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The Impact of Numbered Heads Together Model on the Learning Outcomes of Science Viewed from Students' Self Regulated Learning

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Abstract

This research aims to explain 1) the different impact among Numbered Heads Together (NHT) model and direct instruction on the science learning outcomes. 2) the different effect among the high, medium and low self regulated learning on the students' learning outcomes of science. 3) the interaction among the learning models and self regulated learning towards the students' learning outcomes of science. The type of research was quasi-experimental research with factorial design 2×3. Population of this research was all students of fifth grade elementary school. The hypothesis test used two-way analysis variant with unbalanced cells. Based on data analysis, Numbered Heads Together model with high self regulated learning was the most effective.

Keywords: *Learning models, learning outcomes, self regulated learning*

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Introduction

Science education is a genuinely interdisciplinary discipline. Clearly, science is a major reference discipline but there are competencies in various other disciplines which are also needed. Natural Science Learning deals with finding knowledge about nature systematically, so it is not merely a mastery of collection of knowledge of facts, concept, or principles only, but also it is itself a process of finding (Depdiknas, 2006: 161-162). Therefore, it is weird that a teacher only emphasizes on understanding natural science concepts without correlating it to technological elements, environment and society. Along with comprehension of better concept, learning outcomes can be expected to increase, as well.

Based on the results of PISA study, scientific literacy in Indonesia is still relatively low. The low learning outcomes and scientific literacy in Indonesia are due to several things for example learning activity focuses on the teacher (teacher centered), positive attitude of students in studying science is low, there are some unfavorable basic competencies related to the content, process, and context taken based on the respondents (students) response. (Widiyanti, 2015:20).

The observation result in the fifth grade of elementary schools in the Gemolong district, students learning outcomes in natural science learning are too low, one of the materials that has low scores is in the water cycle, it is caused the teacher just using direct learning model that the teacher becomes the center of learning (Sanjaya, 2011:177). Direct learning model is a teaching approach which is specially designed to support the student's learning process, which is related to declarative knowledge and a well-structured procedural knowledge with gradual, step-by-step patterns of activity (Trianto, 2011: 29). Direct learning can be in the form of lectures, and demonstrasi, training or practices.

Students often hear verbal information from the teacher, so the students are passive upon learning the natural science. One of some methods to apply the cooperative learning model, according to the result of Slavin's research in Rusman (2011:205-206) stated that cooperative learning can also increase learning outcomes, social interaction, tolerance, and appreciating other's opinion, as well. Whereas the cooperative learning that can applied is cooperative model of Numbered Heads Together (NHT).

Munawaroh (2015: 24) said it has been proven when the application of cooperative learning model of Numbered Heads Together (NHT) shows the participation and involvement of the student during the learning process takes place. Huda (2011:130) said that Numbered Heads Together a variant of group discussion which has the same implementation technique as a group discussion. Firstly the teacher asks the students to sit in groups. Each member is given number. When it is done, the teacher calls out a number to present the result of this discussion. The teacher doesn't tell the number that will present the next discussion result. So, it is done on and on until all numbers are called. This random call will ensure all the students' involvement in the discussion.

Another factor that influences the learning outcomes is self regulated learning. Self regulated learning is an active learning activity which is driven by intention or motives to acquire a competence in order to overcome a problem, and is developed by the acquired knowledge and competence (Mudjiman, 2009). Brookfield (2000:130-133) stated that self regulated learning is self awareness, which is generated by oneself, learning ability to reach goals.

The aim of this research is to improve the impact of implementing learning models by knowing 1) the different impact among Numbered Heads Together of model and direct learning on the science learning outcomes. 2) the different impact among the high, medium and low self regulated learning on the students' learning outcomes of science. 3) the interaction among the learning models and self regulated learning towards the students' learning outcomes of science.

Methods

This research was conducted in the 1st of academic year of 2015/ 2016 with fake experimental research. The research population is the 5th graders of State Elementary school throughout Gemolong District. The sampling schools for this research are 2 schools in Gemolong District. The data is obtained from the natural science test result which is analysed and used for hypothetic test of the research. Such a learning test consists of 40 points of try-out test 30 points were used. The try-out questionnaire consists of 40 point and 30 of them are used for the research.

There are two free variables, which are learning models and self regulated learning and one determining variable is students' learning outcomes. To collect the data the researcher use test and questionnaire method. The test method is used to collect data of the natural science learning outcomes.

Before class is treated, first it is necessary to hold a prerequisite test of students preliminary achievement with lilliefors test and homogenized test variant using the Barlett method. Furthermore, preliminary balanced test is conducted using one way analysis variant with different cell to know whether sampels on group of experiment one, group of experiment two and controlling group derives

from a balanced students preliminary learning outcomes. While the data analysis technique the learning achievement using two-way analysis variant with different cell and subsequent anava test using scheffe method (Budiyono, 2015:168-177).

Findings and Discussion

Balancing test is carried out to identifying the equity average of preliminary competence of natural science of students in experiment and controlling class. The result of this normality and homogenized test for the preliminary data of student's learning outcomes are obtained from samples that derive from normally-distributed population, and the same variant population. Therefore, the balance test is carried out to identify whether the population of the two learning models; Numbered Heads Together or direct learning have the same preliminary achievement in a balanced condition. Next, the hypothetical test uses two-way analysis variant with different cell. The summary of the two-way analysis variant with different cells is represented by Table 1.

Table 1. The Summary of Two-way Analysis Variant with Different Cell

| Source of Variant | SS | df | MS | F | Ft | Decision |
|-------------------|---------|----|---------|-------|------|----------------|
| Major Effect : | | | | | | |
| A (row) | 1930,49 | 2 | 1930,49 | 28,49 | 3 | Ho is rejected |
| B (column) | 951,04 | 2 | 475,52 | 7,02 | 3 | Ho is rejected |
| A B (interaction) | 275,04 | 4 | 137,52 | 2,03 | 2,37 | Ho is accepted |
| Error | 2981,53 | 44 | 67,76 | | | |
| Total | 6138,10 | 45 | - | | | |

Table 1 shows that H_{0A} is rejected, meaning that there are different impact on each category of the learning models towards the student's learning outcomes of science learning. Besides, H_{0B} is rejected, meaning that the impact of each category of self regulated learning is existing on the science learning outcomes. While H_{0AB} is not rejected (accepted) meaning that there is no interaction between the learning models and self regulated learning of the students. Then, the Test Result of the Two-way Analysis Variant should be found its marginal and cell average as found in Table 2.

Table 2. The Summary of the Average Point of Each Cell

| Groups of Treatment (Learning Models) | Self Regulated Learning | | | Marginal Average | Many Sample |
|--|-------------------------|---------------------|------------------|------------------|-------------|
| | High (b_1) | Medium (b_2) | Low (b_3) | | |
| NHT (a_1) | 87,63 | 75,00 | 69,57 | 77,40 | 25 |
| Direct (a_2) | 77,17 | 69,57 | 61,13 | 69,29 | 21 |
| Marginal Average | 157,13 | 145,63 | 134,57 | 72,10 | |

Table 2 the summary of the average point of each cell shows that the marginal average between lines in the treated classes with the NHT model is 77, 40 whereas the class treated with the *direct instruction* model is 69, 29. Based on the marginal average, it can be interpreted that students who were treated with NHT model resulted in better learning outcomes than students who were treated with *direct instruction* model. This is relevant to the results of a study conducted by Hidayat (2014) which states that the NHT model produces better learning outcomes than *direct instruction* model.

The results of data analysis above are possible because the NHT type cooperative model emphasizes to solving problems with all group members. All members have a responsibility to know the answer because no one knows who will be called by the teacher to present the answer. Based on the description, the numbering on the NHT type cooperative model will ensure the involvement of all students. This is supported by the NHT cooperative model, which in this study emphasizes interaction among students. Lie (2008:59) explains that cooperative learning model type *Numbered Heads Together* encourage students to improve their cooperation spirit. Students should work in groups and think together to solve problems with all group members. NHT is a variant of group discussion by calling one of the head numbers to express an opinion so that learners are more active.

This is different from *direct instruction* model that support the learning process related to declarative knowledge and procedural knowledge, taught with gradual activity pattern. This learning model is emphasized on lecture method and abstraction of a problem. The *direct instruction* model runs monotonically, does not allow students to discuss in heterogeneous groups, the more dominant the

teacher learning activities or learning goes in one direction. Such learning can make students bored and not active in the learning process.

The learning outcomes of Natural Sciences of the students besides influenced by the learning model is also influenced by the factors in the students' self regulated learning. Based on the results of Table 2 the summary of the average point of each cell above shows that the marginal mean between columns of low self regulated learning resulted in different learning outcomes. Students with high self regulated learning are 157, 13, students with medium self regulated learning are 145, 63 and students with low self regulated learning are 72, 10. The result of this analysis shows that students with high self regulated learning has better learning outcomes that those with medium and low self regulated learning. Those with medium self regulated learning have better learning outcomes that those with low self regulated learning. The results of this study are relevant to research conducted by Susilo (2013) stated that students' of self regulated learning category have better learning outcomes than those with low self regulated learning.

The result of the data analysis above is possible because high students' of self regulated learning are active, curious, and involved in their development of knowledge. They are energetic in accomplishing their tasks even for challenging ones, and are inclined to make the best efforts in performing them. Students who have medium self regulated learning, sometimes still need encouragement to be able to monitor, evaluate, and manage their own learning effectively. Students who have low self regulated learning are more passive in learning.

This is in line with the results of research conducted by Purwanto (2012) that the higher level of students' of self regulated learning then the student has a better learning outcomes. This is because students with high self regulated learning level more diligent and more active during the learning process takes place. Unlike students with medium self regulated learning, they are less able to monitor, evaluate, and manage their learning effectively in learning the subject matter, but they still have learning awareness. While students with low levels of self regulated learning tend to be passive because they lack awareness to learn well and difficult to be able to control and evaluate to follow the activities undertaken by his friend. So that students who have low self regulated learning cannot get maximum results.

Conclusion

Based on the research result and discussion, it can be concluded as follows: (1) There is a different impact between learning model of Numbered Heads Together and the direct learning. Learning model of Numbered Heads Together has better learning outcomes than direct learning. (2) There are differences impact among high, medium and low student's self regulated learning. Students with high self regulated learning have better learning outcomes that those with medium and low self regulated learning. Students with medium self regulated learning have performed better outcomes than those with low self regulated learning. (3) There is no interaction between the learning models and the self regulated learning.

Based on the data analysis, the cooperative learning model of Numbered Heads Together type with high self regulated learning is found the most effective. This research result can be used by teacher to increase the students' learning outcomes. The cooperative learning model of Numbered Heads Together can serve as an alternative to improve the teacher's performance upon the learning process. This can be used as one of the reference for other researchers to develop research with cooperative learning model of Numbered Heads Together for other material. This research result can be used as a study material to choose and prepare a learning model.

Other than that, the success of classroom learning is also influenced by internal factor of the students; one of them is the student's self regulated learning. With various category of self regulated learning and the research result of the learning model, the development of learning activities can be supported to accommodate the three categories of self regulated learning in the future. Thus, teachers should pay attention to the existence of self regulated learning owned by the students so that the learning can be attempted the steps that can accommodate a variety of student self regulated learning. All the students' of self regulated learning can be supported by a learning process which treats them equally so that their learning outcomes can be improved.

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