL with *Talking Stick* and the control class which was treated using the Conventional model, then continued with the τ^2 -hoteling test to determine the learning model which one is better in increasing students' *self-efficacy and problem-solving abilities.* The following describes the calculation results of the τ^2 -Hoteling test

Table 5. τ^2 -Hoteling Test Results

τ^2 $_{count}$	τ^2 $_{table}$	Conclusion
45.6738	6,413	Rejected

Based on the calculation results of the τ^2-Hoteling Test, it is obtained *that* τ^2 = 45.6738. These results are then compared with the τ^2_{table} with a response variable of 2 and a dk denominator of 64 and a significance level of 5%, so we obtain τ^2 $_{0.05;2;64}$ = 6.413. Because $\tau^2 \geq \tau^2$ $_{\alpha;p;VE}$ then H $_0$ is rejected, meaning that the level of *self-efficacy* and problem solving ability taught by the model PBL with *Talking Stick* is better than that taught by the conventional model.

Based on the results of data analysis conducted at SMPN 19 Tegal for the 2022/2023 school year class VII semester 2 of the subject matter of Data Presentation, it was found that the self- *efficacy* and ability to contextual mathematical problem solving of students who were taught using the *model PBL with Talking Stick* showed positive results. this is because in learning students are taught to work together in a group, students have enthusiasm and are active, increase the ability to argue, and increase *self-efficacy* .

Based on the research results, questionnaire data shows that *the self-efficacy* of students taught using the model PBL with *Talking Stick* has increased. This is because the model PBL with *Talking Stick* can encourage students to dare to express opinions, make students more active in the learning process, and by learning in the form of games it can increase students' interest in learning.

Based on the research results, test data shows that the contextual mathematical problem solving abilities of students taught using the model PBL with *Talking Stick* have increased. This is because the model PBL with *Talking Stick* in the learning process can guide students to think critically, creatively, systematically, analytically and logically thereby improving their mathematical contextual problem solving abilities. In line with this, research by Sipayung, Manurung & Sauduran (2022) states that if you want to improve students' mathematical problem solving abilities, the *Problem Based Learning learning model* can be used as a consideration for use during the learning process.

Judging from the one-way multivariate analysis of variance or *One Way Manova* and the τ^2-Hoteling test , it is proven that there is a significant difference between *the self-efficacy* and contextual mathematical problem solving abilities of students who are taught using the *model PBL with Talking Stick* and those taught using the conventional learning model . The model PBL with *Talking Stick* is able to make student participation in the learning process more dominant, students have a high interest in participating in learning, each student is responsible for themselves and their group. This means that the model PBL with *Talking Stick* can be considered for use in the learning process to increase *self-efficacy* and contextual mathematical problem solving abilities. This was also confirmed in previous research conducted by Nikmatul Karima (2021) which stated that the use of the PBL model in the material on circumference and area of a circle was effective in the *Self Efficacy* and problem solving of Class VIII students at SMP N 20 Semarang.

From the discussion above, it is found that the model PBL with *Talking Stick* can increase *self-efficacy* and contextual mathematical problem solving abilities. In line with the research conducted by Irfan & Susanti (2022) which obtained a positive effect from the PBL model on students' mathematical problem solving abilities and *self-efficacy , as well as increasing mathematical problem solving abilities in the high category and self-efficacy* in the medium category

In implementing the *model PBL with Talking Stick*, both the approach and the method are not without drawbacks. In implementing the model PBL with *Talking Stick,* it takes quite a long time, including in learning preparation, students during mathematics learning still experience confusion when they encounter problems or questions that are given to be solved together with the group and

the supervisor or teacher in implementing the model PBL with Talking *Stick* . able to manage a class with a high level of ability because there were some students who did not play an active role in groups and when the *Talking Stick game* was carried out the students were very enthusiastic in implementing it so the class conditions were not very conducive.

CONCLUSIONS

The research results showed that *the self-efficacy* and contextual mathematical problem solving abilities of students who were taught using the model PBL with *Talking Stick* were better than those taught using the conventional model. So it can be concluded that the *model Problem Based Learning* with *Talking Stick* can increase *self-efficacy* and contextual mathematical problem solving abilities in data presentation material for Class VII students at SMPN 19 Tegal. The model *Problem Based Learning* with *Talking Stick* is able to foster and develop students' self-efficacy and contextual mathematical problem solving abilities in the classroom. Mathematics learning needs to be designed to train students *'* self-efficacy and contextual mathematical problem solving abilities. This ability is very important in learning mathematics and is able to influence students in facing problems in everyday life.

Based on research that has been carried out at SMPN 19 Tegal, the suggestion that can be given is that it is hoped that further research can manage time well in learning when using the model PBL with Talking Stick, adjusting it to the discussion material so that the material can be delivered and completed on time. Then it is hoped that the preparation and production of the LKPD can be made as attractive as possible using communicative language. This must be followed by conveying information at each learning stage so that students are able to clearly understand the steps that must be completed. And teachers need to have good classroom management skills, including the ability to respond to student responses, provide clear instructions, focus group attention, reprimand and reinforce learning material.

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