The application of cooperative learning model type problem base learning (PBL) to increase the learning activities of students of class XII MIA 3 in SMA Negeri 1 Padang

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Abstract. This study is a classroom action research which aims to apply the Problem Based Learning (PBL) model as an effort to improve the learning activities of class XII MIA 3 SMA Negeri 1 Padang students. This research is conducted in two cycles on genetic substance material. Each cycle consists of four stages, namely planning, implementing, observing, and reflecting. The instrument used in this study is the student’s observation sheet as a form of reflection in each cycle. Six aspects that observed were working on the student’s worksheets, working together/discussing in groups, observing presentation activities, giving responses/questions, paying attention to teacher explanations, answering questions or giving opinions. The results showed that the learning activities of students through the application of the PBL model were classified as good category. This category based on an increase of student’s activities from the first cycle with an average achievement score of 60% (good category) to cycle II with an average achievement score of 76% (very good category).

1. Introduction

Biology is one of the natural sciences materials in senior high school. Biology subjects are products of natural knowledge in the form of facts, theories, principles and laws from the scientific work process. Students often have difficulty in understanding biological material.

The difficulties that student face in learning biology materials caused by some reasons, especially by teacher learning method. Based on preliminary observations that have been made on Biology learning in class XII MIA 3 of SMA Negeri 1 Padang, the learning model used is the lecture and discussion method. Optimizing the learning process that involves the role of students is very lacking. The students were passive, lack attention to explanations and instruction of teachers in learning activities, talking to friends, do not feel comfortable sitting quietly in his chair, not carrying textbooks, not doing homework, even some playing cell phones secretly while learning, many were silent, many noted, no one asked the question that evidenced by the lack of students who raised their hands to ask questions and were less able to express their opinions.

Based on the results of interviews with teachers, even though the teacher has applied the discussion method, the students' activeness is still lacking. The cause of the students being less active in the discussion is that students think that this method is commonly found in class and no longer attracts their interest to actively participate in the learning process. Active students tend to dominate the discussion, so that sometimes it does not provide opportunities for other students to express their
opinions and also discuss the issues raised. But on the other hand there are also students who tend to wait for answers or the results of discussions from more intelligent and active students. The teacher stated the problems that have been raised greatly affect the learning outcomes of students. This condition cannot be allowed because it will adversely affect student achievement.

The success learning of students can be determined by the learning activities they have. In the learning process learning activities are said to be good if students are able to follow the learning well until it is finished, the ones shown bring the textbooks according to the subjects, then students do the homework given by the teacher, pay attention to the teacher's explanation, sit quietly in their respective chairs, and be active interact in learning. Nawawi et al. (2013: 26) revealed that the lack of active participation of students in each learning activity in understanding concepts of learning materials resulted in understanding the concept of material is still not optimal so that the learning outcomes achieved by students are still low. One of the causes of students' learning outcomes is low, namely the lack of precise learning model or it can be said that the subject matter is not in accordance with the learning model used.

To overcome the problems related to the lack of active students towards the discussion method, it can be done with the right discussion pattern so that it can attract the attention of students to stay focused on the material being discussed. The method that can be taken to restore the effectiveness of discussion in groups is to make the experience of students related to everyday life as a topic of discussion. The method that can be used for learning that involves students playing an active role is with problem based learning. The PBL model is a problem based learning model. Nurhadi (2004: 109) revealed that PBL emphasizes on students to find a problem then students are directed to use existing knowledge in order to solve problems then find new knowledge. To plan, provide alternative solutions, analyze and synthesize, present alternative solutions provided, and evaluate the process when new problems are encountered, students must be able to think more critically (Tosun, 2013). Trinanda et al (2018) found that PBL student worksheet effective to increase student learning outcomes. All of the reasons made the application of cooperative PBL to Increase Learning Activities of Class XII MIA SMA 1 Padang Students should be done.

2. Material and Methods

Subjects in this study were students of class XII MIA 3 of SMA Negeri 1 Padang in the academic year of 2017/2018 with 36 students consisting of 19 males and 17 female students. The procedures and steps in this class action research follow Lewin's model. This study took place in two cycles. The first cycle consists of two meetings (4 × 45 minutes) and the second cycle consists of two meetings (4 × 45 minutes). Cycle I and Cycle II were held in two meetings because it was adjusted to the implementation plan of learning and the complexity of the material.

The instrument used in this study is the observation sheet of learning activities. Observation guide lines are in the form of tables containing absentee numbers of students and aspects of learning activities that may be raised. During the observation process, observers only write numbers in the columns provided according to the grid.

Data collection techniques are carried out through observation using observation sheets that have been prepared. Observation sheets are used to obtain data about student activities during the learning process. In data retrieval, each observer can walk around to see activities in groups. Learning activities of these students include; work on student worksheets, work together / discuss in groups, observe presentation activities, provide responses / questions, pay attention to teacher explanations, answer questions or give opinions.

Analysis of students activities in groups are carried out with the following steps:
1) Provide criteria for scoring each descriptor in each aspect of the activity observed
2) Summing up scores for each aspect of the activity observed
3) Calculating the activity score in each aspect observed with the formula:
Total score on every aspect

Achievement = \frac{\text{Maximum score}}{\text{X 100%}}

4) After obtaining the percentage with the formula, then activities of students is classified into four categories of feasibility as shown in table 1.

| Percentage of achievement (%) | Value scale | Interpretation |
|-------------------------------|-------------|----------------|
| 76 – 100                      | 4           | Very good      |
| 56 – 75                       | 3           | Good           |
| 40 – 55                       | 2           | Adequate       |
| 0 – 39                        | 1           | Not good       |

Students achievement are said to be successful if the activities of students are at least in the good category (\geq 56\%). If the action has not been successful then it is planned for the next cycle with improvements according to the results of reflection in cycles I and II.

Indicators of success of student learning activities in the first cycle of each item if they reach as follows: (1) Working on student worksheets 60\%, (2) Working together/discussing in groups 50\%, (3) Observing presentation activities reaches 55 \%, (4) Giving responses/questions 40\%, (5) Paying attention to the teacher's explanation 55\%, (6) Answering questions or giving opinions reaching 40\%.

The overall total success indicator (in the initial cycle and the final cycle of the study) is if five of the six items have reached the indicator of success, as a result of using the learning model with good efforts.

3. Results

3.1. Description of cycle I

3.1.1. Planning phase. At this stage the researcher prepares learning tools which consist of learning implementation plans, teaching materials, (LKPD), assessment instruments (which consist of assessment of spiritual attitudes, social attitudes, evaluation of learning outcomes and skills) and learning media. Coordinate with two teachers (observers) on behalf of Nofia Lola Putri, S.Pd. and Dian Fitriyanti, S.Pd. regarding the implementation of observation principles on September 27, 2017 before the teaching and learning process begins.

3.1.2. Implementation phase. The first meeting was held on September 7, 2017 and the second meeting on September 11, 2017, carried out the activities of the teaching and learning process that refers to the planning of PBL learning programs that have been prepared by teacher.

3.1.3. Observation phase. At this stage observations are made about the learning activities of students in the learning process by using problem based learning models. To get more valid data, the observations were made by the teachers' teachers as observers by referring to performance indicator benchmarks in order to equalize observers so that they would not be much affected by subjective factors, maintain the stability of data collected, and facilitate researchers in processing data. Before finalizing the column to be coded, the two negotiate first to establish an agreement. If there is still a difference, the two observer together recall the events related to the indicator items observed and re-display the learning while discussing to further strengthen the observations model, these steps were finally able to equalize the perceptions and the results of the two observers' observations.
| No | Student Activities                  | Percentage (%) | Average (%) |
|----|------------------------------------|---------------|-------------|
|    |                                    | Meeting I     | Meeting II  |
| 1  | Wok on student worksheet           | 60            | 65          | 63          |
| 2  | Collaborate/discuss in group       | 60            | 64          | 62          |
| 3  | Observe presentation activities    | 58            | 61          | 60          |
| 4  | Provide responses/questions        | 45            | 51          | 48          |
| 5  | Pay attention to teacher's explanation | 53      | 61          | 57          |
| 6  | Answer question/give opinions      | 54            | 57          | 56          |

Table 2 showed that all of students activities in first cycle increase in second meeting of 36 students who attended the two meetings whose details of the changes can be explained as follows: (1) working on 60% of students' worksheets at meeting I, and continuing to increase to 65% at meeting II, (2) cooperating / discussing in groups of 60% at meeting I, and increasing to 64% at meeting II, (3) observing presentation activities at 58% at meeting I, increasing to 61% at meeting II, (4) responding / question 45% at the first meeting, increased to 51% at the second meeting, (5) paying attention to the teacher's explanation of 53% at the first meeting, increasing to 61% at the second meeting, (6) answering questions or giving 54% opinion on meeting I, increased to 57% at meeting II.

3.1.4. Reflection stage. This stage is carried out by analyzing, synthesizing and evaluating thoroughly the actions that have been taken. The results of observations about the learning activities of students in the first cycle (listed in Table 3) have shown an increase compared to the activities of students before the use of the learning model. The percentage results obtained showed that the learning activities of students have met the total success indicators, because they have achieved six aspects of indicators of success of the learning activities of students who have been determined.

The aspects that need to be optimized include:

1) Planning
   a) The emphasis on the learning model steps is still lacking.
   b) The provision of inadequate volume and sound pressure for all 36 students because there are still many participants who are noisy in the teaching and learning process.

2) Implementation
   a) Providing stimulus to students regarding daily events but not all students understand the problems they have gained, so that 40% of students still express their thoughts are not directed, but 60% of students have been able to interpret the explanation.
   b) Most of the students have been active in learning, but still lacking enthusiasm even though many have solved the problems with LKPD even though some see their friends 'work, they still don't pay attention to their friends' presentations, few give responses/questions or just accept the
opinion of the speaker, some have paid attention to the teacher's explanation, few have answered questions or given opinions.

3.2. Cycle II description

The second cycle is carried out in four stages according to the procedure for implementing class actions, namely:

3.2.1. Planning phase. At this stage the researcher prepares learning tools which consist of learning implementation plans, teaching materials, LKPD (Student Activity Sheet), assessment instruments (which consist of assessment of spiritual attitudes, social attitudes, evaluation of learning outcomes and skills) and learning media. Coordinate with two teachers (observers) on behalf of Nofia Lola Putri, S.Pd, and Dian Fitriyanti, S.Pd about the implementation of observation principles on September 13, 2017 before the teaching and learning process begins.

3.2.2. Implementation phase. The research implementation in the second cycle consisted of two meetings (the first meeting was held on September 14, 2017, and the second meeting was on September 18, 2017). Activities carried out at the implementation stage include the use of problem based learning models accompanied by interlude adequate explanations.

3.2.3. Observation stage. At this stage observations are made about the learning participation of students in the learning process related to the use of problem based learning models. To obtain valid data, the two observers repeated the same observation steps in cycle I.

| Table 3. Recapitulation student activities in first cycle |
|----------------------------------------------------------|
| No | Student Activities | Percentage (%) | Average (%) |
|----|---------------------|----------------|-------------|
| 1  | Wok on student worksheet | 74 | 81 | 77 |
| 2  | Collaborate/discuss in group | 69 | 74 | 72 |
| 3  | Observe presentation activities | 76 | 78 | 77 |
| 4  | Provide responses/questions | 61 | 74 | 67 |
| 5  | Pay attention to teacher's explanation | 76 | 78 | 77 |
| 6  | Answer question/give opinions | 59 | 72 | 65 |

The results of the percentage of students’ learning activities indicate that the learning activities of students have met the indicators of total success, because they have reached six aspects of the predetermined learning activity indicators. The achievement of learning activities above as the impact of improving aspects that have not been optimal and strengthening / repetition of aspects that have been optimal in cycle I. Students have felt the positive impact of management activities of these
activities, as evidenced by the percentage of students who expressed a positive response to the use of problem based learning models learning from all instrument items, the study was stopped in cycle II.

4. Discussion
The results of this research data are learning activities of students on the material of genetic substance with PBL is a learning model that trains students to find their own concepts based on real problems of life with inquiry skills so that the model is the highest level model. The syntax of the problem based learning model which consists of five aspects, namely the presentation of problems, organizing students to research, assisting students in investigating, exhibiting work and evaluating problem solving. This syntax makes the teacher play a role in guiding students to conduct investigations, not giving concepts to students (Arends, 2007).

This result is in accordance with the opinion of Sudjana (1996: 93) which states the advantages of PBL learning models, namely students get practical experience, learning activities are more attractive so that teaching materials are not boring and are understood and understood by students, students can learn from various sources, social interaction between participants is more developed, students learn to do analysis and synthesis simultaneously and familiarize students to think logically and systematically in problem solving

The first syntax of the teacher provides stimulus to students about everyday events. In this case educators deliver students into learning activities through everyday experience. Teacher raised the issue of the problem of the case of a mother who lost her baby. Local residents found a baby who was later suspected of being a baby from the mother. However, after DNA testing, it was proven that the baby found was not the baby's mother. The problems experienced by the mother deliberately design by teacher for how to direct students to be able to solve a problem related to the model provided and the material to be taught. From this problem the teacher then draws the students' minds to do questions related to the problems given. Students are quite responsive in responding to problems given by teacher. This condition is strengthened by questions that can be considered quite weighty. For example, students ask how DNA tests can prove the baby is not the mother's baby and how to do the DNA test. The educator then keeps the students' questions and tries so that the students will answer the questions themselves after giving the material.

The second syntax is the organization of students to discuss. This syntax of teachers divides learners in several groups. Each group has members with various questions then the teacher directs the students to discuss what problems are selected in the group, determine the title and ready to be investigated.

The third syntax is to help students in discussions. Once ready with the group and the problem, the teacher helps students to carry out an investigation. This syntax of students is given a worksheet that is useful for directing students to find the concept. The worksheet contains sequential questions from problem questions, hypotheses, data information and conclusions. In this syntax the skill of discussion activity is measured.

The fourth syntax is displaying the work. In this syntax, students exhibit by presenting in front of the class, the activities measured are communicating, the activity of paying attention to the presentation friends gives responses and question about the presentation material. The results of the investigation work are works that will be exhibited to others because they are new knowledge created by the students themselves by means of investigation.

The fifth syntax is problem solving evaluation. This syntax of the teacher evaluating the problem solving process of students relates to things that are not right so that students do not have differences in understanding of concepts and the teacher also clarifies whether what is obtained by students is as expected in the indicator. This syntax measured the activity of students paying attention to the teacher's explanation and answering the questions given.
The assessment carried out to measure the learning activities of students is when learning takes place using an observation sheet.

4.1. Cycle I
The percentage of learning activities of students in cycle I is 60% with good categories. The value obtained was observed by observers from various aspects. Aspects that are seen are aspects of working on student worksheets, working together/discussing in groups, observing presentation activities, giving responses/questions, paying attention to teacher explanations, answering questions or giving opinions. These aspects are indicators of participation in learning.

The first aspect is the aspect of working on students' worksheets. This aspect is related to the activities of students in the timeliness of participants not collecting LKPD assignments, writing their own answers or seeing the work of their friends. The activities shown by students in this cycle are good with a score of 63%. The value of this aspect is quite good because students of class XII MIA 3 are able to work on the questions on LKPD even though there are still some who see the answers of their friends or do not even do the work.

The next aspect is the aspect of student interaction with other students. The activities observed for this aspect were discussing with group friends. Because the model used is cooperative learning, of course students are required to work together with a group of friends to solve problems in LKPD while the results of the writing are written on newsprint. Students present the results of their group work. The aspect measured here is the activity of students paying attention to their friend presentation and giving responses and questions about the material presented. For researchers, discussing and asking a lot of questions is one of the important activities that must arise from students to live an active learning atmosphere. After observing, observers, the learning activities of students for the interaction aspects of students and other students fall into good criteria, which is 62%. While the percentage looks at the friend's presentation in good category, that is 60% and gives a response or question in the sufficient category, 48%. This is because some students are still hesitant in asking questions or are afraid to ask questions.

The aspect of teacher interaction with students that is paying attention to the teacher's explanation and answering questions or giving opinions is the next aspect that is considered as an indicator of students' activeness in learning. The activity that is seen is the willingness of students to conclude learning material based on learning objectives. Hope that researchers want is that students compete to raise their hands to conclude learning material. It turned out that it was not in accordance with the researcher expectation, students did not have high confidence in this aspect. Aspects pay attention to the teacher's explanation with students in the good category but the percentage is 57% and answering or giving opinions is in good category but the percentage is only 56%.

After conducting the research two meetings, the researchers reflected. Reflection is an analysis and analysis of the interpretation of the data obtained. Fixing the deficiencies found during the research to improve the next cycle II.

4.2. Cycle II
The percentage of students in cycle II was 76% with very good criteria, it was seen that the learning activities of students had increased compared to cycle I. This second cycle was a continuation of cycle I. The difference was that this cycle was carried out based on the results of the reflection of cycle I. The point is that the deficiencies that are still found in cycle I are corrected in the second cycle. The aspect of activity observed is still the same as the aspect in cycle I.

The first aspect observed was the aspect of working on the students' worksheets. This aspect in the second cycle has increased by 72%. The criteria obtained in this aspect are high. Students have begun to be able to do their own work even though there are still those who see their friends' work.

The next aspect is the aspect of student interaction with other students. The activities observed for this aspect were discussing with a group friend, 72% with good criteria. Compared to cycle I, this aspect also increase, while the percentage of paying attention to a friend's presentation is in a good
category, which is 77% and giving a good response or question in the category of 67%. Students begin to dare to give responses or questions to their friends who are preset.

The aspect of teacher interaction with students is paying attention to the teacher's explanation and answering questions or giving opinions such as concluding the learning material there has been an increase observed compared to the first cycle, namely the aspect of paying attention to the teacher's explanation that is 77% with very good category and answering and giving opinions that is 65% with good category. This is because students start competing to raise their hands to conclude the learning that has been done.

This is in accordance with the opinion of Sudjana (1996: 93) explaining that the problem-based learning model will increase learning activities both individually and in groups. Almost every step guides the learning activity of students, while the role of the teacher is more over as a stimulator, guide the activities of students and determine what direction students do. The success of this learning model relies heavily on learning resources for students, requires sufficient time, and the ability of the teacher to raise and formulate problems. Therefore, before this model is used must be prepared carefully by the teacher, both preparations of problems, learning resources for students, time needed, and grouping of students. Broadly speaking, problem-based learning can foster activeness and independence of students in the learning process, especially in solving a problem related to ongoing learning activities. This condition cause in PBL models, students are faced with real-world problems and are required to be able to find solutions to the problems faced. This will lead to a sense of curiosity of students towards the problems being faced so that the activeness of students appears to try to find solutions.

Learning using the Problem Based Learning model is proven to create diverse learning activities as stated by Paul B. Diedrich in Sardiman (1986: 101), that the learning activities of students in schools should include all activities such as visual activities (visual activities), writing activities (writing activities), oral activities (oral activities), drawing activities (drawing activities), motor activities (motoric activities) mental activities (mental activities) emotional activities (emotional activities). According to Sardiman (2010: 101), "the application of complex and varied learning activities in schools will create dynamic and non-boring schools so that schools become a maximum learning center". Based on the results of the study and a description of the discussion above, it can be seen that the application of PBL models can improve the learning activities of students in class XII MIA 3 of SMA Negeri 1 Padang.

5. Conclusion

Based on Classroom Action Research (CAR) conducted in class XII MIA 3 Padang 1 State High School Padang City Academic Year 2017/2018 on the odd semester it can be concluded that the use of problem based learning model in the subject matter of genetic material in class XII MIA 3 SMA Negeri 1 Padang can increase student learning activities. Students as a whole get an acquisition score of 518 with a percentage based on 60% category with good categories. Whereas, in the second cycle students as a whole experienced an increase with the acquisition score of 654 with a percentage based on 76% category with a very good success category which means that there was an increase in student activity from cycle I to cycle II by 16%.

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