Implementation of Guided Discovery Learning to Improve Chemistry Learning Outcomes in Hydrocarbon Topics of Students' at SMK Negeri 2 Palembang

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Abstract: Implementation of Guided Discovery Learning to Improve Chemistry Learning Outcomes of Class X Geomatika 2 at SMK Negeri 2 Palembang. The aim of this classroom action research is to improve chemistry learning outcomes of student in class X Geomatika 2 SMK Negeri 2 Palembang by implementation of guided discovery learning model. Research conducted at SMK Negeri 2 Palembang with the subject of the research are 34 students of class X Geomatika 2 consist of 21 men and 13 women. The acts of research are consists of two cycles, each cycle performs two meetings. Data collection is done with test in ending of cycle and observation through the learning proccess. The average student learning outcomes in pre-cycle (T0) are 72,35 with percentage of mastery learning are 67,65%. Based on the results of the research, average score in first cycle (T1) are 79,81 with percentage of mastery learning are 79,41%. In second cycle (T2), average score are 84,85 with percentage of mastery learning are 88,24%. Results of this research by using guided discovery learning model increase the learning outcomes of students in the subjects of chemistry shown from T2>T1>T0.

Keywords: learning model, guided discovery, student chemistry learning outcomes.

▪ **INTRODUCTION**

Based on the data obtained from the teachers, the students of SMK Negeri 2 Palembang mostly come from the middle to lower academic circles. Students of SMKN 2 Palembang class X Geomatics 2 have a mindset by going to SMK, so the lesson they get is practicum in accordance with their respective areas of expertise. This mindset makes students put chemistry aside because it is considered not the main subject. Learners become inactive in learning process, so that the learning process tends to be one way. Learning that occurs is inductive where the teacher provides concepts and then students carry out exercises based on the concepts provided by the teacher. When students are given different but similar problems, they experience difficulties in finding solutions to these problems. This is due to the absence of a concept for the learning material they get, thus causing the learning outcomes they get are not optimal. It can be seen from the number of students in class X Geomatics 2 SMKN 2 Palembang who achieved a KKM score of only 67.65% even though the specified percentage of learning completeness was 85%.

Learning with the right model can make students interested so that they are more motivated to actively contribute to the learning process. Learning with a model that can increase student activity is needed to be able to form their own concepts from the learning they experience. According to Yurahly (2014) learning with the guided discovery model makes students able to understand the lessons given by the teacher with a better understanding of concepts compared to the application of conventional learning, students are also more interested in participating during learning.

The guided discovery learning model makes it easier for students to remember because they observe or discover directly so that students build their own knowledge. New knowledge that is formed by students themselves will make it easier for them to remember and understand material for a long time so that students are expected to be able to solve the problems they will face. So that it will have an impact on increasing student learning outcomes. Understanding the concept is the main basis for solving problems in learning chemistry. Based on the data obtained from the teacher, students generally only understand the material based on what the teacher gives. They do not have their own concept of the material being studied so that when given a learning achievement test with similar problems they are unable to solve it. As a result, 32.35% of class X Geomatics 2 students could not reach the KKM score. To generate self-concept of the material studied by students, learning should be inductive. Students are given contextual examples of the material being studied and from this students can create their own concepts for the material. The teacher acts as a guide to show directions to students in forming their concepts so that misconceptions do not occur.

Nurcholis (2013) states that the use of the guided discovery model can provide an increase in student learning outcomes in the matter of drawing conclusions on mathematical logic in class X A SMA Negeri 9 Palu. Meanwhile, Astuti (2015) concluded that the application of the guided discovery learning model can increase the biology learning activities of students in class X-2 Muhammadiyah 1 Karanganyar High School in the 2013/2014 academic year which includes 8 aspects, namely verbal activity, motor, mental, emotional, writing, listening, drawing, and visual.

Based on the explanation above, it is necessary to do research by applying the guided discovery model to the chemistry learning of class X Geomatics 2 SMK Negeri 2 Palembang. This research is entitled "Application of the Guided Discovery Learning Model to Improve Chemistry Learning Outcomes of Class X Geomatics 2 Students at SMK Negeri 2 Palembang".

The formulation of the problem in this study is how to increase students' chemistry learning outcomes through the application of the guided discovery learning model in class X Geomatics 2 SMK Negeri 2 Palembang? This study aims to describe the application of the guided discovery learning model, and improve the chemistry learning outcomes of class X Geomatics 2 SMK Negeri 2 Palembang through the application of the guided discovery learning model. The results of this study are expected to provide benefits to teachers as information about the planning and implementation of guided discovery learning models in an effort to improve student learning outcomes in chemistry subjects. The application of the guided discovery learning model is expected to be a solution to overcome learning problems to improve the quality of learning and school quality, and the research results can be used as input and reference for conducting research related to the guided discovery learning model.

▪ **METHOD**
Types of research

The method used in this research is classroom action research. This research consisted of two cycles, where each cycle consisted of 4 stages of activity namely planning, implementation, observation, and reflection. The steps in learning activities with the application of the guided discovery model, namely providing stimulus, identifying problems, collecting data, processing data, testing results, and concluding.

Time and Place of Research

The research was conducted in November 2017 - July 2018. Data was collected in class X Geomatics 2 SMK Negeri 2 Palembang in the even semester of 2017/2018 on March 12 2018 - June 9 2018.

Research subject

The research was conducted collaboratively with tutors at SMK Negeri 2 Palembang. The research subjects were students in class X Geomatics 2 SMK Negeri 2 Palembang in the academic year 2017/2018, totaling 34 people with a ratio of 21 male students and 13 female students.

Procedure

The research steps carried out consisted of the research preparation stage, research implementation, and research reporting. Research preparation began with collecting data on students in Class X Geomatics 2 SMK Negeri 2 Palembang through interviews with chemistry teachers at SMK Negeri 2 Palembang so that data on student characteristics, school, learning achievement, and problems faced by teachers and students in chemistry subjects were obtained. . The results of the initial observations and interviews were analyzed to obtain alternative solutions to problems which were then proceed to the process of preparing research proposals and instruments. The research proposal contains a class action research implementation plan that will be carried out in Class X Geomatics 2 SMK Negeri 2 Palembang.

The implementation phase of the research aims to implement the implementation plan the research then obtained data on student learning outcomes in class X Geomatics 2 SMK Negeri 2 Palembang. The research data were then analyzed, described, and interpreted to obtain conclusions. Reporting of research results can used as additional insight and input material for teachers to improve the quality of the learning process, besides that other researchers can also using the reporting of research results as input and reference in conducting further research.

Planning

Plans made before taking action in cycle 1, as follows: (1) Looking for data on test scores on the previous material, (2) Determining the subject matter, namely hydrocarbons, (3) Develop a Learning Implementation Plan (RPP) in accordance with guided discovery learning model, (4) Prepare teaching materials, (5) Prepare sheets observation to see the activities of students during the learning process, (6) Make questions and answer keys for the final cycle test.

Execution

Implementation of the action in cycle 1 is divided into 2 meetings with time allocation ie 3 x 45 minutes. The first meeting was held on March 29 2018 learn general formulas, properties, and nomenclature of alkanes, alkenes, alkynes and compounds the second meeting on April 12 2018 studied isomers and simple reactions in alkanes, alkenes, alkynes. Actions taken according to plan Learning Implementation (RPP) that has been made.

Observation

Observers make observations of learning activities. The goal to find out how far the action can produce the desired change as well as to ensure the suitability of plans with the actions implemented. Observations were also made to collect data about the activities carried out students as long as they get instruction.

Reflection

Reflection is the stage to see the shortcomings in the previous cycle then it can be repaired for the next cycle. The good things can be improved in cycle II. The reflection results of cycle I are the reference for planning cycle II so that better results will be achieved.

Data, Instruments, and Data Collection Techniques

The test is a written test in the form of an essay. The test works for find out the learning outcomes of students, which will then be compared in each cycle. The test is carried out at the end of each cycle, namely at the end of the second meeting in each cycle. Observations were made by paying attention to the activities of students during learning takes place through the help of observation sheets that have been completed guide. Observations were also made by observing videos taken during the study going on.

Data Analysis Techniques
Analysis of Learning Outcome Data

To measure success in action research, a comparison is made of the average value of each cycle. The final score obtained for each cycle is expressed in percent, then compared with the percentage of learning completeness before the action. Individual learning mastery is achieved when students get a score of ≥ 75 and classical learning mastery is achieved when 85% of students get a score of ≥ 75 in the class. The formula is used to find the average value of all students:

$$M_x = \frac{\Sigma x}{N}$$

(Sudijono, 2010:81)

Information :
Mx : the average value of students
Σx : The number of student scores
N : Number of students

To calculate the percentage of students' learning completeness, a formula is used as follows :

$$P = \frac{\Sigma \, siswa \, yang \, tuntas \, belajar}{\Sigma \, siswa} \times 100\%$$

(Daryanto, 2011:192)

Observation Data Analysis

The learning activities of students in groups during the learning process are observed directly by marking ($\sqrt{}$) on each descriptor that appears on the observation sheet. Calculations to find out the learning activities of students during the learning process can be seen from the average value on the observation sheet using the formula:

$$Skor = \underline{perolehan\ skor\ skor}\ x\ 100$$
$$maksimum$$

Information:
score acquisition: total student score that appears on the descriptor maximum score: maximum score descriptor

Indicators of Research Success

If the cycle shows that students' classical learning outcomes reach 85% of subject completeness, namely ≥ 75, then the cycle is considered sufficient because the indicators of success have been achieved. However, if the subject has not reached completeness, it will continue with the next cycle, and so on.

- **RESULT AND DISCUSSION**

Student Learning Outcome Data

This Classroom Action Research (CAR) was carried out at SMK Negeri 2 Palembang by applying the guided discovery learning model. The subjects in the study were all 34 students in class X Geomatics 2 SMK Negeri 2 Palembang for the 2017-2018 academic year, consisting of 21 boys and 13 girls. Action data was collected in the even semester of the 2017-2018 academic year, March 12 2018 – June 9 2018. This research was conducted in two cycles, each cycle consisting of two meetings. The first cycle studied hydrocarbons and the second cycle studied petroleum and polymer materials.

Qualitative data were collected using observation sheets used at each meeting to see an overview of the teaching and learning process that took place. The observed data were then compared at each meeting. The collection of quantitative data obtained from the research includes test result data, consisting of a pre-action test (T0), post-action test data in cycle I (T1) and post-action test data in cycle II (T2).

Data on students' learning outcomes before being given action (T0) was taken from students' daily test scores on electrochemical material with a complete learning score of 67.65% and an average student learning outcomes score of 72.35. Recapitulation of student learning outcomes data can be seen in table 1.

Table 1. Recapitulation of student learning outcomes data

Siklus	Jumlah peserta didik	Jumlah peserta didik tuntas (≥75)	Jumlah peserta didik tidak tuntas (<75)	Rata-rata nilai	Persentase Ketuntasan (%)
T0		23	11	72,35	67,65
T1	34 orang	27	7	79,81	79,41
T2		30	4	84,85	88,24

Data on student learning outcomes after the action was obtained from the results of tests carried out at the end of each learning cycle by applying the sort card active learning strategy. Data on student learning outcomes consists of post-action test data in cycle I (T1) and cycle II (T2). Based on data on student learning outcomes before being given action (T0), cycle I (T1) and cycle II (T2) showed an increase in the average learning outcomes and student learning completeness. The learning completeness of students before being given action (T0) was 67.65% increasing to 79.41% in cycle I (T1) and in cycle II (T2) increasing to 88.24%, which means that they have achieved classical

mastery, namely ≥ 85 %, so the action was stopped in cycle II. Student learning outcomes before the action (T0) with an average learning outcome of 72.35, in cycle I (T1) with an average of 79.81 and in cycle II (T2) with an average of 84.85.

Description of Student Active Observation Data

The activeness of students in the learning process was observed using observation sheets. Recapitulation of student activity per cycle can be seen in the following table.

Table 2. Average Recapitulation of Student Activity Per Cycle

	Tahapan	Persentase Keaktifan Peserta didik	Rata-rata Keaktifan Peserta didik
Siklus I	Pertemuan 1	37.65%	
	Pertemuan 2	44.41%	41.03%
Siklus II	Pertemuan 3	53.82%	57.5%
	Pertemuan 4	61.18%	

Based on Table 2, it can be seen that there was an increase in the percentage of active students who carried out activities from cycle I to cycle II. The percentage of student activity in class X Geomatics 2 SMKN 2 Palembang in cycle 1 was 41.03%, then in cycle II it increased to 57.5%.

The results of observations from cycle I and cycle II showed an increase in the percentage of student activity. In cycle I, the average student activity was 41.03%, increasing in cycle II to 57.5%. This increase in student activity occurs because in the learning process an action is given, namely the application of guided discovery learning strategies. The teacher's task as a facilitator can be realized through the application of the guided discovery learning model. Students are required to be active in solving problems given through teacher guidance. The teacher as a facilitator gives a problem and then gives directions to students to think in stages so that they can solve the given problem. The learning process that involves the activeness of students can make them have a better understanding of the material, so that it will result in an increase in student learning outcomes.

Based on the results of the study, student learning outcomes also increased. The learning outcomes before being given action (T0) were taken from the daily test scores of electrochemical material with an average learning result of 72.35 and a learning completeness percentage of 67.65%. The average learning outcomes of students after being given action in cycle I increased to 79.81 with a learning completeness percentage of 79.41%. In cycle I there were 27 students who had completed and 7 students who had not completed. The average increase in learning outcomes is 7.46 and the percentage of mastery learning is 11.76%. This increase occurred due to the implementation of guided discovery learning strategies during the learning process. The increase in the percentage of learning completeness has not yet reached the learning mastery indicator, namely 85% of students achieve a KKM score of 75. This is because there are still weaknesses in the application of guided discovery learning strategies. The weakness of implementing the guided discovery learning strategy in cycle I is that students are less active in the learning process, especially during the first meeting. Students are not confident to ask questions or express opinions. In addition, in the stage of collecting data and processing data, only one or two group members are involved. So to correct the weaknesses that occurred in

cycle one, an action plan for improvement was made in cycle II. Action plans that will be carried out include motivating students to be more confident both in asking questions and expressing opinions, admonishing students who do not cooperate in data collection and data processing, reminding students to read the material before the lesson begins, and adjusting the use of study time. with the lesson plans that have been made.

Learning in cycle II was carried out with planned improvements through reflection in cycle I. The average learning outcomes of students in cycle II increased by 5.04 to 84.85 and the percentage of mastery learning increased by 8.83% to 88.24% . The percentage of completeness of students has reached the mastery learning indicator, namely at least 85% of students get scores above 75. In cycle II there are 30 students who have completed and 4 students who have not completed. The increase in learning outcomes was due to the application of the guided discovery learning model with action improvements based on reflection in cycle I. In cycle II students were able to go through the learning steps well. The learning atmosphere becomes more fun because during the learning process students actively participate and are required to think critically. This is consistent with research conducted by Maulidar, Yusrizal, and A. Halim (2016) learning by applying the guided discovery model can improve students' conceptual understanding and critical thinking skills.

▪ **CONCLUSION**

There is an increase in student learning outcomes by applying the guided discovery learning model in class X Geomatics 2 SMK Negeri 2 Palembang. The increase in learning outcomes can be seen from the average learning outcomes of students before the action (T0) is 72.35 with 67.65% mastery learning, increasing to 79.81 with 79.41% learning mastery in cycle I (T1) and in cycle II (T2) increased to 84.85 with 88.24% completeness. The increase in student activity during the learning process was seen in cycle I of 41.03% and increased to 57.5% in cycle II.

The guided discovery learning model can make students build their own concepts from the material being studied. Learners more actively participate during learning takes place so that they can understand the lesson better. It is suggested to teachers to apply the guided discovery learning model as an alternative learning model. Before learning begins, students should be conditioned first by providing information about the guided discovery learning model. Teachers can manage time well so that all stages of learning can take place optimally. The teacher must also be able to control the class so that students can follow the lesson well.

▪ **REFERENCES**

Astuti, Fitri. W. U., Sajidan, Sri Dwiastuti. (2015). *Penerapan model pembelajaran guided discovery untuk meningkatkan aktivitas belajar biologi siswa kelas X-2 SMA Muhammadiyah 1 Karanganyar tahun pelajaran 2013/2014. J. Bio-Pedagogik.* 4(1): 25-29.

Daryanto. (2011). *Penelitian tindakan kelas dan penenlitian tindakan sekolah beserta contoh-contohnya.* Yogyakarta : Gava Media.

Maulidar, N., Yusrizal, & A. Halim. (2016). *Pengaruh penerepan model pembelajaran guided discovery terhadap kemampuan pemahaman konsep dan ketrampilan berpikir kritis siswa SMP pada materi kemagnetan. J. Pendidikan Sains Indonesia.* 4(2): 69-75.

Nurcholis. (2013). *Implementasi metode penemuan terbimbing untuk meningkatkan hasil belajar siswa pada penarikan kesimpulan logika matematika. J. Elektronik Pendidikan Matematika Tadulako*. 1(1): 32-42

Sudijono, Anas. (2009). Pengantar *evaluasi pendidikan*. Jakarta : PT Raja Grafindo Persada.

Sudijono, Anas. (2010). Pengantar *statistik pendidikan*. Jakarta : PT Raja Grafindo Persada.

Yurahly, D., I Wayan Darmadi, & Darsikin. (2014). *Model pembelajaran guided discovery dan direct instruction berbasis keterampilan proses sains siswa SMA Negeri 4 Palu. J. Pendidikan Tadulako*. 2(2): 43-47.