Improving Mathematic Students’ Learning Process and Achievement Through Discovery Learning Model at MAN 2 Model Pekanbaru

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Abstract: This classroom action research is aimed to improve teaching learning process and students’ achievement by applying Discovery Learning model. The subject of this research was the second semester mathematic students of tenth grade science class in MAN 2 Model Pekanbaru year 2016/2017 which consisted of 13 male students and 17 female students. There were two types of instruments used in this research namely observation sheets to record the teaching learning process and students’ achievement test to obtain students’ score achievement. From the observation sheets which were analyzed descriptively narratively and the second instrument which were analyzed descriptively statistically, it was found that there was a significant improvement in the teaching learning process and the number of students who reached the minimum passing grade increased before the treatment was carried out towards the Cycle I and Cycle II. In the regard of knowledge competence, there were only 11 students or 36.67% who reached the minimum passing grade before the treatment, became 15 students or 50% at the first cycle and 21 students or 70% at the second cycle. In the regard of skill competence, the number of students who reached minimum passing grade from the first cycle with a percentage of 23.33% was increased to 50% in the second cycle. According to the finding of this research, it can be concluded that the implementation of Discovery Learning (DL) model successfully improved the mathematic of second semester students of tenth grade science class in MAN 2 Model Pekanbaru year 2016/2017.

Key Words: Mathematics Learning Achievement, Discovery Learning model, Classroom Action Research

1. Introduction
Mathematics is a universal science that is useful for human life and underlies the development of modern technology, and has an important role in various scientific disciplines to advance the power of human thought. The purpose of learning mathematics is to train the ways of thinking in comprehending concepts,
using pattern as assumption and generalize it according to phenomenon, using reasoning in solving problems, developing the ability to communicate ideas, having the attitude of appreciation the usefulness of mathematic, having the attitude and behavior based on mathematical values, conducting the motoric activities, and developing the ability in performing teaching aids [1]. The achievements of aforementioned mathematic learning objectives can be identified through students’ learning achievements. Therefore, the successfulness of students in learning mathematic is inseparable from mathematic learning process at school. In the process of learning at school, improving learning outcomes is very necessary in order to obtain the mastery of learning outcomes. Consequently, teachers must be able to implement a learning model which attract students’ attention, create good classroom ambiences, train the students’ ways of thinking in comprehending mathematical concept and make the students actively involved in the teaching learning process.

In Permendikbud No. 22 year 2016, it is stated that the mastery of learning outcomes is a minimum level of attainment of attitudes, knowledge, and skills competencies which includes mastery of substance mastery and mastery learning in the context of the learning period [2]. Mastering the mastery of substance is the mastery learning of students for each of specified basic competency (KD). In Permendikbud No. 23 year 2016, it is stated that minimum passing grade (KKM) is the completeness criterion which determined by the education unit that refers to the basic competencies of graduates by considering the characteristics of students, the characteristics of subjects, and the condition of the education unit. Hence, all the students at any level of education must reach the determined minimum passing grade (KKM).

In fact, according to result of the interview that the researcher had done with the research subject’ mathematics teacher, it was revealed that there were many students who failed to reach the minimum passing grade. The minimum passing grade (KKM) that had been set by the school for mathematic subject was 78. From the result of the students regular examination, it was found that there were only 11 students who successfully reached the minimum passing grade with percentage 36.67% at the subject matter inversion and composition of functions.

According to the result of the observation of teaching learning process at the research subject class, it could be seen that there were some problems which always appeared during the teaching learning process. When the teacher asked question, only few students who responded due to the low of students activeness while the rest were waiting the others to respond the question. The students felt hesitate to do the given assignment because they did not understand how to do it. During the process of teaching learning, the students seemed to memorizing the formula or the step in solving the question that had been explained previously and did not participating at overcoming the concept of the given material.

To support the finding, beside conducting interview with the teacher and classroom observation, the researcher also interviewed some students in this class. From the result of the interview with some students, it was obtained sort of information as follows: it was difficult for the students to recall the previous material, therefore, the students did not attempt to redoing the previous material. When the chance to ask question was given, the students were afraid to ask the teacher about the material that they did not understand yet and tend to ask their friend which considered smarter. When the teacher gave chance to present the answer in the board, the representative student from each group where afraid to give wrong answer.

The aforementioned elaboration showed that the students were not interested to learn mathematic and the students were having difficulties in comprehending the material especially about the interrelationships between concepts in mathematics. The students were not conditioned to get the opportunity to find and develop their knowledge and moreover the students did not have a good ability in communicating which caused the students became passive.

To overcome these conditions, an attempt to improve the teaching learning process which involved the students to be more active, creative and students centered which able to find concepts needs to be taken.
One of the models which involved students' activeness in the process was Discovery Learning. As stated in Discovery Learning is a model which forced the teacher to be more active to create situations that forced the students to learn actively in finding concepts through a set of data or information which obtained through observation and experiment [3]. Discovery Learning is a way to convey ideas or ideas through discovery [4]. In this learning model the teacher does not provide formulas or material directly but students are required to organize their own knowledge with the help of stimuli given by the teacher [5]. According to Emily discovery learning is an active learning model where students actively participate in the learning process. In this learning model students are required to think, ask, hypothesize, and cooperate with their friends to develop self-confidence in answering problems using their own thoughts [6]. Akinbobola & Afolabi mentioned that the use of discovery approaches can involve students in problem solving activities, independent learning, critical thinking, and creative understanding and learning [7].

This research was conducted on Trigonometry subject matter which was studied in the second semester year 2016/2017. According to descriptions, therefore the researcher conducted a research by implementing the Discovery Learning model to improve the teaching learning process and the learning achievements at the basic competences 3.9 about sinus rules and the basic competences 4.9 which related to rules of sinus and cosinus.

2. Research Methodology

This research was conducted collaboratively with the mathematics teacher in the subject class which made this class as a collaborative action research. The implementation of this research follows the stages of CAR, the implementation of which consisted of two cycles, each cycle consisting of three meetings and one daily test. Suharsimi Arikunto (2012) argued that each cycle consists of four stages (planning, implementation, observation and reflection)[8].

The action taken in the learning process in the classroom in this study is the Application of the Discovery Learning Model (DL). The subject of this research T was the second semester mathematic students of tenth grade science class in MAN 2 Model Pekanbaru year 2016/2017 which consisted of 13 male students and 17 female students. There were two types of instruments used in this research namely observation sheets to record the teaching learning process and students’ achievement test to obtain students’ score achievement. The mathematics learning achievement test kit consists of blueprint and regular examination questions I and II. The mathematics learning achievement test was used to collect data about the mathematics learning outcomes of students after completing a basic competency with the Discovery Learning (DL) learning process.

Data collection techniques in this study were observation techniques and learning achievement test techniques. Data from observations were analyzed with descriptive narrative analysis techniques while the data obtained from students’ mathematics learning achievement tests were analyzed with descriptive statistical analysis techniques [9]. The data analysis in this study was a analysis of observation data, the process of analyzing data from observations of teacher and student activities begun by examining all available data from each meeting from the observation sheet of teacher and student activities, and observing the suitability of the actions with the steps in the Discovery Learning (DL) model, analysis of mathematics learning achievement data, data analysis of mathematics learning achievement of students was analyzed in quantitative descriptive statistics. Quantitative data analysis is performed by analyzing the achievements of the minimum passing grade. For analysis of minimum passing grade Achievement, data analysis on the achievement of minimum passing grade was done by comparing the percentage of the number of participants who reached minimum passing grade on the base score with the number of students who reached the minimum passing grade on the mathematics learning outcomes test after applying the Discovery Learning (DL) model. The percentage of students who reached the minimum passing grade was calculated by using the following formula.
Information:  
- \( P \): Percentage of students who have reached the KKM  
- \( K \): The number of students who reach KKM  
- \( S \): The number of students

And for analysis of minimum passing grade Achievement in Knowledge and Skill Competence, using data analysis on the achievement of minimum passing grade indicators of knowledge and skills is done by calculating the percentage of the number of students who reach minimum passing grade on each indicator. The minimum passing grade achievement for each indicator was calculated by using the following formula.

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P = \frac{K}{S} \times 100\%
\]

Information:  
- \( P \): Achievement Indicators  
- \( SP \): Scores obtained by students  
- \( SM \): Maximum score

3. Finding and Discussion
The implementation of Discovery Learning gave the students the opportunity to comprehend the given material, active in responding to the apperception given by the teacher, consistent in expressing opinions and active in responding to the presentation of the group discussions. Based on the steps of the activity at each meeting, there was an increase in students' attitudes towards a better direction during the learning process.

However, during the research there were several obstacles. These constraints were inseparable from the lack of researchers in the learning process, including in the first cycle the planned learning process has not yet been fully achieved. Students were not familiar with the steps of the discovery learning model. As a result, not all stages could be carried out as planned. The drawbacks that occurred could not be separated from the role of researchers as teachers. Researchers did not organized time well, so the planned time allocation for each stage did not go well. As a result, at the end of the meeting the researcher did not provide evaluation training and homework to students. However, drawbacks at the previous meeting were always sought to be fixed at the next meeting.

Analysis of student learning achievement data consisted of minimum passing grade analysis. The improvement of student learning achievement before and after the action can be seen in Table 1.

| Table 1. Percentage of Students’ Achievements |
|----------------------------------------------|
| The number of students who have reached the KKM | Base | Cycle I | Cycle I |
| 11 | 15 | 21 |
| Percentage (%) | 36.67% | 50% | 70% |

From Table 1, it can be seen that the percentage of the number of students reaching minimum passing grade on knowledge competency from a basic score of 36.67% increased to 50% in the first cycle and increased to 70% in the second cycle. In skills competence, the percentage of the number of students who reached the minimum passing grade during the action from the first cycle was 23.33% to 50% in the second cycle. Therefore, it can be seen that the conditions for the success of the action on knowledge and skill competencies had been fulfilled. There had been an improvement in the number of students who achieved minimum passing grade from the base score (before the implementation of DL) to the first regular examination score (Cycle I) as well as the improvement in learning achievement marked by the
increased the number of students who reached the minimum passing grade in the second regular examination (Cycle II).

Based on the analysis of research results, there was a qualitative data analysis in the form of improvement in teacher activity during the learning process and quantitative data in the form of process improvement and improvement in student mathematics learning outcomes. Based on the analysis of research results of teacher and student activity data during the learning process in class X MIA 5 MAN 2 Model Pekanbaru, it appears that students are increasingly active and more accustomed in the process of finding concepts from the material being studied using LKPD, so the need for guidance from researchers decreased. This is in line with Permendikbud No. 22 of 2016 which states that, in the learning process students must actively participate in finding concepts and centered on students to encourage enthusiasm for learning. Generally, mistakes made by students were that students lack understanding of the concept of sine and cosine rules and the concept of area of a triangle. Students were also less thorough in solving problems, and students also make mistakes in operating the root multiplication[10].

Based on the description of the analysis of teacher and student activities, as well as an analysis of student learning achievement improvement it can be said that there was an improvement in the learning process and the learning achievement of students.

4. Conclusion
Based on the results of research that has been done by researchers, it can be concluded that the discovery learning model was successfully improve the learning process and improve mathematics learning achievement of the second semester mathematic students of tenth grade science class in MAN 2 Model Pekanbaru year 2016/2017 at the basic competences 3.9 about sinus rules and the basic competences 4.9 which related to rules of sinus and cosine.

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