Comparison of Learning Outcomes On Chemical Bonding Of Student Class X Senior High School State 1 Ma'rang that Taught by Cooperative Learning Model Type TPS and NHT

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Abstract: This study is a comparison research with quasi-experimental method aimed to investigate the differences of learning outcomes of student Class X Senior High School State 1 Ma'rang between taught using of TPS and NHT types of cooperative learning. The study design was "Two Group, Pretest Posttest Design". The population in this study were all class X Senior High School State 1 Ma'rang which consists of 5 classes, while the sample are class X A as experimental 1 and class X B as experimental 2 with number of students in each class is 20 people. The independent variable in this study are TPS and NHT types of cooperative learning and the dependent variable is the result of learning. Data retrieval of learning outcomes achieved by giving a pretest and posttest. Learning outcome data were analyzed using descriptive statistics and inferential statistics. The analysis showed the average value of student learning outcomes class XA in the pretest and posttest was lower than XB class (It showed respectively with an average N-Gain 0,599 and 0,729). The results of hypothesis testing using t-test values obtained at t_{count} = 2,936 and α = 0.05 significance level with df = 38 obtained table = 2,036. Therefore, t- count> t- table, then H_1 is accepted and H_0 is rejected. It shows that there are difference outcomes learning of X class student of Senior High School State 1 Ma'rang that taught by TPS and NHT types of cooperative learning model on the subject matter of the chemical bond.

Keywords: Comparison Cooperative learning Model *TPS, NHT,* Learning Outcomes.

INTRODUCTION

Teacher is the holder of a very important role in the improvement of the learning process. Teachers have a role shaping the character of the students and develop the potential of students in order to develop their education in Indonesia. The presence of a teacher to this day cannot be replaced by any sophisticated technology.

In addition to the teachers, learners also has determinant of achievement of educational goals. However, learners often have difficulty in following the learning process well. Therefore, it takes a learning model that can increase the interest and motivation of learners in learning. One way is to

apply the model of an innovative and creative teaching that will make students more active during the learning process.

Based on observations conducted by researchers at Senior High School State 1 Ma'rang known that most learners complained about the difficulty in understanding the chemistry, causing learners feel less motivated to engage in the learning process. It is also supported by the learning model used by teachers who mostly still tend to use conventional learning model approach center teacher (teacher-centered learning) so less actively engage learners in the learning process. These problems result in lower learning outcomes of students. Based on data from the study of students Senior High School State 1Ma'rang especially in the academic year 2013/2014 with a standard completeness 65, obtained only 51% of students who completed thus incomplete must follow remedial tests.

Chemical bonding subject matter is one of the subject matter in a comprehensive chemistry with the concepts and descriptions are mostly abstract so it requires a strong understanding of the concept of learners. Therefore, we need a method and appropriate media to be more active learners learn and not get bored.

The main objective in cooperative learning is to learn the learners in groups with their friends with how to respect the opinions of others as well as provide the opportunity for others to express their opinions in groups (Isjoni, 2013). Cooperative learning model TPS (Think Pair and Share) and NHT (Numbered Heads Together) is a model of learning that can improve the mastery of learners towards learning materials, increasing the activity of learners, improve interactions, and increase the motivation of learners to be active in the learning process (Trianto, 2012).

NHT learning model is a model that emphasizes the activity of learners in finding and developing answers through discussion in more depth so that they can find the answers to these questions as a knowledge of the whole (Suprijono, 2010). The learning model TPS involves only two people in one group. As revealed in Suprijono Chaplin (2010) that the group may consist of two people only. This statement is also supported by Silberman (2009) that two heads are better than one. So this method can optimize the participation of learners and can be applied to all subjects and grade levels (Huda, 2012). In this study are expected to occur frequently asked questions that will promote knowledge to construct an integrated manner so that learners can find the structure of the knowledge they have acquired (Suprijono, 2010). The purpose of this study was to find a significant difference to the learning outcomes of students of class X Senior High School State 1 Ma'rang taught through cooperative learning model TPS and NHT on Subject Matter of Chemistry. "

RESEARCH METHODS

This study is quasi-experimental comparative method. Two research design is a group, pretest-posttest group design. In this research there are two variables, independent variables and the dependent variable. Independent variable is the TPS type of cooperative learning and cooperative learning NHT, while the dependent variable is the result of studying chemistry. The population in this study were all students of class X Senior High School State1 Ma'rang the academic year 2015/2016 consisting of eight classes namely 107 people. Based on information obtained from teachers of chemistry Senior High School 1 Ma'rang, that the ability of learners each class are the same so do sampling with random sampling method class. Determination of the experimental class 1 and 2 is done by a draw, as well as for the determination of the class will be taught by cooperative learning model TPS and NHT done by the draw anyway. From the results of the random randomly selected two classes, namely class X A as an experimental class 1 taught by cooperative learning model TPS and X class 2 B as an experimental class taught by cooperative learning model NHT. Research was conducted in the first semester of the school year 2015/2016 in Senior High School State 1 Ma'rang.

Data collected by administering a pretest to test the ability of early learners and giving post-test) to test the ability of learners at the end of each class and grade TPS NHT. The instruments in this study was an objective test in the form of multiple choice as much as 20 numbers with 5 possible answers. This instrument has been validated items and validated the contents by chemistry professor and teachers of chemistry Senior High School State 1 Ma'rang Each item prepared in accordance with the indicator. Here the value of completeness that is used in Senior

High School State 1 Ma'rang. The test results of student learning obtained in the form of scores are converted to values using the formula:

$$\text{Value} = \frac{(\text{number of correct score})}{\text{number of maximum score}} \times 100$$

Tabel 1. Criteria for mastery learning Student Senior High School 1 Ma'rang

Value	Category
≥ 65	Completed
< 65	Not Completed

(Source: Chemistry Teacher Senichool 1 Ma'rang)

$$\%\text{Completeness} = \frac{(\text{number of student who completed})}{\text{number of all students}} \times 100\%$$

Data were analyzed using descriptive statistics and inferential statistics. The hypothesis in this study was no significant difference to the learning outcomes of students of class X Senior High School State 1 Ma'rang taught through cooperative learning model TPS with learners who are taught through cooperative learning model NHT in the subject matter of Chemical Association.

RESULTS AND DISCUSSION

Result of Research

Descriptive Statistics Analysis

Based on the results of descriptive analysis tests the ability of the initial (pretest) and achievement test (posttest) learners class XA and XB Senior High School State 1 Ma'rang in the first semester, after going through the learning process by using cooperative learning model TPS in the experimental class 1 (XA) and using cooperative learning model NHT the experimental class 2 (XB) obtained statistical data in Table 2.

Table2.Statistic Value Learning Outcomes of Students

Descriptive Statistics	Statistic Value			
	Experiment 1 (TPS)		Experiment 2 (NHT)	
	Pretest	Posttest	Pretest	Posttest
Sample size	20	20	20	20
Lowest value	20	55	15	60
Highest Value/rated	45	90	35	95
The average value	35,75	73,70	28,25	79,10
Median	36,50	76,33	27,40	79,00
Modus	45,64	72,25	27,16	85,83
Standard Deviation	9,44	10,34	4,25	10,21

Based on the overall value obtained by students in the class and grade TPS NHT, if the learning outcomes of students grouped in categories mastery learning outcomes based mastery learning standards chemistry class X Senior High School State 1 Ma'rang, the obtained data is the frequency and percentage of completeness learning outcomes of students as shown in Table 3.
Tabel 3. Category Mastery Learning Outcomes Learners TPS and NHT Class

Category	Value	TPS Class		NHT Class	
		Frequensy	Percentage	Frequensy	Percentage
Completed	≥65	17	85,00%	19	95,00%
Not Completed	<65	3	15,00%	1	5,00%
Total		20	100%	20	100%

Based on Table 3 above shows that the thoroughness of the study of students at grade material for the chemical bonding NHT shows the percentage complete of 95.00%, while the class polling shows the percentage who complete at 85.00%. It shows that the students in the class NHT more thorough than the students in the class TPS, so it seems clear that the learning outcomes for NHT grade higher than the grade TPS.

Analysis of Inferential Statistics

a. Normality test

Normality test is intended to test the normality of the data obtained from the research. Normality test was also conducted to determine whether the sample was representative of the population or not. In this research, testing normality done using Formula Chi-Square (X^2). Based on calculations by N-gain for the learning outcomes in the classroom TPS obtained χ2hitung = 4.26 and the value for χ2tabel = 7.81, because the value χ2hitung <χ2tabel it was concluded that the sample at a grade TPS normally distributed as for class NHT from the calculation, χ2hitung value = 3.91. To χ2tabel at the level of 0.05 and degrees of freedom (df) = 3 obtained χ2tabel = 7.81. Value χ2hitung <χ2tabel it was concluded that the sample in the control class are normally distributed.

b. Homogeneity test

Homogeneity test is performed to determine whether the data have variances homogeneous or not. Homogeneity testing criteria, if F-count <F-table then the TPS grade variance with NHT class variance is homogeneous. Based on the test results of the homogeneity of the learning outcomes of students using class variance of TPS as the greatest variance and variance NHT class as the smallest variance obtained value of F = 1.352 and the value of F table at the level of 0.05 was 2.17. Value F-count<F-table concluded that the variance between classes TPS with NHT class is homogeneous.

c. N-Gain

Gain Normal test is done by calculating the difference between the pretest and posttest achieved by learners. Data from scoring Normal Gain on class TPS and NHT presented in Table 4.

Table 4. Calculaton Of Result N-Gain

Normal Gain	**TPS Class**	**NHT Class**
Lowest	0,308	0,429
Highest	0,833	0,923
Average	0,599	0,729
Standard deviation	0,151	0,130
Varians (S^2)	0,023	0,017

d. Hypothesis testing

Testing this hypothesis was conducted to determine the differences in learning outcomes of chemical bonds learners are taught through cooperative learning model TPS and NHT. After conducting tests of normality and homogeneity, noting that the two experimental groups were normally distributed and homogeneous, and therefore do hypothesis testing using t. T tests were aimed to find any significant difference to the learning outcomes of chemical bonds learners are

taught through cooperative learning model TPS with NHT. The t-test is done by comparing the N-gain in each of the experimental class. Testing this hypothesis was conducted to determine the differences in chemistry learning outcomes learners are taught through cooperative learning model NHT and TPS. After conducting tests of normality and homogeneity, noting that the two experimental groups were normally distributed and homogeneous, therefore the hypothesis testing using t. T tests were aimed to find differences in chemistry learning outcomes learners are taught through cooperative learning model NHT with TPS on chemical bonding material. The t-test is done by comparing the value posttest in each class experiment. From the results of inferential data analysis, t-count amounted to 2,936 with df (degrees of freedom) of 38 (20 + 20-2) are not on the table so that it uses dk approaching that 40 of the obtained t-table at significance level of 0.05 at 2,036. From these data it looks t-count> t table (2,936> 2,036). This shows that Ho refused and H1 accepted, meaning that there is a significant difference to the learning outcomes of students who were taught through cooperative learning model TPS with learners who are taught through cooperative learning model NHT

Discussion

This study was conducted to determine differences in learning outcomes of students who were taught through cooperative learning model TPS and NHT. Each class was given a different treatment, one experimental class taught using cooperative learning model TPS while the second experimental class taught by cooperative learning model NHT. The learning process is different from both the class cause different results as shown by the data in Table 2. Based on the table, the lowest and highest values for the pretest on the TPS grade 20 and 45 is greater than the lowest and highest values to pretest the NHT class namely 15 and 35, as well as to the average value of pretest at the beginning TPS grade higher at 35.75 compared to the average value for a class pretest NHT is 28.25. However, after application of cooperative learning model TPS in the experimental class 1 and cooperative learning model NHT the experimental class 2, looks very different results. Where the lowest and highest values to posttest at the NHT classes 60 and 95 is higher than the lowest and highest values to posttest on the TPS grade 55 and 90. It would affect the value of the average posttest to class TPS also lower at 73 , 70 compared to the average value posttest for NHT class is 79.10. The standard deviation for both classes during the pretest and posttest, to the lowest value shown by NHT class, this means that the size of the data on the spread of NHT better class than in class TPS. Percentage of completeness of the class of TPS are lower, amounting to 85.00% while for NHT grade of 95%. This can be seen in Table 3. The difference in learning outcomes were also seen on the acquisition of N-Gain can be seen in Table 4, the TPS-class category and a high of 20.00% in the high-grade category NHT by 60.00%.

Table 2 showed that the implementation of cooperative learning model NHT provide better learning outcomes. This proves that there is increasing mastery of learners towards learning material presented, because during the learning process capable of involving students actively in the learning process in the classroom. It can be seen from different stages of learning in it. In the early stages of organizing teacher class into several groups are heterogeneous, then the teacher to share the number of heads (numbering) to each learner in the group, giving the head a number is intended as a marker for each learner in the group. The teacher explains the subject matter to be discussed. The next stage of the teacher asking questions to the students (questioning) through the worksheets provided. The questions relating to the material that has been described. After that, each group answered the question (answering) given. At this stage, each group member is required to know the answers to the group because at later stages of answering the teacher will call a random number of group members and members whose number is selected to answer questions without the help of other members. It is intended that each member of the group can understand the material they have learned so as to create a responsible individual.

The existence of such cooperation make learners feel motivated to be active in the learning process in the classroom, because each member of the group was ready to be called the number. Discussions have also become more effective learners who are good would teach learners who have less ability so it will affect the learning results obtained, the result of higher learning than learning results obtained learners are taught through cooperative learning model TPS. The learning

process that takes place in the classroom NHT has shown the advantages of this model as described in the literature review.

The implementation of cooperative learning model TPS requires learners to think independently (think) first, before then working together in pairs (pair) with friends in groups. And will ultimately share (share) and discuss the answers they get, because in the end will be appointed one member of a group to answer questions independently. However, in the application of this learning model, students who have communication skills and self-confidence that is less to make cooperation within the group less than the maximum. Moreover, in the study group only consisted of two people, so most students are not accustomed to this situation causes some students are less actively involved in the learning process, especially when discussing with their friends in same group. It is certainly an impact on the study of students in this class. Based on the results of inferential analysis obtained by value t = 2.936 and the value t-table at significance level $\alpha = 0.05$ with degrees of freedom (df) = 38 is 2,036. This shows that t-count> t-table which means the hypothesis is accepted where the statistical hypothesis H0 and H1 accepted then it can be concluded that there is a significant difference to the learning outcomes of students of class X Senior High School state1 Ma'rang that learned with cooperative learning model TPS and NHT.

Based on hypothesis testing is done, it can be said that the implementation of cooperative learning model NHT applied to the experimental class 2 in the subject matter of chemical bonds can provide better results than the application of cooperative learning model TPS applied to the experimental class 1. The implementation of cooperative learning model NHT provide higher yields, better learning outcomes and activities of learners compared TPS type of cooperative learning. This occurs because the cooperative learning model NHT engage more learners in reviewing the material covered in the lesson and check their understanding of the lesson content. NHT teach learners to work together, responsible for the group and to myself, so that students are motivated to learn and be active in the learning process. Implementation of the learning process in the experimental class 2 by applying cooperative learning model NHT, learners are grouped in small groups with the numbering on each member of the group later discussions. The learning process using cooperative learning model NHT demanding optimal participation of learners in the learning process.

While the type cooperative learning model TPS, in its implementation, students are required to work independently in advance, before then working together in pairs with a friend in sesame group. The application of this model is intended to develop the social skills of learners. Because the implementation will require the cooperation every learner in the group to accomplish task given. In the completion of this task that will occur interpersonal interactions (interactions between members) that aims to develop interpersonal intelligence. Thus interactions with the group's friends will run intense that eventually will result in a positive dependence between them. Positive interdependence is expected to increase their motivation to further improve the performance of the group, which would certainly have an impact on the individual learning achievement.

However, in the application of this learning model, students who have communication skills and self-confidence that is less to make cooperation within the group less than the maximum. Moreover, in the study group only consisted of two people, so most students are not familiar with this situation causes learning motivation in the group lower than students who studied in large groups.

Based on the above and support the theory advanced by Johnson in Trianto (2012) is to determine the quality of learning models should be viewed from two aspects: the process and the product. Aspects of the process in the form of activity observed during the learning process, from the aspect of the process according to the second place in the experimental class.

Classes are taught by cooperative learning model NHT fulfills the mentioned process that is capable of creating a situation of learning fun and encourage students to be actively involved in the learning process than classroom experimentation one taught by cooperative learning model TPS, cooperative learning model TPS less able to create an atmosphere of learning or fun discussion, other than because of the group members were slightly causing an idea that emerged from each group also tends to be limited, because basically the more heads thinking, of course, the more ideas that come coupled with some of the participants students who still lack confidence in delivering or ask questions about the material being studied.

Furthermore, aspects of the product in the form of learning results obtained by the two classes, where the study of students experimental class 1 are taught through cooperative learning model TPS lower than the study of students in the experimental class 2 are taught through cooperative learning model NHT, then of the results of this study can be seen that there is a significant difference to the learning outcomes of students who were taught through cooperative learning model TPS with learners who are taught through cooperative learning model NHT in the subject matter of chemical bonding in class X SMA Negeri 1 Ma'rang. Where the learning outcomes of students taught by cooperative learning model TPS lower than students taught by cooperative learning model NHT.

CONCLUSIONS

Conclusion

Based on the results of data analysis and discussion we can conclude that H_0 rejected and H_1 accepted which means that there is a significant difference to the learning outcomes of students of class X SMA Negeri 1 Ma'rang taught through cooperative learning model TPS cooperative learning model NHT. It is shown from the average value of the N-Gain derived from two classes, namely to class TPS amounted to 0.599 and NHT class of 0,729.

Suggestion

The suggestions in this journal further research should be more attention to the management of the time when they wanted to apply the model of learning, especially for learning model NHT. In addition, teachers in dividing the study groups should familiarize divide students into heterogeneous groups, to avoid the habit of those who just want to cooperate with the friends they consider familiar.

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