

ELEMENTARY STUDENTS' MATHEMATICAL UNDERSTANDING SKILL INCREASING BY GENDER DIFFERENCE

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Abstract: Mathematical understanding is a very important skill in this century for students' mindsets and technological developments. The fact, some learners in elementary school consider this lesson difficult because they are still at the stage of concrete operational while the object in mathematics is abstract. The purpose of this study is to determine whether there is a difference in the mathematical understanding skill increasing between male and female students after following cooperative learning Type Team Games Tournament (TGT). The method used is mix method with technique quasi experiment because this research is to test whether there is a difference in the mathematical understanding skill increasing between male and female students after following cooperative learning Type Team Games Tournament (TGT) and observation to observe the phenomenon during the lesson in the classroom. Data in the form of students' values is processed by SPSS to tested normality, homogeneity, and the difference for further analysis. The location of this study is in an elementary school in Coblong Bandung City. The results of this study are there is no difference in mathematical understanding skill increasing between male students and female students after the application of cooperative learning type Team Games Tournament. It can be affected by the implemented learning which is male students and female students have the same chance.

Keywords: Mathematical Understanding Skill, Elementary School, Gender, Team Games Tournament

1. Introduction

Education is everything that attempts to improve human quality, so that it is so important for human. Education is an input for national product function in its role as human capital, which means productive investment in human resources [1]. Education is also a human resources improvement effort [2].

In education, there is a process called teaching and learning. Teaching and learning is an interaction process between students and learning resources in a learning environment. In teaching and learning, students get knowledge about all subjects, one of them is Mathematics. Mathematics included in general subject group A where general subject group A is national subject and developed by National Curriculum, Kurikulum 2013 [3].

Mathematics is a subject that discusses about regularity or pattern and order associated with reasoning [4]. Furthermore, Mathematics is human thinking creation, especially associated with idea process and reasoning [5]. Based on these opinions, it can be concluded that Mathematics is a subject that associated with reasoning, pattern and regularity, and quantitative relation in every phenomena. Reasoning is a thinking process in drawing a conclusion in the form of knowledge [6].

Mathematics is one of important subject in global community because it has important role in modern knowledge and technology development [7]. Furthermore, improving mathematical skill must be a priority consideration in education nowadays where the state faces economic crisis challenge and technological development [8]. Based on these opinions, it can be concluded that Mathematics is one of the important subject because it is related with students' logical framework and it has important role in technological development.

In nowadays life, sometimes people tend to prioritize their feelings compared with logics. Adverse behavior like nepotism just thinks about how to prioritize the nearest family or friends, compared with other people who are more competence. Of course, it shows an unfair treatment and do not use logic. Mathematics that can be also called "mother of science" can help human to always use their logical framework. Mathematics can help people get used to solve the problem systematically, carefully, honestly, and patiently. Mathematics can form the better human character. And in modern era like now, Mathematics can help people to interact each other well in social environment. This is in accordance with *Pancasila* Philosophy, especially *Sila 1* about *Ketuhanan Yang Maha Esa* dan *Sila 3* about *Persatuan Indonesia*.

The problem nowadays, some elementary students' assume that Mathematics is difficult because Mathematics is abstract and most of the elementary students are still in operational concrete level. In operational concrete level, students just can solve the concrete problem in daily life, they have not been able to solve the abstract problems like symbols in Mathematics [9]. If the students have been in formal operational level, they can think about the abstract things. In line with this, one of the causes of the students' boredom, trouble, and fear of Mathematics is learning process in the classroom [10]. Based on these, it needs efforts to facilitate students' skill.

Efforts in learning process that can be used to facilitate students' skill can be learning model or media. Learning model is a pattern or plan which can be a curriculum or courses to select instructional materials and to guide teacher actions [11]. One of the models that can be implemented in learning process is Cooperative Learning. Cooperative Learning is a learning process that students learn and work collaboratively in a small group consist of 4 until 5 students with heterogeneous group structure. This learning model aims to develop the academic achievement and social skill, and also instill tolerance and accept individual diversity. Cooperative Learning consists of several types, one of them is Team Games Tournament (TGT) Type. The type developed by Slavin and friends involves competition between groups. The students are grouped heterogeneous based on skill. First of all, students learned the learning materials with their friends in a group. And then, they are tested individually through the academic game. Team Games Tournament consists of five steps, they are: class presentation, teams, games, tournament, and team recognition [12]. Therefore, it can be concluded that Cooperative Learning TGT Type is one of the learning model that can be implemented in the classroom to facilitate the students' skill.

When the students follow the learning, it is expected that all the students can get all the learning materials optimally. Although it cannot be denied that in reality every student as an individual is unique and different from each other. Individually variability is one of the most striking feature of students reasoning [13]. Psychologically, students have uniqueness and differences, like in interest, talent, and potency they have according to the stages of development [14]. One of the fundamental differences in students is gender difference, there are male and female students. This gender issue is a trending topic nowadays and gender mainstreaming becomes the government task. Gender is one of the issues listed in the Sustainable Development Goals (SDGs) indicator. In Goal 4 about Quality Education, gender mainstreaming becomes one of the target, which reads “Eliminate gender disparity in education, and ensure equal access to all levels of education and vocational training, for vulnerable communities including persons with disabilities, indigenous people and vulnerable children [15].” Both in Indonesia and International World, there is a common goal or desire to advance the field of education without differentiating gender in the sense that men and women have the same rights so that education becomes a very basic need for all parties without exception [16].

Reflecting on history, efforts to mainstream gender are positive, given that in the past there was the fact that men were always considered superior to women. For example, in the era of Jahiliyyah in Saudi Arabia, before The Prophet Muhammad spread his teaching, newborn baby girls were buried alive because women were considered useless creatures. In the colonial era, women in Indonesia were not given the freedom to make choices, lack of educational opportunities, forced marriage, must be willing to be polygamized, only work on household affairs, and not given the opportunity to develop their potential. That is why R.A. Kartini wrote letters that voiced women’s right.

Gender mainstreaming effort must be done from the smallest thing, one of them is Mathematics learning in the classroom. One of students’ skill in Mathematics learning that is expected to develop well both in male and female students is Mathematical understanding skill. Mathematical understanding skill is the main requirement in mathematics learning [17].

Mathematics Understanding Skill consists of instrumental understanding, relational understanding, and logical understanding [18]. Instrumental understanding is somebody’s skill to use mathematical procedure to solve the problem without knowing why the procedure is used. The students just know “how” but don’t know “why”. In this level, concept understanding is still separate and only memorizes a formula to solve routine problem so that the students have not been able to implement that formula to the related new problem. Relational understanding is somebody’s skill to use mathematical procedure with full of awareness how and why the procedure is used. The students can know both of “how” and “why”. At this level, students can associate between a concept and another concept correctly and realize the process used. Logical understanding is closely related to convincing yourself and convincing others. Students can construct an evidence before the ideas they have are publish formal or informal so that make them sure to make explanation to another students.

Mathematical understanding consists of conceptual and procedural understanding [19]. Conceptual understanding is knowledge about relation and fundamental ideas from a topic. Procedural understanding is knowledge about regulation and procedure that is used in mathematical process and also the symbols used in in mathematical representation. Based on Revised Bloom Taxonomy, understanding is at the second level after remembering [20].

Based on the expertise opinions about mathematical understanding skill, in this research, the definition of mathematical understanding skill is elementary students’ skill to define concept in elementary mathematics, mention example and non-example in elementary mathematics, represent concept in elementary mathematics to the certain form or way, identify characteristic a concept in elementary mathematics, and compare concepts in elementary mathematics.

Based on those explanations, the writer is interested to research about “Elementary Students’ Mathematical Understanding Skill Increasing by Gender Difference”. This research’s question is “Is there any differences in mathematical understanding skill between male and female students after the implementation of cooperative learning type team games tournament?” So that this research aims to know whether there is a difference in mathematical understanding skill between male and female students after the implementation of cooperative learning type team games tournament.

2. Related Works/Literature Review

There are some previous studies related with this research. Fennema's study shows there was no gender difference in problem solving about counting operation like addition and reduction, but in problem solving, it is found the result that female students tend to use the more concrete way than male students do [21]. This study shows that in general, the mathematical abilities of male and female students are the same. But technically, especially in how to solve problems, male students tend to use abstract methods, while female students tend to use concrete ways. In line with this, Hyde's study shows that for grades 2 to 11 in United States of America, the general population no longer shows a gender difference in mathematical skills, consistent with the gender similarities hypothesis. There is evidence of slightly greater male variability in scores, although the causes remain unexplained [22]. This study analyses the data from the state departments of education of all 50 states in USA. That study also shows that there is no difference between male students and female students, although the variability of male student scores is slightly higher. Meanwhile, Charles' study also states that gender difference is very various and it happened in prosperous country [23]. This study uses over-time data on cohorts of eighth graders in 32 countries reveal that aspiration for mathematically related work become more gender differentiated as societal affluence grows. This research uniquely shows that state progress is inversely proportional to gender mainstreaming.

Related to the learning model used, Ke's study shows that gameplaying (team games tournament) was more effective than drills in promoting mathematical performance, and cooperative gameplaying was most effective for promoting positive maths attitude regardless of students' individual differences [24]. In this study, one hundred twenty five fifth graders were recruited and assigned to a cooperative TGT interpersonal competitive or no gameplaying condition. A state standards-based mathematical exam and an inventory on attitudes towards maths were used for the pretest and posttest. Meanwhile, Nawaz's study shows that the cooperative method is good for the students' development in academic achievement and self-concept. Across the gender, the self-concept of female was significantly better than the male, while there was no difference in academic achievement [25]. In this study, two instruments were used for data collection. One was a self-made academic achievement test in Mathematics. The second instrument was a modified version of the self-description questionnaire-I prepared (Marsh, 1992). This study shows that after the application of cooperative learning, there is no difference between the academic achievement of male students and female students. But in term of self-concept, female students are better than male students. This can be influenced by the nature of women who are psychologically more sensitive than men, so that in the affective variables, female students show better result than male students. Njoroge's study also shows that there is no gender difference after the implementation of cooperative learning [26]. This study uses quasi experiment method. The two experimental groups were taught using cooperative learning strategy as a treatment and two control groups were taught using the conventional teaching method. This research shows that cooperative learning proved better in removing the gender differences gap in students' mathematics achievement.

Material & Methodology

a. Data

This research was held in 4th grade in Sekolah Dasar (SD) in Kecamatan Coblong Kota Bandung on January until February 2017. The class consists of 12 male students and 16 female students. The data in this research is from Permatasari's Thesis, 2017 [27]. The data consists of pretest and posttest data.

To get data, the researcher compiles the instrument. There are two instruments used in this research, they are learning instrument and data collection instrument. Learning instrument used in this study is a lesson plan. The researcher constructed the lesson plan based on TGT steps, they are class presentation, teams, games tournament, and team recognition. It is done so the learning goes well as expected.

Research instrument consist of two types, they are mathematical understanding skill test to get the quantitative data and field notes to get the qualitative data. In compiling mathematical understanding

skill test, researcher compiles the question lattice with describing mathematical understanding skill indicators into the test items.

b. Method

The research's method is mix method with quasi experiment technique, because this research aims to know whether there is a difference in mathematical understanding skill between male and female students after the implementation of cooperative learning type team games tournament, and also observation to observe phenomena in the classroom when the learning was held. Every research method has their own limitation, and the mix method researcher sure that bias occurs in one method can neutralize or erase another method bias [28]. In this research, mix method strategy used is embedded concurrent because the more dominant in this research is quantitative research [28].

Steps in this research consist of: 1) researcher compiles the research plan and compiles instrument; 2) researcher hold pretest in the classroom; 3) researcher gives treatment in the form of cooperative learning type TGT in Mathematics subject for 6 meetings in the classroom; 4) researcher gives posttest in the last classroom meeting; 5) researcher analyses the research data.

3. Results and Discussion

a. Result

The result of this research in the form of quantitative data is obtained from mathematical understanding skill pretest and posttest. The pretest was held to know the students' mathematical understanding skill before following the cooperative learning type TGT. And the posttest was held to know the students' understanding mathematical skill after following cooperative learning type TGT.

Cooperative learning type TGT is implemented in the research classroom with guided by RPP. That RPP generally consists of the learning aim, the learning material, and the learning scenario. This RPP is compiled based on Kurikulum 2013 with Core Competency "Factual understanding by observing and asking based on curiosity about himself, god's creatures and activities, and the objects he encounters at home, school, and playground." The learning scenario is compiled based on the cooperative learning type TGT steps, such as class presentation, teams, games tournament, and team recognition.

Learning process was held in 6 meetings. In every meeting beginning, the students were given ice breaking in the form dancing and singing. This ice breaking is function to focused the concentration and improve students' spirit in the learning process. There is a relationship between body movements and the ability to think creatively because pleasant movement can affect the work of the brain to work better [29]. In this learning, it was used sticky notes to be sticked in front of the classroom as number circle to learn about factor tree.

The characteristic of cooperative learning type TGT is games tournament. In the implementation of games tournament, students answered the questions with enthusiasm. Games tournament gives positive contribution in the learning to improve students' competitiveness [30].

In team recognition, every groups were evaluated in the learning process. The best group was given reward in the form of "star pin". TGT learning will be more successful with giving reward [31]. In behavioristic learning theory, there are three things influencing learning process, such as stimulus, respond, and effect [32]. Stimulus is like cue, it is something coming from environment that can improve individual respond. Effect is everything that happens after individual respond, both positive and negative. The effect that makes satisfy is positive for students and will strengthen learning motivation, and the effect that doesn't make satisfy tends to be avoided. This principal is called reinforcement.

The pretest and posttest data is processed to knowing the n-gain and to be compiled its improving difference based on the research's aim. The data processing is used SPSS software to test the normality, homogeneity, and difference.

TABLE 2. The Student' Test Score

Pretest				Posttest				
Min	Max	\bar{x}	S	Min	Max	\bar{x}	S	<g>
36	73	55	11,28	55	100	78	13,12	0,49
36	73	58	10,95	64	91	81	9,31	0,53

Based on Table 2, it is known that both male and female students got the improvement of mathematical understanding skill test score, which was known by the average of pretest and posttest score. In pretest, the highest and the lowest score of male students and female students are same. But in posttest, there is a difference, which the highest score of male students got the maximum score, that is 100. By the deviation standard, the pretest and posttest deviation standard of male students is higher than the female students'. That shows that male students' score is more distribute than female students. In other words, male students'skill is more various than female students'.

TABLE 3. Test of Normality

Gender	Statistic	df	Sig.
Male	0,912	12	0,229
Female	0,921	16	0,172

Table 3 is normality test of students' mathematical understanding skill. Normality test used is Shapiro-Wilk because the number of respondent is lower than 50. Based on the table, Shapiro-Wilk test in the significance level 0,05, got significance score for male students is 0,229 and for female students is 0,172.

TABLE 4. Test of Homogeneity of Variances

Levene Stat.	df1	df2	Sig.
.000	1	26	.994

Homogeneity test uses Levene Test with significance level 0,05. If the significance score more than significance level, the students' mathematical understanding skill distributed homogenous. And if the significance score is lower than significance level, the students' mathematical understanding skill is not distributed homogenous. Based on Table 4, it is got the significance score is 0,994. So it can be concluded that both male and female students' mathematical understanding skill score are homogenous.

After normality test, it was done test for equality of means with using Independent Samples t-Test or t-test.

TABLE 5. T test for equality of means

	df1	t	df	Sig. (2-tailed)
Ngain	Equal variances assumed	-475	26	.639
	Equal variances not assumed	-463	21.381	.648

Test for equality of means uses t-test with significance level 0,05. If the significance score is more than significance level, there is no difference between male students' mathematical understanding skill and female students' after the implementation of cooperative learning type TGT. If the significance score is lower than significance level, there is a difference between male students' mathematical understanding skill and female students' after the implementation of cooperative learning type TGT. Based on Table 5, the significance score 2-tailed is 0,639 and more than significance level. So, it can be concluded that there is no difference in mathematical understanding skill improvement between male students and female students after the implementation of cooperative learning type TGT. It can be influenced by some factors, such as the implementation of democratic learning, every student has the same chance, and the heterogeneous group in the learning.

Based on the observation, in the learning process, almost all the students both male and female looked enthusiasm in following the learning. Students sometimes looked difficult to be arranged by the teacher. When the teacher gave change the students to answer the questions, sometimes the teacher felt confused because there were many students who raised their hand. So too when games tournament was held, sometimes the teacher felt confused because almost all teams answered the

questions. That made some students in the teams who didn't selected looked disappointed. Beside that, because of the classroom was hard to be arranged, meeting time also exceed the schedule so that there are some learning steps in lesson plan that were not implemented in the classroom. In this case, teacher skill is very important. Therefore, it can be concluded that both male and female students' score is distributed normally. Significance score of male students is more than female students'. After it was known that the score is distributed normally, it is next to homogeneity test to know whether the data is homogenous or not.

b. Discussion

Based on the previous researches, this research result is different with Charles' which states that gender difference is very various and it happened in prosperous country [23]. The relationship that can be drawn from this study and Charles' study is that Indonesia is still a developing country, and there is a possibility in developing country to develop the gender mainstreaming.

However, there are some previous researches that correspond with this research result. Fenema's research also shows there is no gender difference in problem solving about counting operation like addition and reduction, but in problem solving, it is found the result that female students tend to use the more concrete way than male students do [21]. In Hyde's study, there is evidence of slightly greater male variability in scores, although the causes remain unexplained [22]. Both studies generally support this study's result where there were no significant differences in mathematical skill between male and female students.

In the term of learning model, some studies also correspond with this study. Ke's study shows that gameplaying was more effective than drills in promoting mathematical performance and cooperative gameplaying was most effective for promoting positive mathematical attitude regardless of students' individual differences [24]. Nawaz's study also shows that the cooperative learning method in the development of academic achievement and academic self-concept of the students. Across the gender the self-concept of female was significantly better than the male, while there was no difference in academic achievement across the gender [25]. Njoroge and Githua says that there is no gender difference after the implementation of cooperative learning [26]. These studies show that cooperative learning is effective to reduce the gender gap.

If it is linked with methodology used, that is mix method with technique quasi experiment and observation, it can be a factor that influences the research result. Where in quasi experiment technique, the research subject is not randomized because it has been formed students group in the classroom. The population in this research is also become the sample, that is students in 4th grade an elementary school in Kecamatan Coblong Kota Bandung. However, this technique has weakness, that is controlling to variables is difficult to do. Therefore, observation technique was done to observe everything happening in the learning process which can influence the students' mathematical understanding skill. However, observation technique also has weakness, that can not observe everything that happens outside the classroom and not all incidents were documented because the researcher also had role as a teacher.

Learning model implemented is cooperative learning type team games tournament (TGT) where this model prioritizes the social relationship between students and principled on the fun and interactive learning. Therefore, the democratic learning and each student has the same chance. Based on this research result, cooperative learning type TGT implementation is effective to reduce the gap in the learning and can facilitate the unique and various students' skill.

4. Conclusion

- a. This study analyses about elementary students' mathematical understanding skill increasing by gender difference, which the result shows that there is no difference in mathematical understanding skill between male and female students after the implementation of cooperative learning type team games tournament.
- b. For researcher, more in-depth research can be carried out with a larger sample size, with the other students' skill variables, and also with other methods.

- c. For policy makers, activities can be held to facilitate teachers to develop learning, for example by training teachers to implement cooperative learning models. In addition, special attention needs to be paid to support learning such as facilities and infrastructure in schools.

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