

**THE DIFFERENCE OF STUDENT'S PHYSICS LEARNING OUTCOMES
USING COOPERATIVE LEARNING MODEL TYPE NUMBERED HEAD
TOGETHER WITH DIRECT INSTRUCTION IN GRADE X
SMA NEGERI 1 BERASTAGI**

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ABSTRACT

The purpose of this research was to find out the difference of student's physics learning outcomes using cooperative learning type numbered heads together model with direct instruction model in topic dynamic electric at grade X SMA N 1 Berastagi Academic Year 2012/2013. Method of this research is by using quasi experiments with one group post-test, pre-test design. Population in this research were all students in grade X amount 224 students consist of 7 classes. Sampling technique was random sampling. The sample in this research are students of grade X SMA N 1 Berastagi academic year 2012/2013 consists of two class, X₄ as experiment class using Numbered Head Together and X₅ as control class using direct instruction model. There were three instrument for research, such as multiple choice test as cognitive instrument, affective assessment instrument, and psychomotoric assessment instrument. Learning outcomes of students is from affective, psychomotoric, and cognitive value. Affective and psychomotoric of experiment class was enough category, while affective and psychomotoric in control class was bad category. The cognitive show by post test, mean value of experimental class was good category, and mean value of control class was enough category. The result of t test was pre-test get value t_{count} is 0.68 means there was no difference of student's physics learning outcomes between control and experiment class. For the post test H_0 was refused because t_{count} is 4.43 means there was a difference of student's physics learning outcomes between control and experiment class. So can be concluded that there was the difference of student's physics learning outcomes using cooperative learning type numbered heads together and direct instruction model in topic dynamic electricity at grade X SMA N 1 Berastagi Academic Year 2012/2013.

Keywords : numbered head together, physics learning outcomes

INTRODUCTION

Physics is the basic of science that learns natural phenomena systematecally. Physics is subject that give us information and concept of natural phenomena occur in our daily life. Physics is an interesting subject, because we can directly

observe in our daily lives. But in reality many students stating that physics is difficult, because many of the formulas should be memorized. This fact is reinforced by the results of their low physical exam. The low physics learning outcomes can be caused by various factors, among

others, the low interest in students to learn physics, the way teachers teach less attractive, and less precise model of learning materials in teaching physics.

Based on interviews with physics teacher in SMA Negeri 1 Berastagi, physics learning outcomes is still low. This is evident from the mark of summative examination's students with an average 67, whereas the value of mastery minimal criteria of physics is 75. In the learning process, teachers using conventional methods, learning process was teacher centered. In the learning process, the teacher explains the material and noting formulas and work on the problems. So that became synonymous with physics formulas and learning becomes less attractive.

Appropriate with the problems above, the learning process of physics required an innovative learning model that can encourage student learning, making students more active, and learning more fun, so that with increasing student motivation will also increase learning outcomes. One alternative to student motivation is to engage students in learning. Teachers must be able to create a comfortable atmosphere for learning and fun, as well as to actively involve students in the learning process. Therefore, the learning model used is a model that attracted students, enhance the spirit of learning, and fun. One alternative learning model that evokes the spirit of learning and engage students is cooperative learning.

Based on the issues that have been presented previously, the writer tries to do research in an effort to improve student learning outcomes by implementing

cooperative learning model type numbered heads together (NHT) with some methods of learning.

According to Slavin (2005:256), "Cooperative learning type NHT is a better approach to learning allows students to be more active and take full responsibility for understanding the subject matter both in groups and individually."

Therefore NHT learning model can be applied in day-to-day on the subject at the junior high or high school students. In this study the writer chose the dynamic electric topic because it is contextual topic explained with the steps of cooperative learning type NHT. In addition, cooperative learning model type NHT has not been used for research In SMA N 1 Berastagi. Dynamic Electricity also allows students to learn to identify concepts through visual aids and group discussions. Based on the description the writer wanted to do research on NHT model to improve student learning outcomes in grade X SMA Negeri 1 Berastagi Academic Year 2012/2013 on dynamic electric topic.

Numbered Head Together Model

There has been a growing interest among teachers in using cooperative learning activities in earlier decade. With cooperative learning, students work together in groups whose usual size is two to four members. However, cooperative learning is more than just putting students in groups and giving them something to do.

Cooperative learning principles and techniques re tools which teachers use to encourage mutual helpfulness in the groups and the active participation of all members.

Numbered Heads Together encourages successful group functioning because all members need to know and be ready to explain their group's answer and because Numbered heads together have strategy that offers an alternative to the competitive approach of whole-class question-answer, in which the teacher asks a question and then calls on one of the students. In numbered heads together approach, the teacher has students number off (e.g. 1-4), asks a question, and then tells the students to "put their heads together" to develop a complete answer to the question. When the teacher calls out a number, the students with that number raise their hands to respond. This structure facilitates positive interdependence, while promoting individual accountability. It also gives confidence to lower achievers because they know they will have the correct answer to give to the class.

These principles can be seen in the cooperative learning technique Numbered Heads Together (Kagan, in Slavin 2000: 80) that can used, for example, in reading class. The steps of numbered heads together can we see in Table 1.

Table 1. Syntax of Numbered Head Together Model

Phase	Teacher Role
Phase1 Delivering objective and motivate students	Teachers convey all the learning objectives to be achieved in these subjects and motivating students
Phase 2 Presents information	Teachers present information to students by way of demonstration or by presentation in power point

Phase 3 Organize students into Numbered Heads Together groups	Teachers divide the student become several groups and give different number card to member of group
Phase 4 Guiding the group work and guided study	Numbered <ul style="list-style-type: none"> • Teacher give every student Card Number and deliver the worksheet student's will do. Heads Together <ul style="list-style-type: none"> • Teacher engage the student to discuss the answer of teacher question • Teacher call the number randomly, and give time to student to present their answer
Phase 5 Evaluation	Teachers evaluate the learning outcomes of the material being studied or each group present their work
Phase 6 Rewarding	Teachers find ways to appreciate the effort and the learning outcomes of individuals and groups

RESEARCH METHOD

Research was carried out in Grade X SMA Negeri 1 Berastagi academic year 2012/2013 and carry out in April 2013.

Research done since April 27th 2013 until May 11th 2013.

The population in this study is all students in grade X 2nd semester State SMA Negeri1 Berastagi Academic Year 2012/2013 consisting of 7 parallel classes and the average number of students per class consists of 32 peoples. So the total student is 224 students.

From the seven classes, a sample of this research is the student SMA Negeri 1 Berastagi Academic Year 2012/2013 were selected 2 classes from the 7 classes. Sampling

technique is simple random sampling, where each class of the population has the right to have the opportunity to be a sample because all classes from grade X in SMA Negeri 1 Berastagi is homogeneous. Experiment and Control class fixed according lottery from 7 parallel classes. One class with cooperative learning model type numbered heads together and other class with direct instruction learning model.

The research involved two classes, experimental class and control class given different treatment. In experiment class given treatment teaching use cooperative learning model types numbered head together. While the control class is treated using direct instruction learning model.

Determining student's physics learning outcomes, obtained by applying the two treatments with give test to the students. The research design could found in Table 2.

Table 2. The design of experiments

Group	Pre - test	Treatment	Post -test
Experiment	Y ₁	T ₁	Y ₂
Control	Y ₁	T ₂	Y ₂

Description:

Y₁ = Pre-test

Y₂ = Post-test

T₁ = Learning with cooperative learning model types numbered heads together

T₂ = Learning with direct instruction learning model

Data analysis technique used in this research is analysis of difference by using t test formula. Before performing t test without

integrated learning first calculate test for normality and homogeneity of variance test of two groups of samples with pretest. However, before calculating the normality and homogeneity of variance test two groups of samples with pretest, first calculate the standard deviation.

RESEARCH RESULT

Implementation of Numbered Head Together make the student have high value of affective and psychomotoric, and also can increasing cognitive of student.

Below the describe of student cognitive according Blooms taxonomy, after implementing Numbered Head Together.

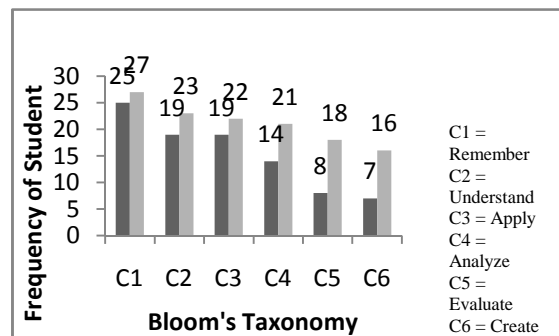


Figure 1. Chart of cognitive student

From the chart we can see, student in experiment class using numbered head together can answer problems from C₄-C₆ much than student in control class using direct instruction. It's in line with theory, implementation of numbered head together make student memorized the learning material so student can answer difficult problem.

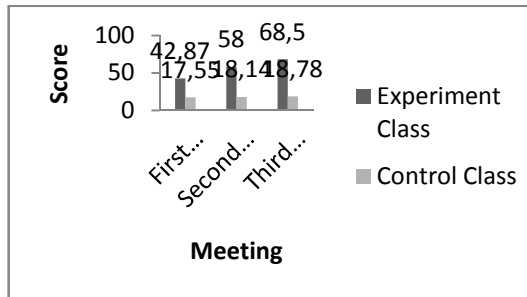


Figure 2. Chart of student psychomotoric

From the chart, we can conclude that psychomotoric's student in experiment class higher than psychomotoric's student in control class. There was increasing value of psychomotoric for three meeting in experiment class, while in control class, there was no significant increasing. Because in experiment class researcher make the experiment while in control class researcher was not make the experiment about electric circuit.

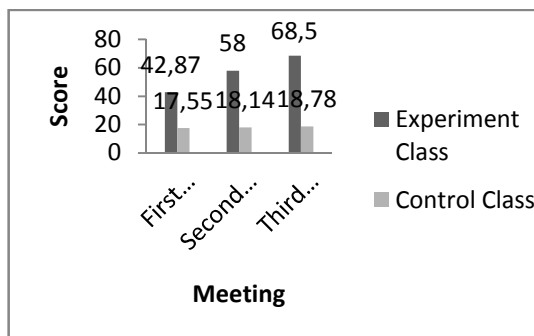


Figure 3. Chart of student Affective

Figure 3 showed that, there was increasing of student affective in experiment class using numbered head together, while in control class there was no significant increasing. Implementing numbered head together make student become active, have team work, and responsibility.

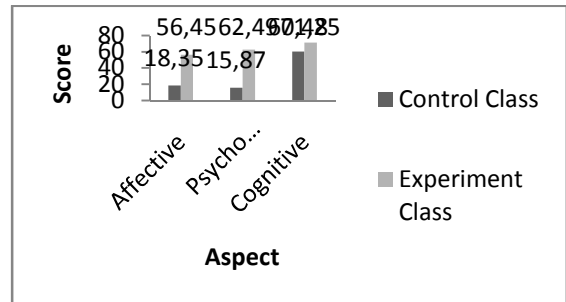


Figure 4. Chart of student affective, psychomotoric, and cognitive

DISCUSSION

Student's physics learning outcomes is seen from three aspects/domain. Such as, affective, psychomotoric, and cognitive. Third aspects observed in experiment class and control class.

In control class we used direct instruction, student's physics learning outcomes is lower than student's physics learning outcomes in experiment class using numbered head together.

From the data, we know affective and psychomotoric, and also cognitive of student in control class is tendency low, because direct instruction don't make the student as the center of learning, so the student become passive and the cognitive of student in enough category. In experiment class, affective and psychomotoric of student higher than control class, it caused numbered head together make te student as center of learning, student become active and also after doing experiment, student memorize the learning material Figure 4 showed that student's affective, psychomotoric, and cognitive in control class using direct instruction, have value lower than student's affective, psychomotoric, and cognitive in experiment class using nnumbered head together. So, from the chart we can make conclusion that, there was difference of student's physics

learning outcomes with, so the cognitive of student become increasing and higher than control class. The results showed that there were differences in student learning outcomes with implementation of cooperative learning model type numbered heads together with direct instruction models.

In this research, researcher used a method based experiment. Students were given a worksheet that contains step-by-step experiments, the data they need to fill, and the question that enhance students' analytical skills. By conducting experiments students better understand the material dynamic electricity and hold discussions with friends group. By giving students worksheets, teachers expect students to work together and be responsible to the group. Personal responsibility imposed on each member, which requires friends to help each other, develop group skills, and maintain an effective working relationship, this situation also occurs when teachers guide learning and working groups.

As the theory, NHT cooperative learning model provides the opportunity for students to exchange ideas - ideas and consider the most appropriate answer. In this case students are required to exchange opinions, to obtain a better knowledge, and to foster mutual respect the opinions of others, to appreciate the differences that exist, taking advantage, and take up the slack of each. In addition to the numbering system, students are required to understand the answers to the discussion or understand the material being taught, so that when called upon by the teacher to present an answer, every student is ready to present the group's answers.

Using of cooperative learning models numbered heads together give a good profit on lower ability students and students whose capacity is higher. Higher ability students who can help his friends, and lower ability students can receive knowledge / information of higher ability students, as well as learning can also involve more students studying the material covered in the lesson, this condition occurs in when students learn to work independently and in groups. So from the result in experiment class, the implementation of cooperative learning type numbered heads together can make significant increasing in affective, psychomotoric, and cognitive of students. So, the result is in line with the theory.

Result of research showed that implementing numbered head together make student's physics learning outcomes higher than using direct instruction. This fact in line with the old research such as Ertha Wahyu Perangin-angin get the increasing of cognitive domain about 61,23 %. Ebtan Sihotang get the score of post test in experiment class is 78,46 and the post test in control class is 46,41. It means that the cognitive domain of student is increasing by implementing number heads together. And according to Magdalena Sihombing get the post test in experiment class is 73,2 and in control class the post test score is 66,8. And in Dewi Susanti research, in her conclusion state that there is increasing of student learning outcomes in experiment class and control class. But the incresement in experiment class using NHT better than control class. And the researcher know get the result that there is increasing in three aspect/ domain,

that's affective, psychomotoric, and cognitive domain. For cognitive domain, in control class the score is 60,48 and in experiment class using numbered heads together is 71,25.

When researcher doing the research, there was problem existing when implementing numbered head together, such as there was less time to finished all syntax of numbered head together, almost student wasn't know operating the multimeter and make the circuit.

CONCLUSION

Based on the research result, data analysis, and discussion so can be concluded that :

1. Student's cognitive in control class is enough category, while in experiment class is good category.
2. Student's affective in control class is bad category while in experiment class in medium category.
3. Student's psychomotoric in control class is bad category while in experiment class in medium category.
4. Based on result of t test, there was the difference of student's physics learning outcomes implementing by direct instruction and numbered head together.

SUGGESTION

Based on research result and discussion before, researcher give suggestions as follows :

1. Next Researcher should have good time management so, every phase of Numbered Heads Together done in efficient time and lesson close on time.
2. Next researcher must explaining the multimeter and how it used, so the experiment conduct in effective time.

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