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THE USE OF TGT COOPERATIVE LEARNING FOR CHEMISTRY LEARNING ON TENTH- GRADE STUDENTS

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Abstract

This study aims to improve student learning outcomes on chemistry subjects by applying the Teams Games Tournament (TGT) learning model for tenth-grade students. The method used is classroom action research that is carried out in three cycles, each cycle consisting of two meetings. Techniques of data collecting use the observation sheet and final testing cycle. Observation sheet was used to determine the activity of students and the test to determine student learning outcomes. Based on research, gained mastery learning outcomes of students increased from 45% before treatment (T_0) to 55% in the first cycle (T_1), 72.5% in the second cycle (T_2) and 87.5% in the third cycle. Average student activity within the group at the first cycle of 53.43%, 57.18% for the second cycle and the third cycle of 64.47%. Average student learning outcomes at the first cycle of 70, 55, 72,125 for the second cycle and the third cycle of 74,6. Cooperative learning strategies are effective when the curricular knowledge taught in the school is drawn from all groups by playing. Based on these results, the researchers suggest to teachers who have the same problem in learning can apply learning model Teams Games Tournament (TGT).

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INTRODUCTION

Education is one that is very important for life in improving the quality of human resources. The quality of education starts from the quality of the learning process. To improve the quality of education, the main thing we do is to improve the quality of the learning process. The learning process is determined by the quality of educators (teachers), learning resources (teaching materials) and student motivation in learning (Azizan et al., 2017). The teacher has an important role in improving the quality of learning, one of which is by selecting a learning model that is appropriate to students' cognitive abilities. If the teacher chooses the wrong model, then certainly learning does not work optimally (Chittleborough, 2014). Skills in choosing a suitable model, understanding concepts, choosing teaching materials as a whole are referred to as teacher professionalism (Gobert et al., 2011; Prins, Bulte, & Pilot, 2011). Professional teachers must be competent in their fields.

Based on the competency standards that must be possessed by the teacher in accordance with the regulation of the Minister of National Education stating that the teacher must have 4 professional teacher competencies, first the teacher must have pedagogical competence in which the ability of a teacher to understand students' characteristics. Both personality competencies are personal abilities that must reflect good attitude, dignity and noble character to be a good example. The third is professional competence where teachers are required to master learning material widely and deeply. The four social competencies are competencies in socializing or communicating well to students, colleagues, guardians and the community.

Chemistry is one of the important lessons needed to know what is happening around our lives (Jegstad & Sinnes, 2015; Wang, 2012). In the learning process students are required to understand the context to be applied and deepen their knowledge and competencies related to chemistry (Broman et al., 2018). Many middle school students have difficulty understanding chemistry (Lythcott, 2015). In chemistry, there are chemical bonding materials. Chemical bonds are one of the basic concepts in chemistry. Where chemical bonding materials contain many concepts. The main goal is that the teacher can motivate students to think, discuss and understand learning (Talanquer, 2011). Many students have difficulty understanding chemical bonds (Nahum et al., 2010), where teachers must be able to provide effective teaching using learning models that can help students. One of the learning models that can be given to students to get effective learning is cooperative learning.

Cooperative learning is one of the student-centered learning approaches. Where students are divided into small teams that collaborate to solve problems (Bruffee, 2010; Gillies & Boyle, 2010). The involvement of active students in learning is needed to see whether students understand in learning so that learning becomes effective(Saborit et al., 2016; Gundara & Sharma, 2013; Munir et al.,2018). One type of cooperative learning that can increase student participation and activity in the learning process, namely cooperative learning Teams Games Tournaments (TGT) type (Wodarski & Feit, 2011; Wyk, 2011).

The Cooperative Teams Games Tournament (TGT) type learning model is a learning model that challenges students to work individually representing their respective groups that compete to collect scores during game tournaments (Herrmann, 2013). This technique provides an opportunity for all group members to be able to participate in getting the highest score, where the group with the highest score will be the winner and get an award (Irawan et al., 2017; Nadrah et al., 2017). TGT cooperative learning has been widely used and studied for other learning. Ranging from low-level school students to colleges and all types of schools (Slavin, 2014). Cooperative learning models vary greatly in learning (Kyndt et al., 2013). In study groups, members have their own assignments or have the same assignments. At the end of the group, learning can be evaluated and valued for group performance in working together (Slavin, 2015). Structured and meaningful cooperative learning that can really help students understand how they work together, contribute and are responsible for completing their tasks and help each other in learning (Miller & Miller, 2017; Yi & LuXi, 2011). In this study the aim was to implement TGT cooperative learning in the learning process of bonding material to improve the learning outcomes of class X students at Palembang State High School 10.

METHODS

The subjects in this study were 10th grade middle school students in Palembang. This study was a Classroom Action Research (CAR) using the TGT cooperative learning model. In this study consists of 3 cycles, each cycle consisting of 4 stages of activity namely planning, action, observation, reflection. Cycle I and cycle II discuss material about chemical bonds and cycle III discusses material about molecular shape. These stages can be explained as follows:

Planning

At this stage the steps taken are:

- Determine the topics to be discussed at each meeting for research

- Prepare a learning implementation plan about the material to be studied, namely chemical material using the TGT cooperative learning model.
- Make an observation sheet on student activities to see how the students are doing during the teaching and learning process
- Preparing student worksheets that are adjusted to the subject matter to be delivered
- Prepare learning media in the form of question cards and rating cards for the tournament
- Make questions that will be tournament
- Make test questions to assess student learning outcomes

Implementation

Activities at this stage are implementing the teaching and learning process that has been applied according to plan. The teacher applies the syntax of the TGT cooperative learning model in the learning process as follows:

Initial Activity

A. Class presentation
- The teacher opens the lesson with greetings
- The teacher informs the goals, methods, and judgments applied to material learning activities
- Teachers convey apperception
- The teacher explains the material

Core Activities

A. Study in groups
- The teacher divides students into groups of each group consisting of 5 students
- The teacher gives the worksheets for discussion
- Teachers ask students for discussion
- The teacher guides the discussion
- The teacher asks one of the group members to present the results of the discussion
- Teachers provide opportunities for other groups to respond to group presentations
- The teacher corrects student presentations

B. Games Tournament
- The teacher groups students who represent their groups to each tournament table
- The teacher explains the rules of the game
- The teacher oversees the course of the game
- Each member of each group goes to a designated tournament table
- In one tournament table, each player first determines the reader of the problem and the player by drawing
- The first player shakes the stack of cards and then takes one question card and is given to the reader of the question
- Readers about reading questions according to what is taken by the player
- Questions are handled independently by the player within one minute
- After the specified time is complete, the player answers the question. If it does not provide an answer, it is thrown at the challenger next to it
- Readers of questions unlock answers and scores are given to players who answer correctly or challengers give correct answers
- If the player and challenger answer wrong then the card is left alone / returned again
- Player position is rotated clockwise so that each player in one table can act as a problem reader, player and challenger
- Readers of questions are only tasked with reading questions and opening answers, may not answer or give answers to other participants
- After the card has been answered, each player in one table counts the number of cards obtained and calculates the points obtained
- Each player returns in their respective groups to add points obtained by the group

C. Group Awards
- The teacher helps calculate the scores obtained by the group
- Teachers give awards to groups based on achieving average scores in one group

Final Activity
- The teacher guides students to conclude the material they have learned
- The teacher notifies the material to be discussed at the next meeting
- Closing learning with greetings

Observation

At this stage an observation process is carried out on the implementation of actions, namely by using the observation sheet that has been made. Observation is carried out continuously during the research to see the results of student activities on the actions taken.

Reflection

After observing the actions and evaluating the learning outcomes, the reflection phase is carried out. This stage is an activity to analyze the results

of observations during the learning process in each cycle. This stage aims to find out the weaknesses of the actions taken. The result of this reflection is to find out whether the action given has achieved the expected results or not. The results of the analysis in the first cycle become a reflection to improve planning in the next cycle.

RESULTS AND DISCUSSION

Table 1. Before Action Student Learning

Outcomes (T_0)				
Value	Amount of students	Percentage (%)	Completeness	Average Value
≥ 72	18	45%	complete	67,95
< 72	22	55%	not complete	
Total	40	100%		

In the table shows that the learning completeness of students' chemistry learning outcomes is still low, that is, from 40 students only 18 people who get a value of ≥ 72 or 45% of students are declared complete. This has not achieved classical mastery learning, which is 85%. Therefore, improvements are made so that student learning outcomes increase.

Table 2. After Student Action Outcomes (T_1)

Value	Amount of students	Percentage (%)	Completeness	Average Value
≥ 72	22	55%	complete	70,55
< 72	18	45%	not complete	
Total	40	100%		

From the data of learning outcomes in the table, it can be seen that students who got a score of ≥72 were 22 people with a percentage of completeness of 55%. This means that the level of student chemistry learning is still low. But when compared with the data before the action where only 18 students who got a score of ≥72 means that there was an increase even though it was still very far to achieve learning completeness which is 85%.

Table 3. After Student Action Outcomes (T_2)

Value	Amount of students	Percentage (%)	Completeness	Average Value
≥ 72	29	72,5%	complete	72,12
< 72	11	27,5%	not complete	
Total	40	100%		

From the table it can be seen the number of students who got a score of ≥ 72, there were 29 students who had achieved mastery learning, meaning that there were 7 students who achieved mastery learning, and classically students' learning completeness in the second cycle was 72.5%. It can be seen that there is an increase in the percentage of learning completeness by 17.5% from cycle I. So that the results obtained $T_2 > T_1$. However, the results of the second cycle learning test of 72.5% have not achieved classical completeness of 85%.

Table 4. After Student Action Outcomes (T_3)

Value	Amount of students	Percentage (%)	Completeness	Average Value
≥ 72	35	87,5%	complete	74,60
< 72	5	12,5%	not complete	
Total	40	100%		

From the table, it can be seen that student learning outcomes have increased from cycle II with the percentage of students who complete learning at 87.5% or as many as 35 students who were declared complete learning in cycle III. Classically, this class has been declared complete learning, because it has fulfilled the requirements.

Each cycle consists of two meetings, before the first cycle is carried out, the researcher gets a daily test score and has made observations on the class to be given the action. The daily test scores of students showed an average score of 67.95 with a percentage of learning completeness reaching 45%. This data shows far from the completeness of learning outcomes that should be 85%, so that classroom action research will be carried out by applying the cooperative learning model type Teams Games Tournament (TGT).

Learning with the TGT model is done in the first place the teacher explains the material to be

learned on that day and then divides students in classes in 8 groups of 5 students. After forming a group of students the student worksheets are distributed so that students can read and understand the material on the worksheet of the students, then students discuss. The results of the discussion are then presented to see the activity of students and the courage of students in expressing opinions and being responded to by other group members. After that students form tournament members to tournament tables. There are 5 tournament tables on each table with 8 people representing each group.

In cycle I, the teacher guides students and explains the subject matter, the teacher gives the opportunity for students to answer questions and ask questions. Then the teacher conditions students in small groups to discuss, then the teacher asks students to present the results of their work. The percentage of student activity obtained from the analysis of the observation sheet in the first cycle was 53.43%. Based on the final cycle test, an increase in T_0 completeness was 45% to 55% and there was also an increase in the average learning outcomes of 67.95 to 70.55. This increase is due to direct student involvement in the learning process.

In this first cycle there was a decrease in the percentage of activity in group I from 60% to 56.66%. This was because one of their group members, Rio Aditya, looked passive that day. From the results of the tests, the value of students' completeness in the first cycle is still far from the classical completeness of 85%. This is due to the weaknesses in the learning process. Students are not familiar with the cooperative learning model of the Teams Games Tournament (TGT) type. The discussion process has not gone well, the discussion was only dominated by a few students, students who did not understand were just silent and chatting. Therefore there needs to be improvement in the next learning process.

In the second cycle this is an improvement from cycle I. The percentage of group activity in the second cycle experienced an increase in the first cycle of 53.43% to 57.18%. In this second cycle not all groups experienced increased activity. Group II experienced a decrease in the percentage of activity from 55% to 50% and group VI also experienced a decrease in the percentage of activity from 60% to 51.66%. This is because members of Putri group I look bored and often daydream as well as members of group VI Annisa who are not healthy. These factors have an impact on student learning outcomes, this is indicated by the results of student cycle test results which show a decrease in value obtained by Putri, namely in the first cycle got a score of 48 to 35 in the second cycle while the Annisa value in the first cycle was 71 decreased to 50 in the second cycle . That body health conditions in general affect the enthusiasm and concentration of student learning in attending lessons. A weak body can reduce the cognitive quality of students, so the material learned is difficult to digest.

The completeness of student learning outcomes increased from the first cycle of 55% to 72.5%. The average learning outcome also increased from 70.55 to 72.12. The increase in learning outcomes was caused by students getting used to learning by using the cooperative learning model of the Teams Games Tournament (TGT) type so that students were more active than the previous meeting. In this second cycle, the teacher is more guiding students in discussions, the teacher comes to each group, giving direction so that students are more active in discussing. The interaction between students in the discussion was better compared to the first cycle, but there were still students who had not been actively involved in the discussion. Students have seen the courage to present the results of their work, but students who dare to present their work are only dominated by certain students. Therefore there is still a need to improve actions for the next cycle, namely the teacher must motivate students to look more active in the learning process.

Cycle III was carried out with improvements based on weaknesses in cycle II. When discussions students give feedback to each other and give explanations to friends who do not understand. When the percentage takes place, many students are already focused on paying attention to their friends during presentation. After the discussion was completed, students formed a tournament group. At the tournament students were brave and enthusiastic about answering question cards. Based on the results of data analysis, the percentage of activity in the third cycle is 64.47%. The percentage of activity increases from cycle I and cycle II. The average student learning outcome is 74.60. The completeness of student learning outcomes in the third cycle is 87.5%. as stated by Wijayanti (2016) the completeness of learning outcomes in this third cycle has reached classical completeness which is 85%. Increased learning completeness, average learning outcomes and activeness of

students in cycle I, cycle II and cycle III can be seen in the following picture

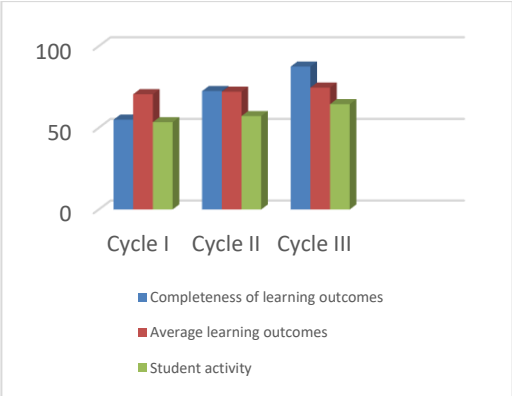

Figure 1. Bar Diagram of Increased Learning Completeness, Learning Outcomes and Activity of Students in Cycle I (T_1), Cycle II (T_2), and Cycle III (T_3)

The research that has been done shows that the learning model by applying the cooperative learning can improve student learning outcomes (Riyanti et al., 2016) also the using of card learning media help to maximizing the increasing of learning outcome (Umar et al., 2016). On the results of the research the application of the TGT learning model with destination cards can improve student learning activities and outcomes in periodic system material elements. From the above several studies show that using the TGT type learning model can improve learning outcomes.

CONCLUSION

The cooperative learning model of the Teams Games Tournament (TGT) type in the learning process can increase students activeness and chemistry learning outcomes on the subject of chemical bonds and molecular shapes. These results can be seen from the percentage of student activity in the first cycle of 53.43% in the second cycle the percentage of student activity is 57.18% and in the third cycle the percentage of student activity is 64.47%. The percentage of students' mastery learning in classical before being given action (T_0) is 45%, while after being given the action in cycle I (T_1) of 55%, the second cycle (T_2) obtained a percentage value of 72.5% and in cycle III (T_3) amounting to 87.5% so that it shows $T_3 > T_2 > T_1 > T_0$.

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