

Effect Of Discovery Learningmodel On VII Grade Students' Cognitive Competence In SMPN 1 Koto Salak, Dharmasraya Regency

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Abstract - The result of observation done in grade VII of SMPN 1 Koto salakshowed that students' cognitive domain competence was still low. One way to overcome the problem was by using discovery learning model in learning process. Purpose of the research was to know the effect of discovery learning model on students' cognitive competence. It was a quasi experimental research. The populasiof the research was students in VII grade of SMPN 1 Koto Salakregistered in even semester in academic year 2017/2018. Sample was taken by using purposive samplingtechnique. As a result, VII D was as experimental class and VII C was as control class. Instruments used were objective test andobservation sheets. Technique of data analysis used T-test.Based on the result of data analysis, it was known that students' cognitive domain competence using discovery learning model was better than students' cognitive domain competence using direct instruction model.

Keywords - *Effect; Discovery Learning; Learning Competence.*

I. INTRODUCTION

Education is gotten from learning process. Learning is a process of individual behavior exchange which is occurred because of interaction with environment. According to Slameto (2010), learning is a process of efforts done by an individual to get a new behavior exchange completely as an individual's experience competence in interacting with environment.

Nowadays, development of education is more focused on students-centered learning process, which means that students learn to develop their own knowledge. It is done to reach the purpose of education in 2013 curriculum. It is to enable students to have needed competences for real life.

One of the differences between School-Based Curriculum (KTSP) and 2013 Curriculum is in the 2013 Curriculum, learning process in every theme in Elementary School and all subjects in Junior / Senior High School and Vocational School is done by using scientific approach. It means standard process in learning consists of observing,

asking, experimenting, thinking, and communicating. Meanwhile, in School-Based Curriculum (KTSP), standard process in learning consists of exploration, elaboration and confirmation. There is a balance on competence aspect in 2013 curriculum between soft skills and hard skills, which includes affective, psychomotor, and cognitive aspects; while, in School-Based Curriculum (KTSP), it emphasizes more on cognitive aspect (Kurinasih, 2014).

Basically, Natural Science (IPA) subject is an integrated subject. It is first introduced in 2010, in which Natural Science subject is integration of Biology, Chemistry, and Physics (Tamassia and Frans, 2014). Beside that, Natural Science subject is a subject to find, describe, and explain natural events in life.

Biology, as one of Natural Science subject, is a subject uses science processes, which include skills of observing, asking questions, classifying and interpreting data, communicating the finding competence in writing or orally, exploring, and determining relevant information to test ideas

or solve daily problems in its learning process. The objective of Biology subject in content standard is to enable students to develop scientific attitudes, which are curiosity, honesty, open-mindedness, skepticism, and creativity, and cooperative with others. To reach the objective, learning process should develop critical thinking attitude because professional and qualified human resources will be created if they learn in depth and develop critical thinking. In fact, some people think that Biology is a memorizing subject and it is difficult to understand by students. This assumption is caused by Biology learning process in the school is still teacher-centered.

From the observation done on 24 October 2017 and interview with Natural Science (IPA) teacher of grade VII in SMPN 1 Koto Salak, it was known that the learning process still emphasized on cognitive aspect and material understanding. All this time, learning process still uses direct intruction, in which teacher conveys learning materials through lecturing and asks students to do exercises in worksheets (LKS). Consequently, students are less trained in developing thinking skill, solving the problems and applying the concepts which are learned in the school to the real world.

Through observation done, it is known that students' active role in learning process is still low. Only some students are active in asking or answering questions. Beside that, the questions and answers proposed by students are still in knowledge level.

Data of students' cognitive competence which was obtained from IPA teacher of SMPN1 Koto Salak also showed that students' learning competence is still below minimum criteria of mastery learning, which is 75. The average score of grade VII students in SMPN 1 Koto Salak can be seen in Table 1 below.

Table1. Percentage of Grade VII Students' Learning Competence Mastery in SMPN 1 Koto Salakin Academic Year 2017/2018

No	Class	N	Average Score
1	VIIA	22	63.64
2	VII B	22	67.91
3	VII C	22	70.23
4	VII D	22	70.45
5	VII E	22	65.18
6	VII F	22	64.05

Source: Natural Science Teacher in SMPN 1 Koto Salak

Factors that cause the low students learning competence are the choosing of learning model and inaccurate assessment. The low of students' comprehension about learning materials can be seen from the low of students' activities in asking questions. Every question given by teacher is only answered by a small number of students. Students used to do group discussion but it is only to discuss

questions in worksheets. The such learning process is not appropriate with the 2013 Curriculum.

Discovery learning model is a method to develop students' learning actively through doing observation by students themselves. Therefore, the discovery learning model is designed to discover new concepts and principles through their own mental process. The discovery learning model has similar principles with exploration and problem-solving (Martaida, 2017).

The previous research about effect of discovery learning model and worksheet (LKS) had been done by Eriza (2015) entitled "the effect of discovery learning model assisted LKS on grade VII students' learning competence in Biology subject in SMPN 6 Sungai Penuh". The result of Eriza's research showed that the use of discovery learning model gave positive effect on students. It could increase students' learning activities in the classroom.

Based on the explanation above, it is known that the causes of low competence of students' learning are students' perception about Biology and some weaknesses in implementing learning process, such as students are less active in learning process in the classroom and technique in conveying learning materials applied by teacher. Therefore, it is needed to do a research entitled "the effect of discovery learning model on grade VII students' cognitive competence of SMPN 1 Koto Salak Dharmasraya Regency".

II. REVIEW OF RELATED LITERATURES

A. Learning Model

According to Lufri (2005), learning model is a pattern or example of learning which have been designed by using other learning approaches or methods or strategies, and completed with some stages and learning aids.

In addition, Suprijono (2010) stated that learning model is the basic of competence learning practice of derivative educational psychology theories and learning theories which is designed based on analysis towards curriculum implementation and implication in operational level in the classroom.

B. Discovery Learning (DL) Model

Wilcox (2000) in Suprihatiningrum (2013) said that in discovery learning, students are encouraged to learn actively through their active involvement with concepts, principles, and teacher encourages students to have learning experiences and do experiments that make students discover principles by themselves.

According to Syah (2004 in Kemendikbud, 2014), there are some stages of applying discovery learning model in the classroom, as follows:

a) *Stimulation*

In this stage, students were faced on a problem related to learning materials. Teacher might start lesson by giving

questions or other learning activities that aim at problem-solving preparation. Function of stimulation is to provide learning interaction condition that can develop and help students to explore learning materials in depth.

b) Problem Statement

After doing stimulation, teacher gave opportunity for students to identify as many as problems which are relevant to learning materials. Then, they chose one problem and formulated it in form of hypothesis (temporary answer of problem statement) .

c) Data Collection

Teacher gave opportunity for students to collect as many as relevant information to prove whether the hypothesis was right or not. Data can be obtained from reading literatures, observing object, interviewing informants, doing experiments, etc.

d) Data Processing

Data processing is an activity to process data and information collected by students through interviews, observation, etc. Then, the data are interpreted.

e) Verification

In this stage, students investigate data accurately to prove whether the determined hypothesis is right or not. It is linked to alternative finding in data processing.

f) Generalization

Generalization stage is a process to draw a conclusion that can be a general principle and valid for all similar problems. Principles underlying generalization can be formulated based on verification competence.

C. Direct Instruction Learning Model

Direct Instruction is a learning model which is designed especially to support students' learning process related to information-transferred knowledge and well-procedural-and-structural knowledge, which is able to be taught by sequence activity pattern (Sukmana, 2015).

D. Students' Competence

Competence is an ability that students must have during and after learning process. The competence is a combination of cognitive, affective and psychomotor ability used to increase students' qualities in learning process. Sa'ud (2008) stated that competence can be in form of cognitive, skill and basic value reflected in thought and action habit.

So, it can be concluded that students' learning competence can be known after assessing learning process so that the learning competence can explain to what extend a students comprehend a learning material. The competence can be seen from three aspects, which are cognitive, affective, and psychomotor aspects.

III. RESEARCH METHOD

This research applied quasi experimental method. In the experimental class, it used Discovery Learningmodel; while, in control class, it used Direct Instruction model. The design of experimental research used for assessing cognitive competence was Post-test Only Control Design.

A. Technique of Data Analysis

1. Normality, Homogeneity and Hypothesis Testing

The normality test used in this research was Kolmogorov-Smirnov test. While, the variance homogeneity test was done by using Levene's test. Beside that, the hypothesis testing was also done to know whether there is an effect of using discovery learning model on students' cognitive competence or not.

2. Hypothesis Testing

Statistical test used for hypothesis was T-test because the data were distributed normally and had homogeneous variance. Its criteria was if $t_{count} \leq t_{table}$ so H_0 is accepted and H_1 is rejected. On the contrary, if $t_{count} > t_{table}$ so H_1 is accepted and H_0 is rejected with $dk = n_1 + n_2 - 2$.

IV. RESULTS AND DISCUSSION

A. Research Results

1. Data Description of Cognitive Domain Competence

In this research, data of cognitive domain competence was gotten through post-test in form of multiple-choice test which was given to students in both experimental and control classes. It was given at the end of the meeting of each basic competence. From the result of cognitive domain competence, it was known that the average of students' natural science learning competence in experimental class was 82.05, while in control class was 73.07. It means that the average of students' natural science learning competence in experimental class was higher than students' natural science learning competence in control class. Beside that, maximum and minimum scores of cognitive domain competence in experimental class were also higher than in control class.

2. Analysis Requirement Test

Analysis requirement testing was done before hypothesis testing. The first test done was normality test by using Kolmogorov-Smirnov test and variance homogeneity test by using Levene test by assistance of SPSS software. If data was distributed normally and homogenous, hypothesis testing was done by using T-test. Yet, if data was not distributed normally, variance homogeneity test was not done and hypothesis testing was done by using Mann Whitney U test.

a. Normality Test

Normality test was done to students' cognitive domain competence in experimental and control classes. In this

research, it is done to the students' average score of Basic Competence (KD) 1 and Basic Competence (KD) 2. The normality test was done by using *Klomogrov-Smirnov* test by assistance of SPSS software. Criteria of the test is H_0 is accepted if sig. value $>0,05$.

b. Hypothesis Testing

Hypothesis testing is used to know whether cognitive domain competence of students who learned by using discovery learning model is better than students who learned by using direct instruction model. T-test was used to test the hypothesis because data were normally distributed and had homogenous variance. The result of hypothesis testing can be seen in Table 2 below.

Table2. Result of Hypothesis Testing

Class	Sig	α	Conclusion
Experimental	0.002	0.05	H_1 is accepted
Control			H_0 is rejected

The result of calculation in Table 2 shows that students' cognitive domain competence has Sig. value < 0.05 , which means H_0 is rejected. It means that the score of students' cognitive domain competence in experimental class has significant difference from control class. Therefore, it can be concluded that students' cognitive competence in class treated by using discovery learning model is better than students' cognitive competence in class treated by using direct intruction model.

B. Discussion

1. Achievement of Cognitive Domain Competence

The result of the research shows that students' cognitive domain competence can increase by using discovery learning model. It can give effect on students' cognitive domain competence, in which average score of experimental class was 82.05 and control class was 73.07. It is obvious that the average score of both classes were different.

Learning process by using discovery learning assisted by LKPD as an autonomous exercise can be used to attract students' attention and to stimulate them in order to think critically in understanding the concepts. In experimental class, learning process was in form of group discussion and assisted by using LKPD which was suitable with discovery learning model. The provided LKPD contained questions related to the learning materials in order to facilitate students in group discussion and make them more active in learning process.

Learning of Natural Science in experimental class by using discovery learning model was started by grouping students into several groups. Students were divided into five groups, consisted of 4-5 students in each group. They were divided based on their abilities. Then, teacher gave exercise in form of LKPD and each group did it. Students in groups

were given chance to discuss and choose the best answer of every questions in LKPD.

Learning process in direct instruction model in control class was started with grouping students into some groups. Teachers divided teachers into five groups consist of 4-5 students in each group. Students were divided based on the order of seats. At the beginning of learning, teacher conveyed learning materials. Then, teacher gave opportunity for students to ask about learning materials which was not understood by them. Next, students were demanded to answer questions in worksheet (LKS).

Based on explanation of the data above, the result of hypothesis testing shows that average score of students' cognitive domain competence in the experimental class using discovery learning model was higher than control class using direct instruction model. The difference of average scores between experimental class and control class is caused by treatment given by teacher, in which teacher treated experimental class by using discovery learning model while control class by using direct instruction model. It is in line with Cohen (2008) who stated that discovery learning model can train students how to overcome problems, explore information, and implement it in learning activities.

In implementing learning process in experimental class, teacher prepared students to get learning materials, connect learning materials to their daily experiences or previous materials. It was done by noting stages in discovery learning nuanced science. First stage is **stimulation**. Teacher stimulated students in order to provide learning interaction condition that can develop and help students in exploration activities. For example, one of learning materials is interaction between organism and their environment. In this stage, teacher asked some question to students, such as "where do you live?, what are in your neighborhood?". Then, a student answered those questions by mentioning biotic components, like human, animals, and plants; and abiotic components, like soil, water, air, stones, etc. After that, teacher responded students' answer by "yes, your answer is right". Next, teacher asked students again by giving question like "what is relationship between human and air?". By giving such question, students' curiosity became greater. Therefore, it comes to next stage, which is problem statement.

Problem statement. After doing stimulation, teacher gave chance for students to identify as many as problems which are relevant to learning materials. Then, the problems were formulated in form of questions or hypothesis as temporary answers to the problem statements. Giving chance for students to identify and analyze problems they faced is a technique to develop their ability to find a problem. Various answers would arise from students about the problems discussed, such as relationship of air and organism is the air is used to take breath by organism because it has O_2 to help organism breath.

Data collection. While exploration was being done, teacher gave chance for students to collect as many as relevant information to prove whether the hypothesis is right or not. In this stage, students collected information by reading literatures or observing an object provided by teacher. For instance, in material of interaction between organism and their environment, teacher gave chance for students to observe biotic components and abiotic components around school. In other words, teacher asked students to mingle with nature.

Data processing. Next stage is every groups processed data and information from observation that had been done. By doing observation, students tended to remember longer because they experienced learning by themselves. It is in line with Muna, Sukisno, and Yulianto (in Widiadnyana, 2014) who stated that doing observation can improve learning outcomes. Strong interaction between students and objects in experiment activity can attract students' attention to understand the object more.

The collection data stage done by observation and experiment can train students to use scientific models to solve the problems so they will not easily believe to uncertainty things (Roestiyah, 2008). By observing, they can work together in groups and leave their selfishness aside.

Verification. In this stage, students were suggested to investigate accurately to prove whether the alternatively set hypothesis is right or not, related to data processing. Based on the result of data processing, the previously formulated hypothesis was rechecked whether it is proven or not so that students could answer the questions in LKPD. It is in line with In'am (2017), who stated that this activity is done by students after they finished doing problem-solving.

Verification means rechecking what have been done by using available theories. It is done by students through rereading and discussing the problem once more. It is also done before doing presentation in front of the class. Every groups should pay attention while other groups are presenting their discussion results.

The last stage is **generalization**. It is a process to draw conclusion of a problem. It can be a general principle and valid for all similar problems. It is done after all groups of students finish their presentation and note the verification results.

The stages of data collection, data processing, verification, and generalization in discovery learning which are implemented by observation or experiment can actively train students to find something related to problems they faced. Thus, accidentally, students relate problems with their background knowledge so that learning process become more meaningful.

Learning process in experimental class shows that students were active in learning activities because they were

given chance to think and use their ability to find final results. Beside that, students understood learning materials because they experience it by themselves. Furthermore, they could transfer their knowledge to various contexts of learning. Overall, learning through implementing discovery learning model can increase students' intellectual and critical-thinking abilities and train their skills to find and overcome problems.

In the control class, students learned by using direct instruction model. They were less active in learning. Beside that, they were less motivated, too. Most of them were not participate in group discussion. In doing worksheets (LKS), only 4-5 students from each group were active to do it, the others just waited for their peers. At the time of learning process, most of them did activities outside learning context. They talked to or disturbed other group members beside them.

It is proven when teacher asked a group to present their discussion results. There were some groups which did not want to do it because they had not finished doing it yet, so that teacher asked other groups. In presenting their discussion results, they tended to rely on their friend to present the answers, while others kept silent and sometimes disturbed their peers. In conclusion, in direct instruction, teacher explained materials in front of the class, while students only listened, took a note, and memorized learning materials given by teacher.

V. CONCLUSION

Based on research finding and data analysis result, it can be concluded that there is an effect of discovery learning model on students' cognitive domain competence.

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