

Comparison of Number Head Together (NHT) Model and Discovery Learning Model Based Scientific Approach Towards VIII Grade Students' Learning Outcomes in Biology Cognitive Competence in SMP it Darul Hasan Padangsidimpuan

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Abstract — This study compared Number Head Together (NHT) and Discovery Learning models based scientific approach at the Darul Hasan Padangsidimpuan School of Integrated IT Middle School towards the learning outcomes of biology in grade VIII. This study used a quasi-experimental approach and the research design used was The Static Group Comparison Design. Sampling was done by purposive sampling technique, so that the selected class were class VIII-C (experimental group I) and class VIII-D (experimental group II). Instrument used was a written test in form of multiple choice tests, while data of students' cognitive competence were analysed using t-test.

Based on the final test results, it can be concluded that there are significant differences between Number Head Together (NHT) and Discovery Learning based scientific approach in students' cognitive competence. Students' cognitive competence using Number Head Together (NHT) model is higher than using Discovery Learning model.

Keywords — Number Head Together, Discovery Learning, Scientific.

I. INTRODUCTION

Education is a facility to make qualified human resources in physical, mental, and operational. One of important aspects in education is learning process. According to Ali (1983: 4), learning is the core of formal education process in school, in which there is an interaction between teacher, learning material and students. The interaction between these components involves some facilities, like methods, media and classroom so that comfortable situation for learning could be created and learning objectives could be reached.

In learning process, teacher should create a learning situation which enables students to perform potency they

have. It is in line with Trianto (2007: 1), who states that teacher should give more access to students to develop their potency independently through their own discovery using their own thinking process in order to make learning objectives can be achieved and students' learning outcome not low.

One factor which causes the lack of students' learning outcome is low quality of learning. Learning quality can be presented by the use of learning approach and model by teacher. One learning approach used in the 2013 Curriculum is scientific approach, which includes activities of observing, asking, collecting information, associating and

communicating (Permendikbud No 81a year 2013 about curriculum implementation). Besides that, another factor which affects students' learning outcome is the use of learning model. Recently, most of schools in Indonesia use classical learning model. The classical learning is done through teacher teaches same learning materials by same method and same assessment to all students and it is hope to produce the same result. Teacher's paradigm is still being kept and not changing to be students' paradigm.

Learning innovation in learning approach, strategy, method, technique, tactic and model is needed to realize interesting learning for students and to reach primary purpose of learning, which is to improve students' learning outcome. Cooperative learning model is not only good in helping students understand difficult concepts, but also in helping them develop their cooperative skill, have responsibility to other group members to reach group objectives, think critically, and develop their social attitudes (Slavin, 2006:262).

Since the implementation of the 2013 Curriculum, teacher should be able to combine classical learning model and scientific approach so that the old paradigm can change to be better. Besides that, teacher should also understand other learning models. The learning model is cooperative learning model of Numbered Heads Together (NHT) model and Discovery Learning model.

The Numbered Heads Together (NHT) model is a structured work system or learning in group. In it, there is a positive interdependence, individual responsibility, personal interaction, cooperative skill and group process in which students spend most of their times in classroom to cooperate in group of 4 to 5 students and accept rewards based on their group performance (Lie, 2007:18).

Discovery learning model is defined as a learning process which occurs when students are not presented to lesson in final form but they are expected to be able to organize it by themselves. This learning model emphasizes to make students able to discover information and understand learning concept independently based on ability they have but it still under guidance and control from teacher so that the learning process is correct.

Teacher in the school has ever tried to use cooperative learning model to improve students' interest in learning in form of Number Head Together (NHT) model. However, it does not use scientific approach so that students are difficult to understand important concepts in learning. As a result, students' biology learning outcome still low.

The author compares Number Head Together (NHT) model and Discovery Learning model because this learning model is some new learning model recommended by government to be compiled with scientific approach.

Based on the interview done to Natural Science teacher in SMP IT Darul Hasan Padangsidimpuan on 8 October 2018, it is revealed that Natural Science learning process is done by using lecturing method (teacher-centered) because learning media are not sufficient. As a result, students feel bored and unmotivated in following the lesson. In the 2013 Curriculum, learning process should be Student centered, but this school has just currently implemented the curriculum this year so that learning process which is appropriate with the curriculum is not done perfectly. Teacher has ever tried to use cooperative learning model to improve students' interest in learning by Number Head Together (NHT) model. However, it is not maximal because students are difficult to understand important concepts in learning so that learning process is back to teacher-centered model. Consequently, VIII grade students' Biology learning outcome in SMP IT Darul Hasan Padangsidimpuan is less than KKM score in the school, which are 78. The complete data are presented in Table 1 below.

Table 1. Average Score of VIII Grade Students' Natural Science Subject Test in SMP IT Darul Hasan Padangsidimpuan in Academic Year 2018/2019

Class	Total Students	Average Score
VIII-A	27	70.44
VIII-B	28	66.89
VIII-C	27	73.68
VIII-D	27	73.41
VIII-E	27	69.81
Average		70.75

Source: Natural Science Teacher in SMP IT Darul Hasan Padangsidimpuan

II. RESEARCH METHOD

Based on the problems and purpose of the research, it was a quasi-experimental research. The quasi experimental is a research method which is used to looking for an effect of a treatment to something in a controlled situation. This research was to analyze causal relationship by giving one or more experimental group a treatment and compare the result to one or more untreated control group (Setyosari, 2010: 156). This method is appropriate to be used because this

research was to know the comparison the effect of Number Head Together (NHT) model and Discovery Learning model based scientific approach towards students' learning outcome. Furthermore, this research used Static Group Comparison Design (Table 2).

Table 2. The Static Group Comparison Research Design

Class	Treatment	Post-test
Experimental I	X	T
Experimental II	Y	T

Description:

X = Learning using Number Head Together model

Y = Learning using Discovery Learning model

T = Post-test (Emzir, 2008: 97)

Sample of this research was students in class VIII-C and VIII-D SMP IT Darul Hasan in academic year 2018/2019. sample was taken by using purposive random sampling technique, through these following stages:

- Asking VIII grade students' Biology test score in SMP IT Darul Hasan Padangsidimpuan in academic year 2018/2019.
- Deciding two sample classes which have similar ability and the classes have equal test score. As a result, class VIII-C and class VIII-D were the samples of the research.
- Deciding experimental class I and experimental class II randomly through lottery. As a result, VIII-C was as experimental class I and VIII-D was as experimental class II.

Instrument used in the research was final test. Before using it as research instrument, it was done a pilot test to the final test questions. The pilot test was done to determine validity, reliability, item discrimination, and level of difficulty. Research data were analyzed by using 2-tailed T-test. Previously, it was done normality test and homogeneity test. Homogeneity test was done by using F-test. After that, hypothesis testing was done by using T-test, as proposed by Sudjana (1996: 239)^[12].

$$t = \frac{\bar{X}_1 - \bar{X}_2}{s \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

In which
$$S^2 = \frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}$$

III. FINDING AND DISCUSSION

A. Data Description

Data of students' cognitive competence were obtained from final test in form of multiple choice tests. The data are presented in Table 3 below.

Table 3. Students' Cognitive Competence in Sample Classes

Class	N	$\bar{X}$
Experimental I	27	86.51
Experimental II	27	85.48

From the Table 3 above, it is obvious that average score of students' cognitive competence in experimental class I is higher than in experimental class II.

B. Result of Data Analysis

Based on analysis requirement test, it was known that data are normally distributed and have homogeneous variance, which means it fulfills requirement of hypothesis testing. Therefore, T-test was used to test hypothesis for students' cognitive competence.

Result of students' cognitive competence normality test in sample classes can be seen in Table 4 below.

Table 4. Result of Cognitive Competence Normality Test

Class	N	α	S	L_{count}	L_{table}	Desc
Experimenta I I	27	0.05	8.23	0.0414	0.161	Normal
Experimenta I II	27	0.05	5.67	0.0256	0.161	Normal

Based on Table 4 above, it is obvious that data in these two classes have $L_{count} < L_{table}$, which mean that the data are normally distributed. Then, homogeneity test was also done to the data.

Result of homogeneity test in both sample classes can be seen in Table 5 below.

Table 5. Result of Cognitive Competence Homogeneity Test

Class	N	$\bar{X}$	S	S^2	F_{count}	F_{table}	Desc
Experimen	2	86.5	8.2	67.7	2.10	4.0	Homoge

tal I	7	1	3	3		2	neous
Experimen tal II	2 7	85.4 8	5.6 7	32.1 4			

From data in Table 5 above, it is obvious that both classes have $F_{\text{count}} < F_{\text{table}}$, which means that data have homogeneous variance.

Based on normality and homogeneity tests for the final test, it is known that data in both sample classes are normally distributed and have homogeneous variance. Therefore, T-test was used to do hypothesis testing. Result of hypothesis testing is presented in Table 6 below.

Table 6. Result of Cognitive Competence Hypothesis Testing

Class	t_{count}	t_{table}	Conclusion
Experimental I	0.53	0.173	Hypothesis is accepted
Experimental II			

From the calculation, it is known that value of $t_{\text{count}} = 0.53$ and value of $t_{\text{table}} = 0.173$ with $\alpha = 0.05$. Because of $-t_{1-1/2\alpha} < t < t_{1-1/2\alpha}$, hypothesis is accepted. So, it can be concluded that there is a significant different between students' cognitive competence in learning by using Number Head Together model and Discovery Learning model.

IV. DISCUSSION

Students' cognitive competence is observed based on Basic Competence 3.9, which is analyzing respiratory system in human being, understanding disorders in respiratory system, and efforts to keep respiratory system healthy. To know students' cognitive competence in both experimental classes, it can be seen from the result of test analysis. The given test was a written test, consists of 25 questions about respiratory system. From data analysis, it is revealed that average score of students' cognitive competence by using Number Head Together model is higher than by using Discovery Learning model.

Basically, learning process done in experimental class I has similar stages to learning process done in experimental class II, which is presenting general learning materials by teacher, learning in group and group appreciating. However, there is a different in implementing second stage (learning in group). In Number Head Together learning model, students who answer questions in worksheet are the ones who are

called their number. Meanwhile, in Number Head learning model, all students will help each other to answer questions given by teacher without grouping them based on their achievement.

In the Number Head Together model, students answer questions based on their number so that each students in group have to be able to understand all questions. It will make students more motivated to follow learning process because they want to give score for their group.

In addition, the Number Head Together model can improve students' individual responsibility to the group. It can be seen from their seriousness in answering questions in worksheet. While learning, they are motivated to answer and discuss all questions in worksheet. Everyone try to master learning material because they will express their ideas to their group members. In other words, they try to answer all questions because they have individual responsibility in completing worksheet.

In Discovery Learning model, students' cognitive competence also improves before treatment and after treatment. However, students' average cognitive competence in Number Head Together model is higher than students' average cognitive competence in discovery learning model.

Discovery learning model demands students to do observation before answering questions and connecting it to daily life.

The Number Head Together learning model is a type of cooperative learning which emphasizes on a special structure designed to influence students' interaction pattern and has purpose to improve academic accomplishment. This type is developed by Kagen in Ibrahim (2000: 28) by involving students in interpreting learning materials in one lesson and checking their comprehension towards the lesson.

From the explanation above, it is known that learning by using Number Head Together model is better than by using Discovery Learning model in improving students' cognitive competence. Therefore, it can be concluded that students' cognitive competence in learning using Number Head Together model and Discovery Learning model has a significant difference.

V. CONCLUSION AND SUGGESTIONS

Based on the finding of the research, it can be concluded that there is a significant difference between Number Head Together learning model and discovery learning model based scientific approach in students' cognitive competence. In this

research, Number Head Together model is better than discovery learning model.

In addition, there are some suggestions given regarding to this research. They are as follows.

1. Learning process by using Number Head Together model and discovery learning model needs a long time so that it is expected that teachers or other researchers who want to implement these two learning models can manage and use the time efficiently.
2. This research is still limited on respiratory system learning material. Therefore, it is expected that there is an advance research to other materials and different samples.
3. The research result is also able to be used as reference for other researches in order to be able to accomplish the weaknesses of this research to have more optimal result.

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