Gender: Its relation to Mathematical Creative Thinking Skill

HR Permatasari\textsuperscript{1,*} and W Wahyudin\textsuperscript{2}

\textsuperscript{1}Pendidikan Dasar, Sekolah Pascasarjana, Universitas Pendidikan Indonesia, Jl. Dr. Setiabudhi No. 229 Bandung 40154, Indonesia  
\textsuperscript{2}Pendidikan Matematika, Universitas Pendidikan Indonesia, Jl. Dr. Setiabudhi No.229 Bandung 40154, Indonesia

*hanarianapermatasari92@gmail.com

Abstract. Mathematical creative thinking skill is one of the most important capabilities in the present century, both for men and women. One of the current issues is about gender and how gender mainstreaming can be realized optimally. The purpose of this study is to determine the comparison of the mathematical creative thinking skill increasing between male and female students after the application of Team Games Tournament (TGT) learning. This research was conducted at 28 students in the 4\textsuperscript{th} grade of an elementary school in Bandung City. The research method used is quasi experiment because it is aimed to test wether there are differences in mathematical creative thinking skill improving between male and female students after being treatment in the form of learnig with TGT. The result of this research is that there is no difference in mathematical creative thinking skill improving between male and female students after the application of TGT learning. It is influenced by some factors such as how the teacher treats male and female with the same treatment in learning process. Recommendation of this research that can be done further research about this topic more deeply. Beside that, the teacher especially in elementary school can use the TGT learning application to reduce the gap between male and female students during the learning process.

1. Introduction
Mathematics is one of the subjects that is useful to build the logical mindset of learners. Mathematics is often considered difficult by learners in the elementary school level. The cause of this problem is the difficulties of elementary school students who are mostly at the concrete operational stage should be able to think abstractly. At the concrete operational level, students are only able to solve the problems directly facing them. Students have not been able to solve problems that have never experienced. He has not been able to see alternative possibilities to solve a problem. Based on these problems, it is necessary efforts in learning mathematics that can bridge the thinking skill with learning materials that are still abstract.

There are several learning models that can facilitate learners to improve their learning achievement. One of the learning model that can facilitate students' thinking skill is Cooperative Learning Model. This learning model is a social type that has a characteristic of cooperation among students. Cooperative learning is a learning model in which students learn and work collaboratively in a small group of 4 to 5 students with heterogeneous group structures [2]. Cooperative learning generally refers to at least two students who interact as partners with the goal of collaboration mastering academic material and has proven to be an effective learning technique [3]. Cooperative learning is a group learning activity organized by the principle that learning should be based on a social change of
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Cooperative learning is one form of learning based on constructivism [6]. Philosophically, learning according to constructivism theory is to build knowledge little by little which then results expanded through a limited context. In the philosophical school of constructivism, teaching is not an activity of transferring knowledge from teacher to pupil, but an activity that allows students to build their own knowledge [7]. Based on some of these opinions, it can be concluded that cooperative learning is a learning activity where learners interact in groups in the form of brainstorming and solving common problems based on social information changes among groups to achieve learning objectives. Broadly, the application of cooperative learning models can facilitate the social development of learners that are important in everyday life, not just intellectual development alone. Cooperative learning seeks to create a group situation that will help support and provide feedback on the system when developing policy-making, problem-solving, and other general social interaction abilities [8]. Cooperative learning is more than "working in groups" and should include aspects such as positive dependence, individual responsibility, direct interaction, appropriate use of collaborative skills, and group process [8]. This model is usually used specifically in the learning process, but in the Curriculum 2013 this model will be a container for other models [9].

Cooperative learning model consists of several types, one of which is Type Team Games Tournament (TGT). Characteristic of this type is the existence of academic games. TGT is one type of cooperative learning model that focuses on games and tournaments to achieve learning mastery [2].

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Cooperative learning model consists of several types, one of which is Type Team Games Tournament (TGT). Characteristic of this type is the existence of academic games. TGT is one type of cooperative learning model that focuses on games and tournaments to achieve learning mastery [2]. The TGT consists of five step steps, namely: class presentation stages, group learning, games, matches and group awards [10]. Cooperative learning Type TGT is one type or model of cooperative learning that is easy to apply, involving all students without any differences in status [6]. This learning model involves the role of the student as a peer tutor, containing elements of the game that can excite the spirit of learning, and contains reinforcement. Learning activities with games designed in cooperative learning of the TGT model enable students to learn more relaxation as well as foster responsibility, honesty, cooperation, fair competition, and learning engagement. There are several stages of TGT Types and their explanations, among them are: 1) class presentations: stages in which teachers deliver materials directly to students; 2) groups: students studying in small groups (teams) consisting of 4 to 5 heterogeneous people in terms of ability, gender, race, or other characteristics; 3) games: students play games with other team members to gain additional points for their team scores where games are composed of questions relevant to lessons designed to test students' knowledge and understanding; 4) tournaments: each student will compete with other students in answering questions appropriate learning materials; 5) team recognition: the reward for the team that gets the highest score [2]. Each student is placed in a group consisting of low, moderate and high-ability students [4]. In TGT, each member is assigned to learn the material first along with the other members, then they are tested individually through academic games. The value they earn from this game will determine the score of their respective groups. With TGT, students will enjoy how the atmosphere of the tournament is and because they compete with groups of equal comparative ability, competence in TGT feels fairer than competition in traditional learning in general.

There are several mathematical thinking skills that can be developed through this type of learning model TGT, one of which is the ability to think mathematically creative. Creative relationship with the ability to create something unique and different (out of the box). Creativity is the ability of talent, imagination, inspiration, ingenuity, and invention [11]. The importance of creative thinking in both psychology, social, and education [12]. Creative thinking can contribute to the development of decision-making and problem-solving skills. In the mathematical context, there is the ability of mathematical creative thinking which is the ability of high-level thinking. A general understanding of
the process of creative thinking is concerned with the concept of divergent thinking (thinking spreads in many directions) or a method whereby creative solutions are achieved through consideration from a deviant perspective of norms [13]. The ability of creativity can be seen from the skills of smooth thinking, flexible thinking skills, original thinking skills, and judgment skills. The ability to think creatively is a very important ability possessed in this century. Creative thinking and experimentation is one of the skills needed to cope with the development of artificial intelligence in this century. Therefore, this ability needs to be honed early on, especially at the elementary school level, for both male and female students [14].

Gender is the range of characteristic pertaining to and differentiating between masculinity and femininity. Nowadays, gender is a very popular issue and the government plans the gender mainstreaming can be optimal. Although we hope that the gender mainstreaming can be optimal, but there are still some problems about this issue, especially in education side. As women education in developing country tend to be lower than men education [15]. Furthermore, even with such students dismal performance in the subject, female students have had lower achievement as compared to male students at national mathematics examinations in Kenya [16].

There are some studies related with this study. That TGT learning application is effective to improve the reading understanding skill [17]. Beside that, TGT learning application can be for all students’ skill grade and can make them active. From that research, we can conclude that TGT learning is effective to improve students’ learning achievement. Next, there is a significant difference between students’ achievement that use TGT learning and students’ achievement using conventional learning.

From the explanation about introduction, the purpose of this study is to determine the comparison of the mathematical creative thinking skill increasing between male and female students after the application of Team Games Tournament (TGT) learning. From the result of this research, it is hoped that we can find out whether this TGT model supports the gender mainstreaming or doesn’t.

2. Experimental Method
This research based on quantitative research because it used statistical method to analyze the data. This research is conducted in the 4th grade of an elementary school in Bandung City, that consists of 12 male students and 16 female students. The research method used is quasi experiment because the researcher gives certain treatment in the form of TGT learning to see if there is difference of improvement of ability of mathematical creative thinking between male and female student before and after treatment.

There are two types of instruments used, namely learning instruments and research instruments. Learning instrument in the form of learning implementation plan that contains learning steps with Cooperative Learning Model Type Team Games Tournament. Learning steps in TGT are class presentation, groups, games, tournament, and team recognition.

While the research instrument used is a matter of evaluation of learners who contain the questions that contain indicators of the ability to think creatively to measure the improvement of creative thinking ability of learners. Previously the evaluation question tested the validity, reliability, and distinguishing power. Furthermore pretest and posttest result of mathematical creative thinking ability is processed to get n-gain score which can measure improvement of ability of mathematical creative thinking.

The procedure of the research is: first, the students were given pretest which can measure the mathematical creative thinking skill before the application of TGT learning. Second, the students were given the learning with TGT models. This learning is based on learning implementation plan that contains TGT steps. Third, the students were given posttest that can measure the mathematical creative thinking skill after the application of TGT learning. And then to analyze the mathematical creative thinking skill increasing comparison, it is used n-gain score.
3. Result and Discussion

3.1. N-gain normality test result of mathematical creative thinking skill between male and female students

The normality test is performed to determine whether the pretest score is from a normally distributed or non-distributed sample. Criteria testing Normality test using Kolmogorov-Smirnov. If the value of Sig. > Level of significance (α = 0.05), then the pretest score of students' mathematical comprehension ability is normally distributed. Whereas if the value of Sig. < Significance level (α = 0,05), the pretest score of students' mathematical comprehension ability is not normally distributed.

Table 1. N-gain normality test result of mathematical creative thinking skill between male and female students

| Kolmogorov-Smirnov Statistic | df | Sig.  | Shapiro-Wilk Statistic | df | Sig.  |
|-----------------------------|----|-------|------------------------|----|-------|
| M                           | 0.134 | 12 | 0.200 | 0.967 | 12 | 0.879 |
| F                           | 0.112 | 16 | 0.200 | 0.985 | 16 | 0.992 |

Table 1. shows the results of the normality test with Kolmogorov-Smirnov test at the level of significance (α = 0.05) n-gain score of mathematical creative ability between male and female learners. From the table above, the score of n-gain of mathematical creative thinking ability of male learners get the calculation result of 0,200 and score of n-gain of mathematical creative ability of female learners get calculation result of 0,200. Thus, both n-gain scores of mathematical creative thinking ability of male and female learners is greater than the 0.05 significance level. So it can be concluded that the score of n-gain ability of mathematical creative thinking between male learners and female learners normally distributed.

From the table above, we can see the normality test with Kolmogorov-Smirnov test at significance level (α = 0.05), experimental class 1 (TGT) obtained by significance value of calculation result 0.059 and in experiment class 2 (Direct Learning) 0.074. Based on the test result, the value of pretest score of mathematical comprehension ability in TGT class and direct learning class is greater than significance level (α = 0.05). So it can be concluded that the pretest score of mathematical comprehension ability of experimental class 1 experiments (TGT) and experiment class 2 (Direct Learning) is normally distributed.

3.2. N-gain homogeneity test result of mathematical creative thinking skill between male and female students

After it is known that the n-gain score data of mathematical creative ability of male and female learners is normally distributed, then the homogeneity test of variance is tested by Levene test. If the significance value is greater than the 0.05 significance level then the n-gain score of male and female students is homogeneous. Whereas if the significance value is less than the significance level of 0.05 then the n-gain score of mathematical creative ability of male and female students is not homogeneous.

From the Levene test results, Levene statistic (F) is obtained at 1.304 and a significance value of 0.373 which is greater than the 0.05 significance level. It can be concluded that the n-gain score of mathematical creative thinking ability of male and female students is homogeneous or has the same mathematical creative ability.

3.3. Increase difference test result of mathematical creative thinking skill between male and female students

Based on the normality test and homogeneity test of n-gain the ability of mathematical creative thinking obtained the result of data analysis of n-gain score of both research groups normal
distribution and the variance is homogeneous. The mean difference test using Independent Samples t-Test or t-test was tested.

The criterion of t-test is that there is no difference in improvement of the ability of mathematical creative thinking between male and female students if the value of Sig. (2-tailed) Equal Variances Assumed is greater than the 0.05 significance level and there is a difference in the improvement of mathematical creative thinking among male and female learners if the Sig (2-tailed) equal variances assumed value is less than the significance level 0.05. The t-test results are presented in the following table:

Table 2. Increase difference test result of creative thinking skill between male and female students

| Equal variances | Levene’s Test for Equality of Variances | Sig. | t      | df | Sig. (2-tailed) | Mean Difference |
|-----------------|-------------------------------------|------|--------|----|----------------|----------------|
| assumed         | f                                  | 0.822| 0.373  | -0.168 | 26 | 0.868 | -0.02894 |
| not assumed     |                                    | -0.160| 18.654 | 0.875 |                | -0.02894 |

From Table 2, obtained value of Sig. (2-tailed) Equal Variances Assumed of 0.868 is greater than the level of significance (α = 0.05). So it can be concluded that there is no difference in improving the mathematical creative thinking skill after the application of TGT between male and female students.

That result shows that there is no significant difference between male and female students, and that supports the gender mainstreaming. It is influenced by some factors such as how the teacher treats male and female with the same treatment in learning process. This result also promotes that TGT learning which is one of cooperative learning model can reduce the gap among the students because all students learn, share, and construct the knowledge together.

This result related with some previous studies. Generally there is no gender differences in mathematical skills such as solving facts, addition/subtraction, or solving nonroutine problems. Furthermore, there are no differences in students’ mathematics achievement when students are taught using cooperative learning [16]. Whereas, there is previous study that shows different result. Masculinity relates with creativity, so men’s creative skill is better than women’s [13].

4. Conclusion
Based on the research result, it can be concluded that there is no difference in the mathematical creative thinking skill between male and female students after the application of Team Games Tournament (TGT) learning. It is influenced by some factors such as how the teacher treats male and female students with the same treatment in learning process. This result also promotes that TGT learning which is one of cooperative learning model can reduce the gap among the students because all students learn, share, and construct the knowledge together. Recommendation of this research that can be done further research about this topic more deeply. Beside that, the teacher especially in elementary can use TGT learning application to reduce the gap between male and female students during the learning process.

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