

Effect of Discovery Learning Model Assisted by Scientific Approach Based Worksheet on XI Grade Students' Affective Competence in SMAN 2 Padang Panjang

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Abstract - Purpose of the research was to know effect of Discovery Learning model and scientific approach based worksheets on students' affective competences. It was a quasi experimental research. It used Posttest Only Control Design. Population was all XI grade MIPA students in SMAN 2 Padang Panjang in academic year 2018/2019. Finding of the research shows that students' affective competence has Sig. value < 0.05 , which means H_0 is rejected. It shows that students' affective competence score in experimental class has significant difference from control class. In conclusion, Discovery Learning model and scientific approach based worksheets have a significant effect on students' affective competence.

Keywords - Discovery Learning, Scientific Approach Based Worksheet, Affective Competence.

I. INTRODUCTION

Science learning in 21st century is not only focused to develop the science itself, but also to develop characters, positive attitudes, and skills needed in globalization era. Topics of Biology in grade XI SMA/MA discuss science used by students in daily life. Therefore, Biology learning should be designed interestingly in order to raise students' motivation and facilitate teacher to teach the materials. Beside learning materials, a Biology teacher should teach good attitudes to students for their future. Curiosity, cooperation (team work), self-confidence, discipline and tolerance are attitudes that can be taught by teacher in the classroom. According to Irawati (2015), learning which places cooperation and sharing information as primary strategy is considered more humane and appropriate to

apply in school. It will minimize negative competition and encourage students' motivation and self-confidence in learning.

Based on observation done in SMAN 2 Padang Panjang, it is found that Biology learning process is more emphasized only on improving students' cognitive competence. Teacher only focuses on assessing students' cognitive competence, while S/he only gives little attention on affective and psychomotor competences assessment. Beside that, from the interview with Biology teacher in the school, it is known that s/he has implemented some learning model in learning process, such as discussion. However, the implementation is not effective because not many students are active in the discussion. They do not have bravery to present the result of their discussion in front of the classroom. Another problem is

teacher is overwhelmed to subdue students because they do not accustom to work in team to solve problems in learning. Most of them are busy with themselves and do not do the exercise given by teacher. It forces teacher to used teacher-oriented learning process. Teacher explains the learning materials while students listen the explanation.

However, this learning model is not really effective to use. According to Silberman (2006), students can listen without thinking with speed of 400 to 500 words per minute. If they listen teacher's explanation in long time, they tend to be bored and lose their concentration. It is also supported by Wieman (2007), who asserts that by lecturing method in classroom, students are only able to remember 10% after 15 minutes of learning. It means that learning process needs to use lecturing method but it is not as long as learning process goes in the classroom.

Furthermore, other problem is learning materials used in the classroom. The materials cannot raise students' motivation in learning so they do not accustom to think and develop their creativity. Learning materials used by teacher in the classroom are textbooks from Ministry of Education and modules made by teacher based on students' needs.

To solve problems discussed above, it needs a learning model to enhance active and process oriented learning, supported learning materials, and give opportunity for students to construct their own knowledge. One of learning models suggested in the 2013 curriculum is discovery learning model. The implementation of this model should be supported by sufficient learning materials, such as scientific approach based student worksheet. Generally, if there is a certain approach based learning material, there is , indirectly, a combination with learning model used during learning process.

The use of scientific approach in learning process will be more optimal if it is inserted to a certain learning model which has systematical procedures (Susantini et al., 2016). Seen from its characteristics, discovery learning has similarity with scientific approach characteristics, in which students have to search information, analyze, and report it (Kasim et al., 2017). Beside that, Hosnan (2014) also suggests that to strengthen scientific approach, it needs to implement discovery learning model. It can be done by sombining it directly or through learning materials which are used. Implementation of various learning models in scientific approach is very useful for improving learning performance, such as for learning Natural Science (IPA) (Krisno et al., 2016).

Based on the problems explained above, it was done a research, entitled *"Effect of Discovery Learning Model Assisted by Scientific Approach Based Worksheet on XI Grade Students' Affective Competence in SMAN 2 Padang Panjang"*.

II. REVIEW OF RELATED LITERATURES

A. Discovery Learning

Discovery learning is a collection of activities in learning process which focuses on high level thinking process and analyzing to get appropriate solution of a problem in the learning process (Martaida et al., 2017). This learning model also makes students able to explore, find out, and discover by themselves so that they can be active in constructing, integrating, and concluding knowledge in learning process (Kluge, 2011).

Discovery learning is a learning process to facilitate students to construct their own knowledge (Holmes et al., 2000; Balim, 2009) and to discuss the knowledge with other people (Saab et al., 2005). In addition, discovery learning needs inductive process, which is information and knowledge resulted from experiment (Saab et al., 2005), in which students are allowed to discover new rules or ideas, not to memorize what is said by teacher (Hanafi, 2016; Rahman, 2017).

Implementation of discovery learning model is done in some steps. According to Syah (2004), generally, in implementing discovery learning model in classroom, steps or procedures done in learning process are stimulation, problem identification, data collection, data processing, verification, and drawing conclusion.

B. Scientific Approach Based Worksheet

Student worksheet (LKPD) is a facility to help and guide students in learning. According to Permendikbud (2013), the student worksheet is the sheets contain exercises which must be done by students, they usually in form of guidelines and steps in doing the exercises. It is in line with Septia (2015), who states that student worksheet is a printed learning material which contains materials, summaries and directions to do exercise which refer to achieved basic competence.

Learning using scientific approach is a learning process which is designed to make students active to construct concepts, principles and laws through observation steps (to identify or find problems), formulating problem, prposing problem, proposing or formulating hypothesis, collecting data by using various techniques, analyzing data, drawing

conclusion and communicating concepts, laws, or principles which are "found" (Hosnan, 2014; Krisno et al., 2016).

Scientific approach based worksheet means that the sheets contain scientific approach steps. Scientific approach based Learning process consists of five primary learning experiences, which are: observing, asking, collecting information/ experiment, associating/ processing information, and communicating (Permendikbud, 2013).

According to Anggi (2017), there are some strengths of scientific approach. They are: (1) learning process is student-centered so that it enables students to be active in learning (Wieman et al., 2015; Imam, 2016; Susantini et al., 2016); (2) Systematic learning stages, so that it facilitate teacher to manage learning process; (3) Giving chance for teacher to be more creative and invite students to be active with various learning sources; (4) Learning steps involves science process skill in constructing concepts, principles and laws; (5) Learning process involves potensial cognitive process in stimulating intellectual development, especially students' high level thinking skill (Yulianti, 2016); (6) It can also develop students' characters.

On the contrary, weakness of scientific approach is not all subjects or materials can implement this approach. Therefore, scientific approach is not always appropriate to implement in procedural. In certain subject or situation, this approach do not have to implement in procedural, but it can use only some steps of it (Anggi, 2017).

C. Affective Competence

According to Permendikbud (2014), assessment targets of affective competence are: (1) accepting values, readiness in accepting values and giving attention to the values; (2) responding values, readiness to respond values and feeling satisfied in talking about the values; (3) appreciating values, considering the values are good, loving the values, and committing on the values; (4) realizing values, posing the values as a part of their value systems; (5) practicing values, developing the values as their characteristics in thinking, talking, communicationg and character. In this research, the discussed affective competence is curiosity, cooperation (team work), discipline, and tolerance.

D. Hypothesis

Hypothesis of the research was discovery learning model assisted by scientific approach based worksheets has significant effect on XI grade MIPA students affective competence in SMAN 2 Padang panjang.

III. RESEACH METHOD

It was a quasi experimental research because not all variables can be controlled by researcher. In the research, students were divided into two groups, which were students in experimental class and students in control class. The experimental class was a class treated by discovery learning model assisted by scientific approach worksheets; while, the control class was a class treated by scientific approach only. So, the design used was Posttest Only Control Design.

Population of the research was 144 students in grade XI MIPA, which are grouped into four classes. So, they are 36 students in each class. Sample was taken by using random sampling technique by raffle using four rolls of paper written class names. The first taken class was XI MIPA 4 and considered as experimental class; while, the second taken class was XI MIPA 3 and considered as control class. Before taking sample, it was done testings of analysis requirement, such as normality test, homogeneity test, and average similarity test. From the tests, it was found that data of population has normal distribution, homogeneous variance, and similar average score.

In this research, there were two variables. They are two independent variables (discovery learning model and workheets) and one dependent variable (students' affective competence). Instrument used was affective observation sheet in order to assess students' affective competence during learning process. The observation sheet was done by observer by giving score in available coloums based on students' observation during learning process. Technique of data analysis used hypothesis testing by using *Mann Whitney U* test.

IV. FINDING AND DISCUSSION

A. Finding

Data in affective competence are obtained through observation done by observer by using students' affective competence observation sheet during learning process. Data of students' affective competence are presented in Table 1 below.

Table 1. Score of Students' Affective Competence

Classes	BC	N	$\overline{X}$	Category
Experimental	3.5	36	85,55	Very Good
	3.6		87,77	Very Good
	Average Score		86,66	Very Good
Control	3.5	36	75,55	Good

	3.6		76,89	Good
	Average Score		76,22	Good

Based on Table 1 above, it is known that average score of students' affective competence in experimental class is higher than that in control class, in which students in experimental class are in "very good" category and students in control class are in "good" category. It means that students' affective competence in experimental class which uses discovery learning model assisted by scientific approach based worksheets is better than students' affective competence in control class which uses scientific approach only.

Furthermore, based on Table 1 above, it is also known that students in experimental class have higher affective competence than those in control class for each Basic Competence (BC). Score of students' affective competence in both experimental and control classes improves from BC 1 TO BC 2. Experimental class improves 2.22; while, control class improves 1.34. It affects average score of students' affective competence, in which average score of affective competence in experimental class is higher than that in control class.

B. Discussion

Observation result on students' affective competence shows that students' affective competence in experimental class is better significantly than that in control class. In addition, overall, students' affective competence in experimental class is in "very good" category.

The provided problems at the beginning of learning process can stimulate students' curiosity. It is because learning process is started by providing interesting issues or problems around students. It is in line with In'am et al., (2017), who state that learning pattern which focuses on problems and exploring knowledge has positive effect on students' analysis skill and curiosity to give relevant solution to the provided problems. Beside that, it also trains students to have discipline because they should finish it on time. It is supported by Castronova (2002), who says that discovery learning demands students to construct their own knowledge by being involved in activities which need real solutions. It will train their discipline in team work to overcome the provided problems.

In learning process using discovery learning, students are divided into some groups to do some tasks given by teacher. It will train them to build good team work with

other group members so that the result is good and time is effective. It is in line with Lufri (2007), who proposes that students can achieve learning objectives by cooperating with other group members. Students in experimental class, which uses discovery learning model assisted by scientific approach based worksheets, are orderly, happy and enthusiastic in learning, such as in doing practice. It is supported by Mustika et al., (2018), who explain that material presentation assisted by learning material makes students enthusiastic and happy in learning.

Furthermore, students' self-confidence also increases. In problem-solving process, they are demanded to search as many as information through asking and sharing opinions to other group members. As a result, they have self-confidence in sharing opinions, answering questions and behaving correctly. During presentation, they are trained to be brave in expressing their ideas in discussion. It is supported by Rahman (2017), who asserts that discovery learning model demands students to solve authentic problems in order to make them able to increase their self-confidence.

The use of scientific approach in control class might still cause students less active in learning process. They might be lack of curiosity, discipline and self-confidence. Although they are given opportunity to ask questions or deliver opinions, most of them are not confident to do that. Teacher-centered learning process also makes students' curiosity does not develop well. They accustomed to listen teacher's explanation so that they become lazy to read other learning sources.

Beside that, students in control class are also less discipline than those in experimental class. Most of them are late to enter the classroom and to collect exercises given by teacher. It is caused by they are less trained to be discipline.

V. CONCLUSION

Based on the research finding and discussion above, it can be concluded that discovery learning model assisted by scientific approach based worksheets has significant effect on student's affective competence.

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