APPLICATION MODEL BASED LEARNING PROBLEM ON THE CONCEPT OF FUNGI IN IMPROVING STUDENT LEARNING OUTCOMES

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ABSTRACT

This study aims to describe the quality of students' skills in problem solving, improve the quality of the learning process, and improving student learning outcomes in subjects fungal biology concepts through problem-based learning strategies with the cooperative approach aided module. The subjects were high school students in Banda Aceh in the academic year 2016/2017, in amount of 30 students. This research was conducted in two cycles, each cycle consisting of planning, implementation, evaluation, action and reflection. The results showed that the application of problem-based learning strategies can improve the ability of students in problem solving, improving the quality of the learning process in terms of student activities, and improve student results. Student learning outcomes in cycle I and II respectively 66.74 and 71.41. Most of the students gave a positive response and hope that the problem-based learning strategies based modules can be continued and developed in the subjects of biology concepts mushrooms.

Keywords: Model Problem Based Learning, Concept Of Fungi and Learning Outcomes

I. INTRODUCTION

Biology subjects of fungus concepts, is one of the subjects which have problems that both the lectures and the quality of student learning outcomes. Base on interviews researchers through clinical approach to some of the students who take biology subjects revealed fungal biology concept is one of the subjects is difficult. In addition, there are complaints from the students will be the lack of books or teaching materials that can handle biological difficulty in using scientific language. According to students, there are foreign books that available in libarary, however, there are two difficulties in studying the biology that it is how to understand the concepts as well as language of the book.

In biology, it was found that the lack of readiness of students to follow the lessons of biology, learning management with information and discussion methods generally still tend to lead to the provision of information, so that learning is still dominated by the teacher. Teacher posed the question can be answered by the students rarely or only answered by a particular student. Most of the teachers answered questions that posed by them. On this learning, the idea of beginning students is relatively less explored and considered in learning, students tend to be passive, self-motivated students to learn less, and the sharing of knowledge among students less facilitated.

Biology subjects that performed at this moment, tends to only pay attention to the number of subjects and the allocation of available time, by pursuing the achievement of the curriculum without considering some important things that have been outlined by the curriculum. In the subjects of biology, students are expected to understand the concepts of the fungus and its applications. In addition, students are expected to develop the power of thought to solve the problems encountered.

Troubleshooting procedures that perform by students, tend to be unstructured, students perform troubleshooting directly at the level of fungi alone. teacher as a teacher not only instill a concept that should be studied, but also gives insight to the students to do the ways of solving problems in accordance with the scientific role of science itself, so that a pattern embedded in problem solving. One way of resolving problems raised by Heller (1992) includes several stages, namely (1) visualization of the problem, (2) a description of the necessary concepts, (3) completion of the plan, (4) implement the settlement plan, and (5) researching and reevaluate.

In learning based on problem, learning is designed in the form of learning that begins with the structure of the real problems related to the concepts of mushrooms to be covered. Lessons started after the student was confronted with a real problem structure. In this way, the students know why they are learning. All the information they collect through review of teaching materials, laboratory practical work or through discussions with their peers, to be able to solve his problems.

Learning based on problem, intended to improve learning outcomes and student motivation because through learning based on problem, students learn how to use an interative process to assess whether they know, identify what they want to know, to collect information and in collaboration evaluate the hypothesis based on the data they have collected. Therefore, it is unfortunate that this adult subjects biology is still dominated by the teacher.

Learning approach offered combines problem-solving strategies with supporting environment to help students implement the strategy. Learning based on problem, can be implemented through a problem-solving exercise in cooperative groups.

The implementation of a cooperative approach to learning has shown effective results in helping students perform complex skills (Heller, 1992), in the functioning of a good group of students divide knowledge of concepts and procedures when they solve problems together, as long as the interaction of group members can ask for an explanation and justification to others. Good criticism will clarify all group members thinking about concepts that are used and how the concept is applied to practical problems encountered.

On the other hand, Lazarowitz (in Dorothy, 1994) indicate that learning through cooperative approaches can improve academic objective, inquairy skills, self-esteem of students, student behavioral tasks, and academic atmosphere. Tobin (1990), showed that cooperative learning can improve academic objective, self esteem, students can also increase the motivation to learn and tasks, improving students' attitudes in a positive direction towards teaching materials, and encourage students to learn more and help one to another.

Based on the above reasoning, thus follow by conducted research on implementation strategies with a learning based on problem approach to support environmental groups as a

cooperative. The issue to be answered in this study were (1) to what extent the students skills in problem solving that can be enhanced through learning based on problem strategies with assisted module cooperative approach?, (2) to what extent the implementation of learning strategies can improve the quality of the learning process?, (3) to what extent the students learning outcomes that can be improved through this learning strategies?, and (4) How students respond to this model?

II. RESEARCH METHODS

3.1. Research Subject and Object

The research subjects were X grade class students that follows the biology subject, totaling 30 people. The object of this study is problem solving ability of students, the quality of the learning process, student learning outcomes, and the students response to applied learning strategies.

3.2. Research Design

This research is a class action that consisting of two main cycles. Each cycle consists of four stages, namely the action planning stage, the stage of implementation of the action, the stage of observation and evaluation of the actions, and the act reflection stage.

3.3. Planning Stage

Activities that carried out at the planning stage are as the following. (a) Develop module that given to students at the beginning of learning which contains the basic competencies, indicators of learning outcomes, key concepts that must be mastered by students, the questions structured and guided. (b) Setting up a research instrument in the form of the initial test (pre-test), the test results of learning (formative test), observation sheet group learning activities, student perception questionnaires. (c) Prepare a plan of learning.

3.4. Implementation Action Stage

Activities or actions undertaken are as the following.

(a) Divide the class into small groups (3-4 people).
(b) Providing pre-test to determine students' prior knowledge.
(c) Distribute to students the teaching materials in the form of a module package.
(d) Disseminating the contents of the module and how to use it.
(e) Implement learning program with group discussion method with a cooperative approach.
(f) Provide a conclusion or summary of the concepts that have been discussed and provide stabilization task concepts and tasks related to the next meeting,
(g) Implement formative test (achievement test) at the end of each cycle.

(h) Restoring the work / assignments and student test results a week after the assignment or test performed.

3.5. Observation and Evaluation Action Stage

Activities carried out at the stage of observation is as the following.
(a) evaluate the development of problem solving in which students through inspection tasks, the initial test, and the test results of learning. (b) Observing the learning process using observation sheet. (c) evaluating student learning outcomes at the end of each cycle, the form of the test result of learning (formative test). (d) Evaluate the students response to applied learning models, conducted by circulating a questionnaire to students.

3.6. Reflection Actions Stage

Based on the observation of the action at the end of each lesson and end of the cycle, researchers with the teaching team hold a reflection to determine the advantages and disadvantages of the measures that have been implemented. Results of this reflection is used to enhance the implementation of measures in the next cycle. In addition, the reflection is done on the last cycle is used as an ingredient to make a recommendation of this study.

3.7. Data Collection Technique

The data that students perform problem solving ability gathered through inspection tasks, the pre test, and formative tests. Data quality learning process in the form of student activity in the classroom was collected by observation method using observation sheet. Data were collected through student learning outcomes achievement test (formative tests) at each end of the learning cycle. Students' response to the data collected by questionnaire learning strategies.

3.8. Data Analysis Techniques

The data regard to the quality of students skills in problem solving were analyzed descriptively by using the troubleshooting steps designed by Heller (1992), with an average success criteria for the quality of students' skills in problem solving in both categories.

Data quality learning process observed through observation of students in the learning activity were analyzed descriptively. Data student activities include (1) the task, (2) cooperation within the group, (3) the interaction between groups of students, (4) the interaction of students and teachers, (5) requested the question, and (6) to answer questions. Criteria for success is an increase in activity.

Student learning outcome data were analyzed descriptively using the average score (scale of 100) and the percentage of students who received a passing grade. The succed criterion is the average score of graduation ≥ 70 and the percentage of students who received a passing grade B and A greater than 70%.

The data of student response against the learning strategies were analyzed by comparing the number of scale 4 and 5 to the amount of scale 1 and 2. Student responses are positive when the number of scale 4 and 5 is greater than the scale 1 and 2. The criteria for success is the students' response to the positive category strategy to this lesson.

IV. RESULTS AND DISCUSSION

4.1. Ability Troubleshooting

Students' skills in problem solving then conducted evaluation that it is perform inspection tasks, the pre test, and formative tests. Based on the inspection tasks, the pre test, and formative tests in the first cycle, most of the students' problem solving do not structured yet. There is less scrutiny of the question. For example, if the question suggests students to explain a concept, students only mention these concepts without explanation. In addition, students are less likely to re-examine the answer so often miscalculated or incorrect use of the unit.

Students' skills in problem solving on cycle II had no increase. Most of the students perform a structured problem solving, ranging from visualization problems up to an evaluation or re-examine the results of the settlement of the problem in question so there is no calculation errors or incorrect use of the unit.

4.2. Quality of Learning Process

To determine the quality of the learning process, the observed activity of students in the classroom. Activity of students in the first cycle can be described as follows. All of groups performs a good job. At the first meeting, there are some groups who can not work together, but at the next meeting of the group is getting better cooperation. The interaction between groups always occur during class discussions, especially among groups presenter and a buffer group, but have not looked interaction between students buffer group. Student interaction with teachers occurs when there are problems that can not be solved, so the student demanded an explanation from the teacher. The question posed in more discussion refers to the issues that the group task can not be completed and only certain students who ask questions. At the initial meeting, only the student presenters who provide responses to issues in the discussions, other students rarely actively involved in giving feedback, but at the next meeting, in addition to student presenters groups, some students from other groups already participate in responding to the problems in the discussion.

In the second cycle, all groups perform the job well. Cooperation of students in the group and between groups has been good. Student interaction with teachers occurs when lecturers were asked to provide an explanation of the problem can not be solved during the discussion. Students are asked questions and respond to questions already more and more so that the discussions were tough.

4.3. Learning Outcomes

Data obtained from the student learning outcomes in formative test results. The average score of student learning outcomes in the first cycle was 66.74 and the second cycle was 71.65. Distribution of student learning outcomes in cycles I and II are presented in Table 1 and Table 2.

Table 1. Recapitulation Student Results in Cycle I

Groups	Number of Group Members (students)	Test Score				
		0-39 = E (students)	40- 54=D (students)	55-69=C (students)	70-84=B (students)	85-100=A (students)
I	4	0	3	0	1	0
II	4	0	2	1	1	0
III	4	0	1	0	2	1
IV	4	0	0	1	3	0
V	4	0	0	0	4	0
VI	4	0	0	1	3	0
VII	4	1	0	2	1	0
VIII	3	0	0	3	0	0
Total	31	1 (3,2%)	6 (19,4%)	8 (25,8%)	15 (48,4%)	1 (3,2%)

Table 2. Recapitulation Student Results on Cycle II

Groups	Number of Group Members (students)	Test Score				
		0-39 = E (students)	40- 54=D (students)	55-69=C (students)	70-84=B (students)	85-100=A (students)
I	4	0	0	1	3	0
II	4	0	1	0	2	1
III	4	0	1	1	1	1
IV	4	0	0	1	3	0
V	4	0	0	0	2	2
VI	4	0	0	2	1	1
VII	4	0	0	2	1	1
VIII	3	0	1	2	0	0
Total	31	0	3 (9,7%)	9 (29,0%)	13 (41,9%)	6 (19,4%)

4.4. Student Perceptions

Most students showed a very positive response to the application of learning as in this study and hope that the learning model like this can be continued and developed the concept of fungal biology. Suggestions/feedback from biology student responses on the concept of mushrooms with learning strategy are (1) the task given too much, (2) the role of the lecturer is indispensable in providing a preliminary explanation and after the class discussion is

finished, (3) questions in class discussions in order not to extend or exceeded the topic being discussed, and (4) the role of moderator in directing the discussion needs to be improved.

4.5. Discussion

The results obtained in the first cycle is not satisfactory. Students perform troubleshooting capabilities are lacking. Solving problems that do tend to be unstructured and is not evaluate / re-examine the issues that have been completed so frequent errors in giving units or miscalculation. This happens because the students have not been trained in solving problems in accordance with the stages raised by Heller (1992). According to Heller (1992) there are five stages in problem solving. The first is a visualization problems. This stage in the form of a translation problem statement into a form of visual and verbal comprehension of the problem situation. This step is taken in the form of images or statements. The second is the description of the concept. This stage requires students to use a qualitative understanding of the concepts and principles to analyze and express the problem in terms of field of study. The third is the completion of the plan. This step description of the concept in the form of translation into a form suitable mathematical statement with the problem, determining the information required and determine the algebraic procedure to adjust the variables. The fourth is to implement the settlement plan. Here, students use math rules to obtain unknown variables on the one hand and the variables that are known on the other side and find a numerical solution. The fifth is to examine and re-evaluate. Students evaluate whether the final settlement obtained feasible or reasonable, whether the mark and the units are correct, whether the solution in accordance with the experience and expectations, how large numerical number should be.

In the first cycle, students activity in learning are unsatisfactory. Cooperation among the students in a particular group is not going well. Smart students who do not want to help their friends who have difficulties, while student academic abilities are less reluctant to ask their friends and teachers. This indicates that the student has not interpret that requires cooperative learning among students occurred sharing knowledge. In addition, in classroom discussions, most students are more likely to ask questions task group that can not be resolved at home. This shows that students learn just focus on the task and not learn in their entirety to all the concepts. It also led a group of students outside presenters could not provide a response to the problems in the discussion. This is reflected in the results of initial tests of students, many of which have scores below the passing score. Discussions are not going well because most students passive and only a few people who are actively involved. Moderators are also less able to steer the discussion and so most of the time used to think of a question that can not be addressed group of presenters.

Student learning outcomes in the first cycle is low (average score of 66.74), there is even a student who has a score of 38 (E). Mastery of the concepts of mushrooms in line with students' understanding of these concepts during class discussions take place. The low student learning outcomes caused by the learning process is not optimal and the lack of prerequisite knowledge that students should have mastered.

The implementation of corrective actions in the second cycle is quite effective in improving students' ability to solve problems, activities, and student learning outcomes. Corrective actions taken on the second cycle is (1) emphasizes that the problem solving of the task group, the pre tests, and formative tests to be more structured in accordance with the steps designed by Heller (1992), (2) equalize the involvement of students in discussions with the effective role of moderator, and the teacher as a mentor also directs the course of the discussion, and (3) improve student collaboration within and among groups resulting in the sharing of knowledge among students who have different academic abilities.

In the second cycle, the problem solving ability perform by students more better. Troubleshooting is done by most of the students are already structured in accordance with the steps designed by Heller (1992), although the five stages of solution is not explicitly visible in the work of the students. For example, in a matter of completing the count, the students began by writing the statement is known about the biology in the form of a statement, write the question, then students think about concepts that will be used to resolve such problems, working according to the concept that was decided, and finally re-evaluate the completion so there is no calculation error or misapplication of the unit.

Activity of students in the second cycle is more better. Some aspects were very prominent and lasted well is teamwork, interaction among students and between students and teachers, the students were asked and answered in class discussions, then experienced significant improvement from the previous cycle. This finding is supported by the statement Carin (1993) in Wahyu Widada (1998) that the cooperative learning provides opportunities for students are actively involved in learning activities. The characteristics of cooperative learning are (1) every member has a role, (2) direct interaction between members, (3) each member is responsible for learning, (4) the teacher helps students develop interpersonal skills groups, and (5) lecturer only interact with the group when necessary.

The average student learning outcomes in the second cycle was 71.65, higher than the cycle of learning outcomes I. Students who earn a grade of B and A are also more and more (61.3%). The average student learning outcomes in the second cycle is quite good, although not achieve the success criteria as defined in this study (70%).

Application of learning with problem-based learning strategies with the cooperative approach with the help of module received a positive response from the majority of students. Statement of students in student perceptions questionnaire clearly illustrate that cooperative learning has been going very well and almost all members of the group get benefit from the learning activities. Most students expect that this model be continued and developed in biology.

Some suggestions/comments submitted by biology students against biology learning with based on learning strategies problem are (1) the duty is reduced, (2) a description of the teacher is very necessary before and after the class discussion, (3) questions in the discussion is not to extend / beyond the topic being discussed and (4) the role of the moderator needs to be improved. Suggestions students to load the task is not too much and needs to be reduced because the teacher actually less justified in giving the task.

V. CONCLUSION

Based on research results, we can conclude the following. (1) The quality of students' ability to do problem solving (problem solving) can be enhanced/ developed through learning based on problem strategies with the cooperative approach with the help of modules. (2) The application of learning based on problem strategy with the help of modules cooperative approach can increase the activity of the student or the quality of the learning process biology (3). Student learning outcomes in biology learning can be enhanced through learning based on problem strategies with the cooperative approach with the help of modules. (4). Most students responded positively to the biology of learning based on problem strategies with the cooperative approach with the help of modules.

The suggestion based on the findings in this study are the following. (1) The model of learning based on problem with cooperative approach with the help of modules can be applied to improve the quality of the learning process and student learning outcomes. (2) Application of learning strategy as designed in this study will be effective if teachers really have a good qualification in their field and provide more time to examine all of the students work so that the student can be immediately get returned of the result as for feedback.

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