The Effect of Teams Games Tournament (TGT) Method on Outcomes Learning and Conceptual Knowledge in Physics Science

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Abstract. This study aims to determine the effect of the TGT (Teams Games Tournaments) cooperative learning model on students' conceptual knowledge on momentum and impulse material in grade X 7th state Senior High School (SMA) in Medan City. The research type is a quasi-experiment with a two-group pretest-posttest design. The instrument used in this study was a test of students' conceptual knowledge in the form of multiple choices and an assessment sheet to measure student skills and student activities. After the learning was given, the two classes carried out a post-test. The experimental class obtained an average value of 83.19 and for the control class, an average value of 64.58 was obtained. And student learning activities in the cooperative learning process type TGT (Teams Games Tournaments) in three meetings experienced an increase with an average value of 72.4 (active) meeting I, 77.22 (active) meeting II, 82 , 4 (active). Based on the test results, it was found that the cooperative learning model type teams games tournament had a significant effect on students' conceptual knowledge on momentum and impulse material in grade X 7th state SMA in Medan City.

1. Introduction

Learning activity mentioned to be successful and has quality, if most of the students play an active role in the learning process. Then the students show a high motivation for learning, and a sense of self-confidence. Based on the foregoing, the teacher's efforts in developing student learning activeness are very important, because student learning activeness is a determinant of the success of learning carried out (Candela et al. 2018)[1-3]. The reason that causes the low value of physics lessons is namely that students consider physics a difficult subject because many problems must be solved with complex formulas that reduce curiosity students to understand actual physics concepts [4-5].

The difficulty of students understanding the concepts of physics being taught is influenced by several factors, including: a) physics material accompanied by formulas, b) teachers who only convey material in theory, and c) the background of the students themselves who are not good at arithmetic d) lack of cooperation between students to discuss to solve a problem or to solve a problem in physics [6]. The solution to overcome the problems above is that in ongoing learning activities, appropriate models and methods are needed. The learning model used must be interesting and able to make students play an active role in it. This will increase the achievement of student conceptual knowledge competencies (Lambon et al. 2014)[7]. Learning outcomes include three aspects, namely cognitive, affective, and psychomotor aspects. If the learning outcomes can be achieved properly, it means that students' understanding of the concept of the material being taught achieves high scores (Schneider et
al. 2011)[8]. And also improve student cooperation to study together to understand physics concepts well together[9]. Understanding the concept of students is an important thing that must be had when learning physics because when understanding the concept is good, it will go hand in hand with good grades, and vice versa (Bakkenes et al. 2010)[10]. Joyce (2009)[11] says that "a learning model is a plan or a pattern that is used as a guide in planning classroom learning or learning in tutorials and to determine learning tools including books, films, computers, curricula, and so on. -other". The right model to solve the above problems, the writer applies the cooperative model. The cooperative model demands student cooperation and intervention in the task structure, goal structure, and reward structure, the terms goal structure and reward structure refer to the degree of cooperation or competition needed to achieve goals or rewards (Davidson et al. 2014)[12].

Researchers are interested in conducting research that aims to increase conceptual knowledge by using the TGT (Teams Games Tournament) type of cooperative learning model. Students' understanding of concepts is an important thing that must be had when learning physics, because when understanding the concept is good, they will get good value (Nadrah et al. 2017)[13]. Also, the Momentum and Impulse material which has sufficiently broad material and little time allocations very appropriate if the TGT type cooperative learning model is applied in the learning process (Teams Games Tournaments) (Veloo et al. 2013 )[14].

2. Methods
This research was conducted at Senior High School (SMA) 7 Medan, with population take from grade X MIA class. There are 7 classes from grade X MIA used at population. One class is used as an experimental class, namely a class that applies the TGT type of cooperative learning model and another class is used as a control class, namely a class that applies conventional learning. The research design can be seen in Table 1.

| Class        | Pre-test | Treatment | Post-test |
|--------------|----------|-----------|-----------|
| Experiment   | X₁       | T         | X₂        |
| Control      | X₁       | O         | X₂        |

Information
X₁ = Giving pre-test to the experimental class and control class
X₂ = Giving post-test for the experimental class and the control class
T = Treatment with the Teams Games Tournaments learning model
O = Treatment with conventional learning

The researcher will give a pre-test to the experimental class and the control class. After the pre-test data was obtained, data analysis was carried out using the t-test to determine the students' initial abilities in the two sample groups, in this case, the initial abilities of the conceptual knowledge of the two samples must be the same. Furthermore, the researcher taught the subject matter using the TGT type of cooperative learning model in the experimental class and conventional learning in the control class. The researcher will give a post-test to the experimental class and the control class. After the data is obtained, the data analysis is carried out using the t-test to determine the effect of the TGT cooperative learning model treatment on students' conceptual knowledge. Statistical analysis shows that students' conceptual knowledge in the experimental class is better than the conceptual knowledge in the control class, so it can be said that the TGT type of cooperative learning model can affect students' conceptual knowledge.

The Lilliefors test is used to determine the theoretical sample population data to infinity, normally distributed. The Homogeneity test is used to determine whether the theoretical sample population data...
to infinity comes from a homogeneous population. The homogeneity test used the variance equality test.

3. Results and Discussion

The research conducted was a quasi-experiment research, which involved two classes that were given different learning models, namely class X MIA 4 with 36 students as an experimental class taught using the TGT type cooperative learning model and class X MIA 7 with 36 students as a control class taught using conventional learning.

The pre-test was tested on each class first before implementing different learning with a total of 20 items in the form of multiple choices in the two sample classes to determine the pre-test and post-test outcome. The data for the two samples were declared normal and homogeneous so that it was feasible to test the hypothesis and the results are shown in Table 2 and Table 3.

| Class          | Average | $t_{count}$ | $t_{table}$ | Conclusion |
|---------------|---------|-------------|-------------|------------|
| Experiment    | 48.33   | 0.47        | 1.99        | $H_0$ Received |
| Control       | 47.36   |             |             |            |

Based on Table 2, the pre-test average value for the experimental class was 48.33 and the control class was 47.36. After obtaining the data from the pre-test students from the experimental class and the control class, then the data analysis test was carried out using the pre-test average similarity test where the data must be normally distributed and homogeneous. The value of $t_{count} = 0.473$ and $t_{table} = 1.99$, then $H_0$ is accepted, the pre-test data of the two classes is normal, homogeneous and there is no significant difference.

| Class          | Average | $t_{count}$ | $t_{table}$ | Conclusion |
|---------------|---------|-------------|-------------|------------|
| Experiment    | 83.19   | 9.365       | 1.668       | $H_a$ Received |
| Control       | 64.58   |             |             |            |

Based on Table 3, After being given different treatments, the two classes were given a post-test to see if there were differences due to the application of different learning models. TGT type of cooperative learning is very suitable for teaching according to formulated learning objectives, with one correct answer and there are games so that students are more active and don't get bored quickly during physics lessons (Putri et al. 2017)[15]. After being given the treatment, the post-test average score for the experimental class was 83.19, while the post-test average score for the control class was 64.58. Based on the results of the normality test and the results of the homogeneity test of the data, it was found that the two samples were normally distributed and had homogeneous variances. The value of $t_{count} > t_{table}$ or 9.365 > 1.668 then $H_0$ is rejected and $H_a$ is accepted so that there is an effect of the TGT type of cooperative learning model on students' conceptual knowledge on momentum and impulse.

3.1 Assessment of Student Conceptual Knowledge

The assessment of conceptual knowledge in this study starts from the level of categories and classifications, principles and generalizations, theory, subject matter and structure. Conceptual knowledge in the first category and classification (CC), students can understand the basic concepts of momentum and impulse. The second part is principles and generalizations (PP), students can solve problems related to momentum and impulses in everyday life by using the right concept. In the third part of theory, subject matter and structure (TSS), students solve questions from a picture with the
right concept (Schneider et al. 2011)[16]. The assessment of conceptual knowledge can be seen in Table 4.

Table 4. Data on Student Conceptual in Experiment and Control Class

| Class          | Categories and Classifications (CC) | Principles and Generalization (PG) | Theory, Subject Matter and Structure (TSS) |
|----------------|------------------------------------|-----------------------------------|------------------------------------------|
| Experiment     | 84,72                              | 82,14                             | 82,57                                    |
| Control        | 62,5                               | 61,11                             | 72,72                                    |

Table 4, Increasing conceptual knowledge using the TGT type of cooperative learning model is better because this learning model has several advantages, namely 1) making students more active in acquiring knowledge, 2) students can learn to be more relaxed and not easily bored 3) foster a sense of responsibility towards the group when appointed to be representatives to play games, 4) motivate students to better prepare themselves when competing. In the experimental class, in the category and classification section, students are more active and have an easier time understanding the concepts of momentum and impulse. In principle and generalizations students are more interested in solving questions on academic games. And in theory, subject matter and structure, students can find examples of the concepts of momentum and impulse in everyday life.

3.2 Learning Activity

The activity observed was the activeness of students in the learning process according to the indicators of the cooperative learning model type Teams Games Tournaments (TGT). Data The results of observations of student activities in the experimental class can be seen in Table 5.

Table 5. Data from the Observation of Students’ Learning Activities in Experiment Class.

| Gathering | Average Value | Category |
|-----------|---------------|----------|
| I         | 72,40         | Active   |
| II        | 77,22         | Active   |
| III       | 82,40         | Very Active |

Table 5 shows the observation data of students learning activities for experimental class. From this table can be explained that the development of student activity in the experimental class has increased when receiving learning using the TGT learning model. With group discussions and academic games, students are more active and don't get bored quickly during physics lessons. From the first meeting to the third meeting there was an increase in student activity which was increasingly active.

4. Conclusion

Based on the research results obtained, it can be concluded that the students' conceptual knowledge on momentum and impulse material with the TGT (Teams Games Tournaments) type of cooperative learning model is better than conventional learning. Learning activities towards students' conceptual knowledge that were applied to the TGT cooperative learning model increased at the first meeting of 72.4 (active), the second meeting of 77.22 (active), the third meeting of 82.4 (active).

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