Learning Line and Angle at 7th Grade Students

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Abstract. The purpose of this research is to compare two learning model to teach line and angle, that is Numbered Head Together (NHT) model combined with Make A Match and Team Assisted Individualization (TAI) model. This research was quasi experimental research with factorial design 2x3. Population on this research were junior high school students on 7th grade, with 156 students as a sample. Results showed that students that taught by Numbered Head Together (NHT) combined with Make A Match learning have better achievement than student that taught by Team Assisted Individualization (TAI) learning model, student with high creative attitude have better achievement than student with medium creative attitude and low creative attitude, student with medium creative attitude have same achievement with student with low creative attitude. There is no interaction between learning model and creative attitude.

1. Introduction

Geometry is a branch of mathematics concerned with point, straight line, plane figures, space, spatial figures, and the relations between them [1]. Ability student to understand geometry subject less than ability to understand the other subject in mathematics. Line and angle are basic concepts of geometry. In order to have a good understanding in geometry subject, student must have a good understanding in line and angle.

Learning model can influence the students’ understanding in mathematics subject. To create a learning environment that can encourage learners, teachers can create new innovations learning. Problems probably have a better chance of being solved in cooperative than in competitive or an individualized learning environment [2]. Significant improvements in mathematics abilities were found for children in the experimental group that utilized cooperative learning [3]. Combination of learning model can improve student achievement [4].

Learning model Numbered Heads Together (NHT) is better than cooperative learning model of Student Team Achievement Divisions (STAD), although the value of both are equally good [5]. Numbered Heads Together (NHT) improved the students’ achievements of social sciences subject [6]. The empirical test results in the implementation of learning through theory of behaviour modification type of cooperative learning with Numbered Heads Together, both student participation and group renderers group of participants is very high so as to motivate the students to learn to identify and resolve their own problems on a particular topic in number theory [7]. Number Heads Together (NHT) can improve learning outcomes the 5th grade students [8]. The result of students’ mathematics learning of 7th grade students are taught using
cooperative learning Number Heads Together (NHT) type obtained an average value of student learning outcomes at 82.86 and the passing rate of 100% [9].

Student’s motivation to learn mathematics increase after given action in the form of cooperative learning techniques make a match [10]. Cooperative learning model of Jigsaw type and Make a Match type can improve the students’ activity of the 3rd grade students of elementary school [11]. Mathematical skills of students subjected to the Problem Based Learning (PBL) learning model approach Make A Match higher than those subject to Problem Based Learning (PBL) learning model [12].

Besides Numbered Heads Together (NHT) and Make A Match learning model, one model of learning that can improve student achievement is Team Assisted Individualization (TAI) learning model. Team Assisted Individualization (TAI) combining individual and cooperative learning in learning process. Team Assisted Individualization (TAI) learning model was initiated in an effort to design a form of teaching that could resolving individual problems [13]. The ability to communicate mathematics has a significant correlation with Team Assisted Individualization (TAI) learning model, because the students are trained to help each other, argue, discuss, refine knowledge, and eliminating boundaries between students who are good students who are less intelligent [14]. Team Assisted Individualization (TAI) learning model can improve the communication skills of students in the subjects of probability [14]. The value of student learning on a given linear program material Team Assisted Individualization (TAI) learning model is higher than the value of a given student direct learning model [15]. The pairwise comparisons showed that the Team Assisted Individualization (TAI) method had a more significant effect than the Student Team Achievement Divisions (STAD) method [16]. The application of guided journal on cooperative learning of Team Assisted Individualization type can support the mathematical communication ability of students 8th grade students [17].

The improvement of learning activities with good and very good category in all aspects observed, namely participation, cooperation, creativity, responsibility, and the students’ attitude in learning the Indonesian language [18]. Mathematics need creativity in order not replicate the other people creation’s [19]. At the school level, creativity in mathematics is improved by applying teaching using appropriate technology; open-ended activities and nonroutine problems that are with multiple correct answers; modelling approach; group discussions, cooperation, collaboration and social support; appropriate questioning [20]. Prospective mathematics teachers define the characteristics of creative students based on their approaches to problem solving and their thinking styles [21].

The purpose of this research is to compare Numbered Head Together (NHT) learning model that combined with Make A Match technique with Team Assisted Individualization (TAI) learning model. This paper also discusses about achievement of mathematic’s score based on student’s creative attitude. The difference of this research with the other research is combination of Numbered Head Together (NHT) learning model with Make A Match technique.

2. Method
This research is a quasi experimental research with 2 x 3 factorial design. Free variable for this research is model learning and creative attitude of students, while the dependent variable is achievement learning students in the subject of line and angle. Population in this research is all students of 7th grade Junior High School in Sukoharjo. Sample of this research is 156 student taken from 3 school. For each example school taken class taught with Numbered Head Together (NHT) learning model that combined with Make A Match technique, and the class that taught with Team Assisted Individualization (TAI) learning model. The samples taken use stratified cluster random sampling technique. Grouping schools do based from data results of national examination in the academic year 2014-2015 with 3 category that is high, medium and low.

For this research before analysis of variance, first perform the prerequisite test. Prerequisite test of this research use normality testing with Liliefors and homogeneity testing with F test and then do balance testing used T test. Hypothesis testing do by ways analysis of variance with unbalanced cells [22].
3. Result and Discussion
Prerequisite test result will be shown below:

3.1. Normality Test Mathematics Achievement Learning
Normally test used to knowing is data of samples from normally distribution population. For this research, normally test used to Lilliefors. Here is the result of normally test with significance level of 5%.

| Group | L<sub>obs</sub> | L<sub>table</sub> | Conclusion |
|-------|----------------|----------------|------------|
| Experiment (NHT with Make A Match) | 0.0719 | 0.0929 | Normal |
| Control (TAI) | 0.0825 | 0.0934 | Normal |
| Fl | 0.0913 | 0.1074 | Normal |
| FD | 0.0597 | 0.0625 | Normal |

Based of table 1 visible that L<sub>obs</sub> for each samples less than L<sub>table</sub>, so H<sub>0</sub> is accepted. It means that each samples from population have normal distribution.

3.2. Homogeneity Test Achievement Learning
Homogeneity test used to knowing is data of samples have same various. For testing this homogeneity used Bartllet method. Here is the result of homogeneity test with significance level of 5%.

| Groups | K | X<sup>2</sup><sub>obs</sub> | X<sup>2</sup>(0.05;k-1) | Decisions | Conclusion |
|--------|---|----------------|----------------|-----------|------------|
| Learning Model | 3 | 0.9300 | 1.4009 | H<sub>0</sub> accepted | Various Homogeneity Population |
| Creative attitude | 2 | 0.7231 | 3.841 | H<sub>0</sub> accepted | Various Homogeneity Population |

Based from table 2, X<sup>2</sup><sub>obs</sub> < X<sup>2</sup><sub>table</sub> its mean that all students have the same various or the samples is homogen.

3.3. Analysis Test
Summary of two-way analysis of variance with different cells are shown in Table 3 below:

| Source | JK | Dk | RK | F<sub>obs</sub> | F<sub>table</sub> | Conclusion |
|--------|----|----|----|-------------|-------------|------------|
| A | 2.8847 | 1 | 2.8847 | 4.8392 | 3.9068 | H<sub>0</sub>A rejected |
| B | 795.9522 | 2 | 397.9761 | 9.5188 | 3.0589 | H<sub>0</sub>B rejected |
| A*B | 75.6619 | 2 | 37.8309 | 0.1661 | 3.0589 | H<sub>0</sub>AB approved |
| Error | 8041.6141 | 144 | 55.8445 | |
| Total | 8916.1129 | 149 | | |

Based on the result of two-way analysis of variance in Table 3: because F<sub>table</sub> < F<sub>obs</sub>, so H<sub>0</sub>A analysis of variance rejected, it means that learning model influence on mathematics achievement students, because F<sub>table</sub> < F<sub>obs</sub>, so H<sub>0</sub>B analysis of variance rejected, it means that
students’ creative attitude influence on mathematics achievement students, and because $F_{tabe} > F_{obs}$ then $H_{0AB}$ analysis of variance approved, it means that there is no interaction between learning model with students’ creative attitude.

Further research hypothesis test. Table 4 below shows on average each cell and the mean marginal shown in.

**Table 4. Average of students’s score and marginal average**

| Learning model     | Creative attitude | Marginal average |
|--------------------|-------------------|-----------------|
|                    | High (b1)         | Medium (b2)     | Low (b3)  |
| NHT with Make A Match (a1) | 85.6000 | 79.8750 | 78.5714 | 81.3590 |
| TAI (a2)           | 83.3913           | 79.9667         | 79.8421  | 81.0278 |
| Marginal average   | 81.9773           | 78.0000         | 76.7750  |

Based on Table 4, marginal average of Numbered Head Together (NHT) learning model that combined with Make A Match technique is higher than marginal average of Team Assisted Individualization (TAI) learning model, in the other word Numbered Head Together (NHT) learning model that combined with Make A Match technique give better achievement than Team Assisted Individualization (TAI) learning model.

The result of comparison two different cell between column shown in Table 5 below:

**Table 5. Comparison two different cell between column**

| Source | $(x_i - x_j)^2$ | $\frac{1}{n_i} + \frac{1}{n_j}$ | RKG | $F_{obs}$ | $F_{table}$ | Conclusion |
|--------|-----------------|---------------------------------|-----|-----------|-------------|------------|
| $b_1 - b_2$ | 21.3658         | 0.0370                          | 55.8445 | 10.3509   | 6.1244      | $H_{0A}$ rejected |
| $b_1 - b_3$ | 28.8011         | 0.0458                          | 55.8445 | 11.2524   | 6.1244      | $H_{0B}$ rejected |
| $b_2 - b_3$ | 0.5541          | 0.0411                          | 55.8445 | 0.2412    | 6.1244      | $H_{0AB}$ approved |
| Error    |                 |                                 |     |           |             |            |
| Total    | 8916.1129       | 149                             |     |           |             |            |

Based on Table 5, for $b_1 - b_2$ and $b_1 - b_3$, $F_{obs} > F_{table}$, so mathematics achievement of students with high creative attitude is better than mathematics achievement of students with medium creative attitude and mathematics achievement of students with high creative attitude is better than mathematics achievement of students with low creative attitude. The result for $b_2 - b_3$, $F_{obs} < F_{table}$, so mathematics achievement of students with medium creative attitude same with mathematics achievement of students with low creative attitude.

4. **Conclusion**

Based on the results of hypothesis testing in the previous section, can be concluded that learning model influence on mathematics learning achievement student. The student that are given Number Head Together (NHT) with Make A Match technique learning model have mathematics learning achievement better than students who are given Team Assisted Individualization (TAI) learning model, the students’ creative attitude give effect on mathematics achievement students, that is mathematics achievement of students with high creative attitude is better than mathematics achievement of students with medium creative attitude, mathematics achievement of students with high creative attitude is better than mathematics achievement of students with low creative attitude,
and mathematics achievement of students with medium creative attitude same with mathematics achievement of students with low creative attitude. There is no interaction between learning models and creative attitude of student learning.

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