JPPI, Vol. 3, No. 2, November 2017, p. 124-133 Jurnal Penelitian dan Pembelajaran IPA
e-ISSN 2477-2038

The Implementation of Discovery Learning Method to Increase Learning Outcomes and Motivation of Student in Senior High School

(Accepted 29 August 2016; Revised 15 November 2017; Published 30 November 2017)

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Abstract

Based on data from the observation of high school students grade XI that daily low student test scores due to a lack of role of students in the learning process. This classroom action research aims to improve learning outcomes and student motivation through discovery learning method in colloidal material. This study uses the approach developed by Lewin consisting of planning, action, observation, and reflection. Data collection techniques used the questionnaires and ability tests end. Based on the research that results for students received a positive influence on learning by discovery learning model by increasing the average value of 74 students from the first cycle to 90.3 in the second cycle and increased student motivation in the form of two statements based competence (KD) categories (sometimes) on the first cycle and the first statement KD category in the second cycle. Thus the results of this study can be used to improve learning outcomes and student motivation.

Keywords: Discovery Learning Method, Learning Outcomes, Student Motivation, Colloid

INTRODUCTION

One of the chemical learning activities in high school is still experiencing difficulties. Based on the observations at SMAN 86 Jakarta, it was found that daily test data of the students of class XI IPA 2 even semesters were in a low level. The low score of the students related to learning motivation is not good enough or low so the impact on student learning outcomes. In addition, researchers also found that the laboratory is less functional for learning activities so that learning activities are limited to notes, exercises, and memorizing only.

Based on the results of these observations, is very supportive to do a research. This research is conducted to find solutions and new innovations in the learning process. This research use classroom action research method (PTK). This research is one form of devotion to the current state of education. Through this activity, researchers become aware of the conditions and problems encountered in learning activities. This classroom action research, aimed at solving classroom learning problems.

Look at the facts of the problem, then on colloid material need to apply discovery learning method. Based on research conducted by Khoirunnisa, et al (2015) discovery learning makes students find their own concept of knowledge gained, so that student learning outcomes will increase. This is also supported by research conducted by Wulandari (2015) that the choice of learning discovery because this model provides an opportunity for students to think, find, argue, and work together through scientific learning activities, so can get knowledge of important concepts which will have an impact on improving learning outcomes.

Increased student learning outcomes need a high motivation to learn. Research has been done by Miru (2009) that the motivation of student learning is very influence on the achievements obtained by students in learning, students who have great motivation then the results achieved better than students who have less motivation.

Research has been done by Agustina (2011) also concluded the same thing in the results of his research that if students have high learning motivation then the learning outcomes will be high. Conversely with students who are less motivated in learning the learning outcomes become low.

Implementation of discovery learning model can change the concept of chemistry learning not only be a lesson to memorize the concept but also be done with laboratory activities.

Laboratory activities are not only crammed with chemical formulas but also can know a chemical process takes place. Therefore, it is necessary to apply the way of learning in school with discovery learning method, because students will find it easy to learn chemistry and make learning chemistry interesting so that it can improve student's learning motivation.

METHOD

The method of this research is classroom action research (PTK). This research was conducted in class XI IPA 2 at SMAN 86 Jakarta. This classroom action research design is based on an approach developed by Lewin that consists of planning, action, observation, and reflection (Arikunto, 2006). Classroom action research carried out in two cycles. The stages of this research are as follows:

1. Planning

   Planning step is a scenario that is done to take act in research. Action planning includes the preparation of learning implementation plan (RPP), preparation of teaching materials, preparation of instructional media, and assessment instruments.

2. Action

   Action step is an implementation of what has been planned. In this research the action for each cycle is to use the discovery learning model.

3. Observation

   Implementation of actions and observations is done simultaneously, and observations are made by three observers to avoid subjectivity. Observations were made with the instrument of observation sheet along with the assessment guide.

4. Reflection

   The step of reflection is a step in which at this stage analyzed the progress of the learning outcomes along with the students' learning motivation and the constraints that arise when action is taken for improvement in the next cycle.

The research was conducted on the even semester of the academic year 2015/2016. Data collection took place in XI IPA 2 SMA Negeri 86 Jakarta class, starting on the first cycle was held on 26 April 2016, and cycle II on 3May 2016.

Subjects in this study were all students class XI IPA 2. Data collection techniques used the questionnaires and ability tests end. Test methods are used to determine the level of student achievement in the cognitive aspect. The test is in the form of a description given at the end of each lesson. Before the instrument is used in the research, the instrument performed expert validation in advance with 1 expert validator. Instrument test Questionnaire used to determine the level of student

motivation during after learning using discovery learning method. Questionnaire is given at the beginning of cycle and end of cycle. Questionnaire given has passed the validation stage.

Student learning result data is taken by giving test to student at end of cycle. Data analysis technique is percentage analysis. Percentage analysis is to calculate the percentage of students' cognitive value improvement. This analysis aims to determine the percentage of student cognitive improvement from cycle I to cycle II, calculated by the following formula:

$$\% = \frac{X_2 - X_1}{X_2} \text{ x } 100\ \% \quad (1)$$

Informations:

X_1 = the average cognitive score of students at cycle I

X_2 = the average cognitive score of students at cycle II

The analysis of achievement of success indicators shows that the aim is to determine the percentage of classical attainment. The formula was used to determine the percentage of achievement success indicators are:

$$\% = \frac{X}{n} \text{ x } 100\ \% \quad (2)$$

X = Number of students reaching Minimum required Criteria at 78

n = Number of students taking the test

The analysis of this research is used to know and describe about state of motivation variable. The researchers used likert scale to measure the motivation.

RESULT AND DISCUSSION

This classroom action research was conducted in two cycles and was conducted from 26April 2016 to 9 May 2016 on colloidal material. Based on the result of the research, the researcher got the data of the result of the research in the form of numbers analyzed to know there or not the improvement of the learning result and the students' learning motivation after the learning discovery is applied in the learning process. These data include the results of cognitive tests and the results of questionnaire data conducted during the study. This research begins with pre-research activities before going into cycle I. pre-research activities aimed to find out specific student learning problems. Research Results in Cycle I

The Cycle I

1. The Planning Step of Cycle I

   This cycle of planning cycle consists of preparation of RPP which includes learning discovery and preparing research instrument in the form of student worksheet with colloidal system material, cognitive question, and questionnaire to measure student's motivation.

2. The Action step of Cycle I

   The action phase is an implementation of action planning

that is the use of learning discovery to improve learning outcomes and student motivation. Before beginning in cycle I, students are divided into 6 groups and each group is assigned to do the practicum about the difference of solution, colloid, and suspension.

Students are given LKS as reference when conducting practicum activities. This LKS should be done by students in a group. Students find themselves different from solutions, colloids, and suspensions. At the time students do practicum, teachers only help groups who have difficulty and conditioned the classroom so that the practice can work well.

3. The Observation Step of Cycle I

The observation step is carried out simultaneously with the implementation of the action. The observations were conducted using structured and tested observation sheet formats, and the assessment was performed by 1 observer. The observation sheet is based on the discovery learning model stages contained in the RPP.

4. The Reflection Step of Cycle I

The reflection step is the evaluation stage of what has been done. The reflection was done by the researchers and they discussed the weakness of learning process in cycle I with other researchers. The analysist of cognitive test result at Cycle I presented in Table 1.

Table 1 the analyze of cognitive test result at Cycle I

Data	Cognitive at Cycle I
High score	89.4
Low score	42
Average	74
Number of students completed	7
Number of students not completed	28
Percentage of Achievement Indicators	20%

The result of analyze questionnaire Cycle I as listed in Table 2.

Table 2 the result of analyze questionnaire Cycle I

Statement	Total score	Criteria
1	79	KD
2	162	SL
3	150	SL
4	136	SR
5	110	SR
6	116	SR
7	92	KD
8	107	SR
9	34	SR
10	120	SR

The result of students indicates that there is not fullfiled 80% yet, so the researchers need to make the improvement in the implementation of this cycle I. Table 3 shows the result of reflection Cycle I.

Table 3 the Result of reflection Cycle I

Aspect	Activity observed	Action Solutions
Teacher	Analyze student needs	Give more attention to the students to be able to know how far the students understanding
	Selection of teaching materials	Adding material on the student worksheet with the presentation of the material to make it easier to understand.
	Help clarify the students' assign-ments	Provide direction about the task to each group
	Finding out students' unders-tanding of issues and class-room care	surrounds the classroom and make sure all students are focused on the task / problem solving
Students	Findings	Telling students not to rely on friends' notes and to guide their own findings.
	Inter-actions between students	Leads students not to chat much with their group mates.

Cycle II

1. The Planning Step of Cycle II

The planning step in cycle II is a continuation of cycle I. The result of cycle I, it has not reached the achievement targets so that it is continued to the next cycle by revising the learning tool with emphasis on the low indicator.

2. The Action Step of Cycle II

Before entering in cycle II, students are assigned to read submateri that will be practiced, coordinate to bring the practicum materials. The action in cycle II has a positive effect. The student worksheet is made simpler and there is additional material.

In this second cycle, students do practicum and complete student worksheets in groups. In addition, students are required to submit an interim report verbally after the students have finished carrying out the practicum. Then the teacher shows some experimental results and starts the discussion. After that, a cognitive test was done to measure students' cognitive aspects after the discovery learning model was applied in this second cycle.

3. The Observation Step of Cycle II

In the implementation of learning activities cycle II as well as the activities of cycle I but given more assertion. The observations made are questionnaires and cognitive tests.

4. The Reflection Step of Cycle II

Based on the results of analysis on cycle II, it is found that using discovery learning model has been effectively used

in the learning process of the concept of colloidal system by looking at student learning outcomes that have reached the target percentage of success that has reached 80%. The analysis of cognitive test result at Cycle II as presented in Table 4.

Table 4 the analyze of cognitive test result at Cycle II

Data	Cognitive at Cycle I
High score	100
Low score	64.7
Average	90.3
Number of students completed	28
Number of students not completed	4
Percentage of Achievement Indicators	87.50 %

The result of analyze questionnaire Cycle I I as listed in Table 5.

Table 5 the result of analyze questionnaire Cycle I I

Statement	Total score	Criteria
1	112	SR
2	156	SL
3	147	SL
4	136	SR
5	109	SR
6	120	SR
7	93	KD
8	115	SR
9	125	SR
10	128	SR

Classroom action research activities aim to improve the quality of learning and student learning outcomes through a many of well-designed actions. For achieve maximum improvements and quality improvement, the formulation of the action is not enough to be done just one depends on the level of achievement of quality improvement. When the pegged success indicator has been reached, the research cycle can be stopped (Elfanany, 2013).

This research lasted only 2 cycles because in cycle I the target indicator of success has not been achieved so it need further action in the next cycle. In the first cycle, the success reached only 20% with as many as 28 students (Not Completed) and only 7 students (Completed). The inadequacy of this target is due to the lack of approach with the students so that they do not know how far the understanding of the students, the lack of clarity of the content of the LKS, the lack of clarity of the material on the presentation of the material in the LKS, and the number of students who do not record the information / findings on the note that only rely on his friends. So the results of students' cognitive assessment can not be achieved 80% success targets.

In cycle I also measured student's motivation by using questionnaire and obtained the result of questionnaire with there is still "occasional" criterion from result of questionnaire obtained. This means that in the first cycle has not achieved the success of the method used to improve student learning motivation.

Therefore, this research should be continued in the next cycle.

The continuation of this research in cycle II with the same steps as in cycle I.The initial stage of planning by fixing any shortcomings and improve the results of the solution to reflection in stage I. The next step is action. The action in cycle II is the result of reflection from cycle I.

Based on the process of action in cycle II can be identified the increase of learning outcomes and student learning motivation. In the learning results obtained data on the average score of learning outcomes in cycle I of 74 and cycle 2 of 90.3 and in the second cycle has achieved the percentage of success targets of 87.50% while the achievement target of 80%. This means the percentage of success has been achieved. Judging from the calculation results obtained an average increase in student learning outcomes of 16.3%. The success of this study is in accordance with research that has been done by Khoirunnisa, et al (2015) that discovery learning model can improve student learning outcomes because this discovery learning model makes students find their own concept of knowledge gained, so students can master the concept. Another study was also conducted by Istiana (2015) that the discovery learning model can increase student activity and achievement, especially for materials that require a good understanding of concepts and mathematical skills. In addition, according to Wulandari (2015) the choice of learning discovery because this model provides an opportunity for students to think, discover, argue, and work together through scientific learning activities, as well as gain knowledge of important concepts that will later impact on improvement learning outcomes.

The first step of learning discovery is planning. This step is done preparation of learning tools namely RPP, syllabus, and Student Worksheet to be used. Next stage of stimulation by providing stimulation in the form of video footage of colloid application in life so that students stimulated before the learning begins.Once stimulated students are directed to identify a problem in the video about colloids. Students who have identified the problem continue to collect data in the form of observation (experiment). Before students do experiment, students must collect data in advance by searching for the correct theory.The data that have been collected done data repetition accompanied by the proof of theory. Evidence of the theory is done by doing a direct observation or experiment. The results of the

experiment students can give conclusions from the findings.

The result of questionnaire to measure student motivation got conclusion of cycle I there are two statements with category of KD (sometimes) and cycle II there is only 1 statement with category of KD (sometimes). Category KD (sometimes) is meant is a pernyatan about the habits of students in learning activities that are positive. Therefore, by looking at the results of the analysis in the questionnaire cycle II can be concluded that there is an increase in student motivation in learning.

The results of this research can prove that the increase in student learning motivation in line with increasing student learning outcomes. This happens because learning by using the model of discovery learning is a student-centered learning activity so that the curiosity of students increases and makes motivated in learning so that in learning colloid material that there are many concepts of student theories can be more eager in understanding the concepts. This is in accordance with the opinion Miru (2009) students who have strong motivation will have a lot of energy to conduct learning activities. Student motivation is very influential on achievement. Students who have great motivation, the results achieved will be better than the students who have less motivation. According to Agustina (2011) in the results of his research says that if students are motivated in learning, then the learning achievement will be good (high) otherwise if students have bad habits in learning, then the learning achievement will be bad (low). Therefore, the motivation of learning in the student self needs to be strengthened continuously. Students who have strong learning motivation students will study hard and focus on the material, so that learning runs optimally that results in increased student cognitive value.

CONCLUSION

Based on the results of research and discussion can be drawn some conclusions that the cognitive aspects of students get a positive effect of learning by using discovery learning model with the increase of the average student score from 74 in the first cycle to 90.3 in cycle II and the application of discovery learning model can increase students' learning motivation by 2 statements with KD category (sometimes) on cycle I and 1 category KD statement in cycle II.

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