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Implementation of Discovery Learning to Improve Elemental Chemistry Learning Outcomes of 11th Graders at SMK Negeri 4 Palembang

Tiara Indah Agustinah[1,*], Hartono[2], Rahman Susanto[3]
[1]Department of Chemical Education, Universitas Sriwijaya, Indonesia
[2]SMK Negeri 4 Palembang, Indonesia

Abstract: This research was conducted with the aim of improving student learning outcomes and learning activities carried out. The research method was conducted in Classroom Action Research (CAR) which was carried out in two cycles, where each cycle consisted of 4 stages of activities namely planning, implementing, observing, and reflecting (reflection). Each cycle is held in two meetings with a time allocation of 2 x 45 minutes per meeting. Based on the research data, it can be seen that there was an increase (1) the learning outcomes experienced by students from cycle I were 57.14% to 91.42% of cycle II. (2) the learning activities of students from cycle I are 53% to 65% in cycle II. Thus it can be concluded that the application of the Discovery Learning Model can improve student learning outcomes and activities in material Chemistry Class XI TGB 2 at SMK Negeri 4 Palembang.

Keywords: discovery learning, learning outcomes, classroom action research.

▪ INTRODUCTION

Chemistry is an exact subject that studies everything about matter, which includes composition, structure and properties, changes, dynamics, and energetics of substances related to skills and reasoning (BSNP, 2006). Chemistry is one of the subjects that is often avoided by productive vocational students because it is considered not too important and not very popular compared to their vocational practice. In addition to this reason, facilities and infrastructure in productive SMKs, such as chemical laboratories, are usually not very supportive. As a result, it will affect student learning outcomes in chemistry lessons. (Kanthi, 2015).

Based on the background of the problems above, it can be formulated that how to apply the Discovery learning model to improve students' chemistry learning outcomes. Referring to the formulation of the problem, the purpose of this research is to apply the Discovery learning model to improve students' chemistry learning outcomes.

This research is expected to be useful: (1) For students, namely to increase understanding of the concept of colloidal and polymer system material for SMK N 4 Palembang students by applying the discovery learning model so that interest in learning outcomes can increase. (2) For teachers as material that explains information and considerations for teachers and prospective chemistry teachers in determining appropriate, effective and efficient methods, models and learning media in the process of teaching and learning chemistry colloidal and polymer system material so as to increase activity and critical thinking students, and also have the opportunity to use other learning models that are superior, creative, and innovative. (3) It is hoped that schools will assist in finding learning guides and learning models for other subjects and also as material for consideration in determining models, methods and learning media which will be applied for future improvements. (4) For researchers it will be very useful for researchers to find out how to

Tiara Indah Agustinah
Email: tiara888indah@gmail.com

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increase understanding of the concept of colloid and polymer system material for SMK N 4 Palembang students by applying the discovery learning model learning outcomes can increase.

▪ METHOD

Types of Research

The type of research to be carried out is Classroom Action Research (CAR) which is carried out in two cycles, where each cycle consists of 4 stages of activity namely planning, implementation (action), observation (observation), and reflection (reflection).

Time and Place of Research

This research was conducted in 2 cycles where one cycle was carried out in two meetings with a time allocation of 2 x 45 minutes per meeting. The process and data collection was carried out at SMK Negeri 4 Palembang from 18 April 2018 to 9 May 2018

Research Subject

The subjects in this Classroom Action Research (PTK) were students of class XI TGB 2 SMK Negeri 4 Palembang, totaling 35 students.

Procedure

This research was carried out in 2 cycles where one cycle was carried out in two meetings. Each cycle consists of 4 stages, namely: planning, implementation, observation and reflection. At this implementation stage it is carried out based on planning and learning scenarios that are adjusted to the lesson plan and syllabus so that the desired results are achieved. The reflection stage is carried out to determine further steps in the next cycle.

Data Collection Technique

Collecting data with techniques in research are tests and observations. The test is carried out at the end of each cycle which aims to see the ability of students to answer questions related to electrochemical cells before and after getting the action. While observations are made in each cycle with the aim of seeing the learning process carried out by teachers and students.

Data Analysis Technique

The data analysis used is as follows:

Observation Results

Analysis for student observation used the formula:

$$\text{Persentase} = \frac{\text{jumlah aspek aktivitas yang teramati}}{\text{jumlah seluruh aspek aktivitas}} \times 100\%$$

Criteria used:

< 60% of active students : Less
60% - 70% active students : Enough
71% - 85% active students : Good
86% - 100% active students : Very Good

Analysis for teacher observation (researchers) used the formula:

$$\text{Persentase} = \frac{\text{jumlah descriptor yang teramati / dilakukan guru}}{\text{jumlah seluruh descriptor}} \times 100\%$$

Assessment criteria:
Very good if the implemented indicators reach 86% - 100%
Good if the implemented indicators reach 71% -85%
Enough if the indicators implemented are reached 60% - 70%
Less if the indicators implemented are achieved < 60%

Learning Outcomes

To find out the learning outcomes of students independently obtained from the results of learning tests using the Benchmark Reference Assessment (PAP) formula according to Gronlund (quoted from Purwanto 2011: 2017), namely:

$$\text{Hasil Belajar} = \frac{\text{skor yang diperoleh peserta didik}}{\text{skor maksimal}} \times 100$$

Table 1. Success criteria for student learning outcomes

Tingkat Keberhasilan	Keterangan
1 – 60	Tidak Tuntas
61 – 70	Tidak Tuntas
71 – 80	Tuntas
81 – 90	Tuntas
91 – 100	Tuntas

To find out the average value of all students is used:

$$X = \frac{\sum x}{\sum n}$$

With :
X : Average value
∑X : Total value of all students
∑N : Number of students

To find out the percentage of completeness of student learning outcomes using the formula

$$P = \frac{F}{N} \times 100\%$$

With : P : Achievement score, F : Number of students who have changed (completed), N : The total number of students, A class is said to have studied thoroughly if the class has 85% complete learning.

▪ RESULT AND DISCUSSION

Data on student learning outcomes before the action (T0) was taken from students' daily test scores on the subject of the previous material. The value of student learning outcomes (T1) is taken from the final test scores of cycle I, followed by cycle II the student learning outcomes (T2) are taken from the final test scores of cycle II.

Table 2. Recapitulation of Student Learning Outcomes (T_0), (T_1) and (T_2)

Siklus	Jumlah Peserta didik	Jumlah peserta didik yang tuntas (≥75)	Jumlah peserta didik yang belum tuntas (<75)	Rata -rata Hasil Belajar	Persentasi ketuntasan klasikal
Sebelum Tindakan (T_0)	35	15	20	63.49	57.14%
Siklus I (T_1)	35	20	15	71.72	57.14%
Siklus II (T_2)	35	32	3	88.43	91.42%

Table 3. Recapitulation of Student Activeness in Each Cycle (T_1) and (T_2).

No	Siklus	Jumlah Peserta didik	% Keaktifan Pertemuan Pertama	% Keaktifan Pertemuan Kedua	% Keaktifan Peserta didik
1	Siklus I (T_1)	35	49.7	57.12	53
2	Siklus II (T_2)	35	63.79	66.36	65

In cycle I, there was an increase in learning outcomes as seen from table 2. in cycle I (T1), it became 71.72 with learning completeness of 57.14% on the subject of the colloid system with student learning activeness of 53%. In this learning, students look very interested when the teacher gives stimulus to students. After that students identify the existence of an existing problem then collect data and process the data to complete the students' worksheets that has been given by the teacher. Learners find and seek information from various available sources such as teaching materials, textbooks and other literature related to the material.

This was observed when students solved the problems that existed in students' worksheets regarding colloidal system material and colloid types at the first meeting and material for colloidal properties at the second meeting. It can be seen from the observation data that 67.14% of students responded to the stimulus given by the teacher. then 49.99% of students were enthusiastic in identifying problems found in students' worksheets. 48.57% of students were enthusiastic in collecting data such as reading chemistry textbooks to make presentations and looking for additional literature sources of information via the internet using their cellphones or from teaching materials that had been given by the teacher consisting of 16 students at the meeting. the first meeting and 18 students in the second meeting.

After the implementation of cycle I (T1), even though there was an increase in learning outcomes, this was still not optimal because there were still some weaknesses that occurred during the implementation of the actions in Cycle I, such as there were still students going in and out of class during group discussions and there were still students who did not take advantage of the time to discuss were only 48.56% of students who discussed with their groups and answered questions in the students' worksheets.

Then when students presented the results of their group discussions in front of the class there were still many students who still felt embarrassed and not confident, this was seen only by 47.13% of students who presented the results of discussions in front of the class consisting of 15 students on the first meeting and 18 students at the second meeting.

If seen from the results of observations in making conclusions, it was obtained 38.56% of students consisting of 11 people at the first meeting and 16 people at the second meeting.

In cycle I, there were still many deficiencies in the learning activities which made the learning objectives at the first meeting and the second meeting still not achieved. This can be seen from the learning outcomes of students of 57.14% who still have not achieved mastery learning in a classical manner and the active learning of students is 53%.

Based on the deficiencies obtained from cycle I and the failure to achieve the completeness of student learning outcomes as expected, improvements were made in cycle II, namely before entering learning the teacher provided more enthusiastic motivation and enthusiasm for students to be more enthusiastic and motivated in following the lesson will be conveyed by the teacher such as using more interesting media images. The use of learning media like this can increase the motivation and interaction of students in learning because the display provided is more able to attract the attention of students (Ghufroni, et al. 2013). Then the student representatives were also guided to read the instructions or work steps in the students' worksheets in order to make it easier for students to work on or complete the students' worksheets. The teacher also guides students in completing students' worksheets, students can ask the teacher if there are things that are not understood. With the guidance of the teacher it is hoped that the learning objectives can be achieved. At the time of presentation the teacher asked all selected group members to present the results of the discussion. The teacher also provides rewards in the form of additional cognitive value for students who provide responses during question and answer group presentations in this way to make students more active in providing responses to other groups who present the results of discussions in front of the class.

In cycle II, after repairs were made to the deficiencies that occurred in cycle I, there was an increase in the average student learning outcomes of 71.72 with 57.14% completeness in cycle I (T1) then increased to the average student learning outcomes student score of 88.43 with a mastery level of 91.42% in cycle II with the subject of making colloids and the role of colloids in life and polymers. In addition to an increase in learning outcomes in cycle II, there was an increase in the activity of students by 65%.

This increase in cycle II can be seen through the results of observational data of 86.35% of students who responded to the stimulus given by the teacher, then 63.63% of students were very enthusiastic in identifying problems found in students' worksheets. 67.42% of students were also very enthusiastic in collecting data such as reading chemistry textbooks and looking for other additional literature via the internet using their cellphones and also reading teaching materials that had been given by the teacher consisting of 20 people at the first meeting and 25 people at the second meeting.

An increase also occurred during group discussions of 76.50% of students actively discussing in their respective groups and students were quite good at utilizing their time while working on students' worksheets, even though during discussions one or two students were still seen coming in and out of class. Then during the group presentation it was seen that the students were confident to present the results of their group discussions in front of the class which can be shown by the results of the observation data of 63.63%. The same thing also happened to the activeness of students in expressing opinions or giving responses to friends who had presented the results of their group discussions, namely 65.14%. There was also an increase in the activity of students in making their own conclusions from the learning outcomes, namely 60.60% when compared to cycle I which was only 38.56%. This is in accordance with the opinion of Chusin, et al (2014) that discovery can ultimately improve reasoning and the ability to think freely and train students' cognitive skills by finding and solving problems encountered with existing knowledge and producing true

knowledge. meaningful to him. In this lesson the teacher acts as a facilitator or students learn intensively by following the scientific investigation method under the supervision of the teacher. So the learning takes place when it is designed, supervised, followed by investigative methods.

The increase in mastery of learning outcomes from cycle I to cycle II increased by 34.28%. This is because there have been several corrective actions in applying the discovery learning model during the learning process in the classroom. The weaknesses found in the learning outcomes of cycle I were then carried out by several corrective actions in the next cycle, namely in cycle II, although there were still other weaknesses, the learning outcomes of students in cycle II had achieved classical mastery, namely 91.42%%, which means research can be stopped in cycle II, this is because the research conducted is limited to the completeness of classical student learning outcomes which must be achieved by 85%.

▪ CONCLUSION

There is an increase in student learning outcomes by applying the Discovery Learning learning model in class XI TGB 2 SMK Negeri 4 Palembang. Increased learning outcomes seen from the average value of student learning outcomes before action (T0) was 63.49 with 57.14% mastery learning, experienced an increase in learning outcomes in cycle I (T1) with an average learning outcome of 71.72 and learning completeness was 57.14% and students' activeness was obtained during the learning process by 53% and increased in cycle II (T2) with an average learning result of 88.43 and learning completeness 91.42% which was accompanied by increased learning activity students by 65%. From the results obtained, the Discovery learning learning model is very suitable for increasing learning outcomes and student activity in colloidal and polymer system material.

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