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MATHEMATICAL SELF-EFFICACY OF STUDENTS IN COOPERATIVE LEARNING WITH TWO STAY TWO STRAY TECHNIQUES

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ABSTRAK

Penelitian ini merupakan penelitian tindakan kelas yang bertujuan untuk memperbaiki proses pembelajaran matematika ditinjau dari *self-efficacy* siswa melalui penerapan pembelajaran kooperatif teknik *two stay two stray*. Subjek penelitian ini adalah 32 orang siswa dari salah satu SMP di Kota Yogyakarta. Teknik pengumpulan data dilakukan dengan menggunakan lembar angket *self-efficacy* yang terdiri dari 24 butir pernyataan *favorable* dan *unfavorable*. Hasil penelitian menunjukkan bahwa penerapan pembelajaran kooperatif teknik *two stay two stray* dapat memperbaiki proses pembelajaran dan meningkatkan *self-efficacy* matematika siswa. Hal ini terlihat dari peningkatan nilai rata-rata hasil belajar matematika siswa berdasarkan kategori tingkat *self-efficacy*.

Kata kunci: *Self-Efficacy*, Pembelajaran Kooperatif, Teknik *Two Stay Two Stray*

Abstract

This research is a classroom action research that aimed to improve the process of learning mathematics in terms of students' self-efficacy through the application of cooperative learning two stay two stray techniques. The subjects of this study were 32 students from one of the junior high schools in the city of Yogyakarta. Data collection techniques were carried out using a self-efficacy questionnaire sheet consisting of 24 favorable and unfavorable statements. The results showed that the application of cooperative learning two stay two stray techniques can improve the learning process and improve students' mathematical self-efficacy. This can be seen from the increase in the average value of student mathematics learning outcomes based on the category of self-efficacy.

Keywords : *Self-Efficacy, Cooperative Learning, Two Stay Two Stray Techniques*

INTRODUCTION

Education should not only just meet the curriculum target of the school, but also require an understanding process for students. One of the subjects that demands the understanding toward the students is mathematics. Mathematics as a subject, is very important thing to be mastered by all students. Hence, it should have received serious mathematical learning so that the quality of mathematics learning can be improved. To realize this, the teacher should be able to create a conducive climate in learning mathematics in the classroom so that students' mathematics learning outcomes can achieve the expected learning completeness.

In addition to the cognitive aspects, another factor that is not less important in influencing students' mathematics learning success is the affective aspect. One of affective aspect that is expected to have a significant influence on the learning is self-efficacy (Schunk, 2012). In line with this opinion of Zimmerman, Bonner, & Kovach (1996) and Slavin (2006) stated self-efficacy as an important variable which must be owned by students. Students who have high self-efficacy tend to use cognitive learning

strategies, so that it impacts on good learning outcomes.

Bandura (1994) explained that self-efficacy is a person's belief about their ability to perform an action that is designated through performance that has an influence on events in their lives. Meanwhile, Santrock (2018) stated that self-efficacy is one's belief in mastering certain situations and producing positive outcomes. Referring to this opinion, self-efficacy is said to be a belief upon the ability possessed to achieve certain goals and efforts made for the achievement of good results.

Related to self-efficacy in mathematics, Pajares & Graham (1999) stated that self-efficacy is a student's belief in their abilities, successes, and persistence in learning and completing all mathematical tasks as well as confidence in the benefits of mathematics in daily life. As Caprara, Vecchione, Alessandri, Gerbino, & Barbaranelli (2011) and Carroll et al. (2009) who explained that there is a significant relationship between self-efficacy and student learning achievement. These results indicate that if self-efficacy is good then mathematics learning achievement of students will also be good, and vice versa.

Cera, Mancini, & Antonietti (2013) defined self-efficacy as a person's belief in the ability he has in increasing motivation, hope, cognitive power and actions needed to carry out a task. Furthermore, Ghufron & Risnawita (2014) defined self-efficacy as one aspect of self-knowledge that is very influential in everyday human life. This is because the self-efficacy that is involved influences a person in the actions that will be taken to achieve the goals including the estimated events to be faced.

Bandura (1994) said that one's success in self-efficacy can be grown in four ways. There are namely the experience of success, the experience of others, social persuasion and physical also emotional conditions. According to Hodges & Murphy (2009) the experience of success refers to the previous experience of success, success in working on a task will build confidence while failure will weaken self-efficacy. The experience of others who succeed in doing similar tasks can increase self-efficacy while the failure of others can reduce self-efficacy. Social persuasion is usually needed because of the convenience that can be dispensed with, one must see who the persuader has the ability in providing meaningful feedback. Physical conditions, pain, emotions, and fatigue affect self-efficacy. Meanwhile, Loo & Choy (2013) stated that the experience of success is the main source of achievement of students' academic mathematical grades.

Richard & Kilcher (2010) stated that Self efficacy is beliefs held by individuals that their efford will be successful and caused by personal effort rather than by external factors or luck. Meanwhile, McCoach, Gable, & Madura (2013) explained that self efficacy can be defined as one’s perceptioan of his/her ability (i.e confidence) to succesfully perform a task or behavior. Dimopoulou (2012) said that Mathematical self-efficacy is an individual's confidence and confidence in the ability to complete a given mathematical task and how confidence in following mathematics learning.

In connection with the matter above, the expected learning process is learning that be able to make students more active as a whole in expressing opinions and communicating their thoughts both with the teacher, peers, and the mathematics material itself. But in reality, the learning process has not been fully student-centered. the learning process in schools is still largely teacher-centered, because students' self-

efficacy during the learning process is still very low. Students feel embarrassed to answer when their teacher asks questions, and students are embarrassed to present their answers in front of the class because they feel afraid if the answer is wrong. Therefore this study aims to improve the process of learning mathematics which in this case is the mathematical self-efficacy of students. One alternative learning is cooperative learning 'two stay, two stray' techniques, namely learning consist of four people in each group, each of which has a task that is 'two stays', it means to two students who stay in charge of providing information and explanations about the steps to solve the unknown problem by students who come. Other two students who came were called 'two stray', are in charge of looking for the information needed. Kagan & Kagan (2009) stated that the 'two stay, two stray' technique provides an opportunity for each group to provide results and information with other groups.

RESEARCH METHOD

This research was classroom action research with the number of research subjects were 32 students from one junior high school in the city of Yogyakarta. They were consisted of 14 male students and 18 female students who have heterogeneous abilities. This research was conducted in two cycles, which is each of them consist three times treatment and test. Each cycle has four stages namely, planning, implementation, observation, and reflection.

The data obtained in this study were arranged systematically so that it was more easily interpreted, so data analysis must be done during and after data collection. The data analysis technique used in this study was descriptive statistics. Descriptive statistics were used to analyze data by describing the data set that has been obtained, then presented in the form of tables, graphs, diagrams, or through the calculation of data distribution that is looking for the average value (mean), percentage, or standard deviation. In addition, descriptive statistics can also be made to make comparisons by comparing the average sample data or population. The range of scores and scale criteria about self-efficacy can be seen in the following Table 1.

Table 1. Self-Efficacy Scale

Interval	Kriteria
$X \leq \mu - 1{,}5\sigma$	Very Low
$\mu - 1{,}5\sigma < X \leq \mu - 0{,}5\sigma$	Low
$\mu - 0{,}5\sigma < X \leq \mu + 0{,}5\sigma$	Medium
$\mu + 0{,}5\sigma < X \leq \mu + 1{,}5\sigma$	High
$X > \mu + 1{,}5\sigma$	Very High

Information:
X : Total questionnaire score
μ : Ideal average [(maximum score + minimum score)/2]
σ : Ideal standard deviation [(maximum score − minimum score)/6]

RESULT AND DISCUSSION

The action carried out in this study was cooperative learning with two stay two stray techniques. This learning was presented in two cycles; included eight meetings, while the allocation of time in this study was two meetings in one week with each meeting 2 x 40 minutes.

Based on observations made during the first cycle, the two stay two stray cooperative learning process has not been implemented properly. However, at each meeting the teacher tried to improve the actions that he did. The teacher's actions that still need to be corrected are as follows:

1. At the first meeting the teacher has not conveyed the learning objectives.
2. The teacher lacks apperception and motivation to build students' curiosity about the material to be studied.
3. The teacher has not been able to set the condition the class well, especially during the student displacement process.
4. The teacher sometimes does not give an understanding test at the end of the learning activity as in the first and second meetings.
5. Teachers have not been able to arrange time well so there are still learning activities that have not been carried out.

Meanwhile, based on observations from each meeting in the second cycle the overall process of cooperative learning two stay two stray techniques has been going well. The teacher activities that have been carried out are as follows:

1. The teacher has well conveyed the learning objectives to be achieved at each meeting.
2. The teacher has expressed apperception and motivated by building students' curiosity about the material being studied so that students look more enthusiastic in learning.
3. The teacher can set the students' condition the students well so that during the transfer process there is no more noise and commotion in the classroom.
4. The teacher has given individual understanding tests to students except at the fifth meeting, so the teacher is able to know the extent of student understanding of the material that has been learned.
5. The teacher can manage time efficiently, so that all learning activities can be carried out well.

In addition, based on daily tests I and daily tests II obtained by students, the increase in students' self-efficacy can also be seen by using average analysis. The Improvement in average mathematics learning outcomes in terms of students' level of self-efficacy can be seen in the Table 2 below.

Table 2. Average Student Mathematical Learning Outcomes by Category of Self-Efficacy Levels in Daily Tests I and II

Score	Daily Tests I	Daily Tests II	Category
	36.25	86.5	High
Average	43.69	86.44	Medium
	32.38	87	Low

Based on Table 2, it can be seen that the average value of student mathematics learning outcomes based on the category of self-efficacy level has increased from daily tests I to daily tests II. For students who have a high level of self-efficacy increased by 50.25, then for students who have a level of self-efficacy is increasing by 42.75, while for students who have a low level of self-efficacy also increased by 54.62.

As the improvements occured from the activities of teachers and students were well as improvements to student learning outcomes, so it can be said that cooperative learning two stay two stray techniques is one alternative to create a conducive learning

environment by establishing good communication and interaction between teachers and students so as to improve student learning outcomes in mathematics. This statement is supported by the research of Ryan, Bordoloi, & Harrison (2000) who said that cooperative learning has a positive and significant effect on students' self-efficacy in mathematics.

CONCLUSION AND SUGGESTION

Based on the improvement that occured in students' mathematics learning processes and outcomes, as in terms of students' level of self-efficacy in each evaluation that has been carried out, it can be concluded that students' mathematical self-efficacy can be improved through the application of cooperative learning with two stay two stray techniques.

In the implementation of the actions in this study there are some weaknesses both experienced by students, observers, and researchers themselves. In the implementation of the action, the teacher has not been able to manage time properly so that sometimes not all activities in the learning implementation plan can be carried out. This resulted in the learning process not yet carried out as expected. Furthermore, when it is viewed from students, they have not be able to set their condition by themselves well so that at the time of displacement, both into the original group and into the combined group there was noise in the classroom. While the observer has difficulty in deciphering the observations on the observation sheet, this happens because there is no clear descriptor to be used as an observer's guide when observing the activities of the teacher and students in implementing the cooperative learning process of two stay two stray techniques so that the data about the activity has not been so optimal.

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