The effect of team accelerated instruction on students’ mathematics achievement and learning motivation

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Abstract. This study aimed to know the improvement of achievement and motivation of learning mathematics by using Team Accelerated Instruction. The research method used was the experiment with descriptive pre-test post-test experiment. The population in this study was all students of class VIII junior high school in Jogjakarta. The sample was taken using cluster random sampling technique. The instrument used in this research was questionnaire and test. Data analysis technique used was Wilcoxon test. It concluded that there was an increase in motivation and student achievement of class VII on linear equation system material by using the learning model of Team Accelerated Instruction. Based on the results of the learning model Team Accelerated Instruction can be used as a variation model in learning mathematics.

1. Introduction
Students have a perception that math lessons are a very difficult and complicated lesson, unpleasant, less varied teacher in presenting the material so that students are lazy to learn it [1]. This lazy attitude that became one of the causes of student achievement in mathematics cannot be optimal and mathematics has always been a scourge in learning in school. Mathematics is very concerned with abstract ideas and hierarchical concepts and deductive reasoning [2]. So, the material or ideas/concepts of mathematics at the previous level related to understanding the concept of mathematics in the next level [3].

Also, educators have an important role in the learning system for the students, especially to attract student motivation [4]. In general, it stated that one's motivation could affect the learning achievement of the person. In general, someone who has a high motivation will have a good learning achievement as well [5]. Vice versa, if someone has a low motivation, there is a tendency will have a low learning achievement as well. So that motivation can be used as a benchmark for someone to obtain the achievement expected.

Several ways can be used to foster motivation in learning activities among other are scoring; prizes; competition/competition; Ego-involvement; replicate; notify results; praise; punishment; the desire to learn; interests; recognized goals [6-9]. The learners will be keen to learn if they know there will be repetition or evaluation [7, 8]. Therefore, giving a test or evaluation is also a means to increase or foster motivation in the lesson.

Every human being does something because of motivation by a certain motivation [6]. The motivation is the impulse existing the human being. The motivation is also the desire that comes from the human being to do something. Attribution theory is now ending its third decade as a dominant
conception in motivation [10]. Achievement motivation as a force associated with the achievement of some standard of excellence or intelligence, which is an impulse within a person so that he seeks in all activities as high-end.

Also, the low achievement of student learning caused by the ability of learners in solving math problems is less adequate. It shows that the learner in solving the problem of math is unstructured and not systematic, meaning that students only do the step answer only. While the step of understanding, planning and looking back answers sometimes not done [11].

Along with the growing education system and demands, not infrequently schools that still use direct instruction or conventional learning [12]. Where the conventional learning is done solitaire, meaning that learning starts from planning, implementation, to the evaluation of student learning done by one teacher. In fact, the curriculum of education has grown, teachers are required to be more innovative and creative in determining/choosing the learning method used which tailored to the subject matter that presented to the students.

Teachers also have an important role in the learning system, especially improving the quality of learning. Teachers should use varied learning models as well as tailored to the characteristics of the subject, and the learner taught to attract students' learning. In addition to the direct learning model, some learning models used in learning mathematics such as Jigsaw, Team Accelerated Instruction (TAI), and Student Team Achievement Division (STAD) [13].

Although direct learning has shown a pattern of interaction between teachers with learners or a group of students [11], this learning model causes students to be less interested in learning. Fewer students on learning by using direct learning model because the communication patterns that occur only go one way so that students feel not involved directly in learning.

Cooperative learning is one of the learning models that arise as a result of the notion of constructivism, where students will construct knowledge if students find and understand the concept in discussion and cooperate in mastering the material given by the teacher [13-16]. With cooperative learning, students learn to cooperate mutually beneficial not to compete with each other. At least there is Team Accelerated Instruction or Team Assisted Individualization that has the characteristics of the responsibility of learning to be in individual students [11]. Students should build their knowledge and not only accept the finished form of the teacher. On the other hands, the teacher-student communication pattern is negotiation and not the impositions, with TAI learners, can learn at their level. So learners can negotiate with friends in groups or negotiate with teachers regarding the material to be learned in groups [16].

In addition to students, teachers also have an important role in learning, especially improving the quality of learning [17]. To attract student learning, the teacher must use the learning model besides the learning model of language learning. So that learning using direct learning model can cause learners feel bored. It is because the direct learning model of communication patterns run in one direction so that learners feel not directly involved in learning.

Based on the background of the problem, the purpose of this research is to know the improvement of achievement and motivation to learn mathematics by using Team Accelerated Instruction.

2. Methods
Among the problems to be studied, then this type of research included in the experimental research. This research intends to give treatment to the sample; then the researcher wants to know the improvement of achievement and motivation to learn [18].

The population is the overall subject of research, based on that opinion, the population in this study is all students of class VIII junior high school SMP Negeri or private SMP in the city of Yogyakarta Lesson Year 2016 - 2017. The sample representative of the population cannot be proved, but can only be approached methodologically through known and recognized parameters whether or not they are theoretical or experimental. The parameters that can be used to determine the representative of a sample are population variability, sample size, sample determination technique, and accuracy includes the characteristics of the population in the sample. The larger the sample size, the greater the representative level. But in the case of a homogeneous population, the sample size does not affect the representative level of the sample. In this research the sampling technique using cluster random
sampling. The sampling step by cluster random sampling technique is population divided by school. Since public and private schools are considered equal, the population has 57 schools. Furthermore, the school group was randomly using the lottery to obtain six schools used as research sites. Furthermore, the six schools taken by lottery method were randomized back by using cluster random sampling technique based on the classes held in each school. It aims to obtain two classes used as a research sample. From the cluster, random sampling technique used obtained six schools with the sample size of 134 students.

The instruments used in this study were questionnaires and tests. Questionnaires are used to obtain data about learning motivation. The questionnaire contained several statements with category answers. The answers chosen by the students describe the individual states of their students. The indicator of motor learning is the giving of prizes; Competition/competition; Ego-involvement; Give a repeat/task; Notify results; praise; punishment; Desire to learn; interest. Questionnaire Motivation gave to students before and after treatment. Of the 38 items prepared, 30 items have eligible alignment levels that have a correlation index of more than 0.300. The Cronbach alpha calculation results from 30 items indicate that the alpha index is 0.96, it indicates that the compiled motivation questionnaire can be used to obtain the data. The test instrument is used to collect preliminary (pre-test) and student achievement data on linear equation system (posttest) material. Both pre-test and posttest are multiple choices with five choices of answers. Of the 20 items prepared, all items have an eligible alignment level that has a correlation index of more than 0.300, KR calculation results from 20 items indicates that the alpha index is 0.819, it indicates that the compiled test can be used to obtain data.

Descriptive data analysis technique used to test the proposed hypothesis is done using Wilcoxon test statistic. The hypothesis tested is TAI learning can improve the motivation and achievement of learning mathematics.

3. Results and Discussion

Based on the data of learning motivation before using Team Accelerated Instruction obtained that the highest score is 103, the lowest score is 52, the average of 75.49 and the standard deviation is 11.630. While the results of the questionnaire calculation of learning motivation after using Team Accelerated Instruction obtained that the highest score is 112, the lowest score is 66, the average is 93.63, and the standard deviation is 10.876.

Based on the test results before using Team Accelerated Instruction, it was found that the highest score was 20, the lowest score was 3, the mean of 14.34 and the standard deviation was 3.614. While the results of test calculations after using Team Accelerated Instruction obtained that the highest score is 20, the lowest score is 2, the average of 15.62 and the standard deviation is 3.869.

Results of non-parametric statistical calculations with Wilcoxon test on learning motivation obtained that the coefficient of Z equal to -9.705 with sign 0.000 while on learning achievement of -4.255 with sign 0.000. Based on this result, it concluded that there is the difference between the mean of motivation and learning achievement between before and after using a model of learning Team Accelerated Instruction. The average frequency difference results presented in Table 1.

| Table 1: Frequency of pre and post differences |
|-----------------------------------------------|
| Motivation Post < Pre Post = pre Post > pre |
| 6 2 126 |
| Achievement 47 22 109 |

To find out whether the difference is a positive difference seen in Table 1, where most of the difference that occurs is a positive difference means that the average post is better when compared with the average pre-test. Based on these results it can be concluded that the learning model of Team Accelerated Instruction can improve the motivation and achievement of student teaching mathematics class VII on linear equation system material.

Motivation to learn is the impetus that it is for someone to do learning activities. Motivation learning is the very important role for students in the effort to achieve high learning achievement [19].
Students with high motivation to learn tend to show passion and excitement in learning, they usually look more seriously at learning and actively participate in learning activities, both in class and outside the classroom.

Motivation is one of the factors that determine learning achievement. The motivation to learn has a positive relationship to the preservation of learning so that learning motivation influences achieving one's goals [20, 21]. In the learning activities, intrinsic and extrinsic factors are not able to stand alone, but both factors must be together to guide one's behavior toward a target to be desired or intended. According to need, motivation differentiated into the need for achievement and the need for social relationships.

In essence, the motivation of each is different. Some have high motivation, and some have low motivation. Motivation differences are one of the causes of differences in achievement of learning achieved each. With a strong motivation then someone will be easy to achieve what desired, so to obtain a good learning achievement becomes easier to achieve and vice versa, if the motivation is weak then there is a possibility to reach something becomes more difficult so to obtain a good learning achievement to be difficult.

Students who have high motivation to learn will be more diligent, passionate, more resilient and have higher ambitions in achieving better learning achievement, compared with students who lack or have no motivation to learn [22]. Those who do not have the motivation to learn will seem less or less passionate about learning and learning in the classroom, not paying attention to lessons learned, apathetic and not actively participating in learning. The condition of students who lack the motivation to learn is certainly not able to produce satisfactory achievement.

Team Accelerated Instruction, can motivate students in learning seen from the discussion process that occurs in the group, where students who have better ability compared with his friends in the group provide the impetus to solve the problems of mathematics [11, 22]. It is what encourages students motivated in solving math problems.

Improving student achievement in learning mathematics is one of the tasks of a teacher. Factors that greatly affect student achievement are factors from outside students. The results of the previous research indicate that there is a relationship between learning and mathematics learning achievement [13-15] this result indicates that learning achievement influenced by learning motivation owned by learners. Also, the learning model used also affects the learning achievement [5, 6, 16].

Team Accelerated Instruction model requires students to work together in groups and is expected to be able to become a group tutor for students who cannot pre-pay as the next material supporters. Also, teachers can also help students become tutors in groups of students to present material in groups and solve mathematical problems. So that students controlled their ability to understand the material other than that, students with a variety of abilities are also served maximally by the teacher and the pattern of communications created and the direction.

In addition to learners with high initial skills, educators can also help students become tutors in groups of students to present the material to the group and solve mathematical problems [22, 23]. So that students controlled their ability to understand the material. Also, students with a variety of abilities are also served maximally by the teacher and the pattern of communications created and the direction. It is what causes student achievement increased between before and after treatment.

4. Conclusion

The results of research concluded that there is an increase in motivation and student achievement of class VII on linear equation system material by using learning model of Team Accelerated Instruction (TAI).

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