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Application of the Problem Based Learning (PBL) Model to Improve Chemistry Learning Outcomes in Class X of SMKN 2 Palembang

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Abstract: The Implementation of Problem Based Learning Model to Increase Student Learning Outcomes of Chemistry Subject in Tenth Grade of SMKN 2 Palembang. This Research aimed to determine the implementation of Problem Based Learning model to improve the student learning outcomes using Problem Based Learning (PBL) model. Research was done by two cycle and every cycle conducted two meetings with including planning stage, implementation, observation, and reflection. This research is conducted in SMKN 2 Palembang which the subject of research si students in X classs. The Populations is class X TKR 2, the subjects were 34 students. The instrument used observation sheet and the learning outcomes test. The result showed that of students learning outcomes is increased with the students average value of evaluation test for first cycle si 74 with the clasical percentage value is 70.59% and students average value of evaluation test for second cycle is 80 and the classical percentage value is 80. Depend on the result of the research showed that the implementation of Problem Based Learning model showed there is significant differences by using PBL. So, we can obtained that the teaching chemistry by using PBL is quite effective.

Keywords: problem based learning, learning model, learning outcomes

▪ INTRODUCTION

Education is an important aspect used to prepare human qualities that have the ability and competence to carry out better life functions. So we cannot separate the education process from the changes that occur in the current changes in globalization. Because with the development of education it is hoped that it can increase changes that can change the quality and quality of life for the better (Silaban, 2016).

One educational platform that can be used is a Vocational High School or what we call (SMK) where this school aims to prepare and form students who are ready and skilled and have reliable personnel with the potential to face the world of work. In student teaching and learning activities in vocational schools, we know that student orientation is shown more to help students develop abilities than aspects of knowledge, attitudes and values and character contained in students. Because we know that it is not enough for vocational school students to master their vocational program so they can master the world of work or industry, so that they can be combined to produce a skilled and productive workforce as expected to face the world of work.

An example is studying chemistry which is expected to help students improve their skills program skills. However, the academic scores of vocational school students in chemistry subjects are still low, because of the assumption by vocational school students that learning in vocational schools only focuses on vocational practice. Vocational school students prioritize their major subjects compared to general subjects such as chemistry. The low student learning outcomes can be proven by the low KKM obtained by students,

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as evidenced by the number of students who reach the KKM 60% and those who do not reach the KKM 40%. The low learning outcomes of vocational high school students in the field of chemistry need to be improved to direct students to understand chemical concepts by using the PBL model which is expected to help students to improve their learning outcomes. The application of appropriate learning models is very necessary to support learning activities. The use of the Problem Based Learning (PBL) model which begins with the provision of problems as an initial stage to collect and instill new things and knowledge for students so that it can help students to increase their knowledge so that it can make students more active in the learning process associated with daily problems so as to improve student learning outcomes in the learning process.

According to previous research by Cholik, 2015 with the title PTK "Application of the Problem-Based Learning Model to Improve Student Learning Achievement in Class It can be concluded that student activity in the learning process has increased from cycle one to cycle two. Student learning outcomes were obtained from the average of cycle 1=70 and cycle 2=79.78. "It can be concluded that there was an increase in learning outcomes in cycles one to two, where research data was taken using student response sheets and activity sheets and student learning results sheets and analyzed using descriptive analysis and qualitative analysis."

Based on the problem and literature review, the researcher will conduct classroom action research with the title "Application of the Problem Based Learning (PBL) Model to Improve Chemistry Learning Outcomes in Class X SMKN 2 Palembang".

The formulation of the problem in this research is: "Can the Application of the Problem Based Learning (PBL) Model Improve Chemistry Learning Outcomes in Class X of SMKN 2 Palembang?"

The aim of this classroom action research is to apply the PBL learning model in class X of SMK Negeri 2 Palembang through the PBL (Problem Based Learning) learning model.

▪ METHOD

Subject, Time and Place of research

The subjects in the research were 34 class X students at SMKN 2 Palembang in the 2017/2018 academic year. The research was carried out from February 2018 to June 2018. Data collection was carried out in class X TKR 2 SMKN 2 Palembang in the even semester of the 2017/2018 academic year.

Types of Research

The type of research carried out was classroom action research with the aim of improving the quality of chemistry learning in class X SMKN 2 Palembang. The research will be carried out in two cycles and each cycle consists of planning, action, observation and reflection stages.

Planning Stage

At the planning stage, the activity that will be carried out is determining the learning material for cycle 1, namely hydrocarbon material. Next, make a learning implementation plan in accordance with the syntax of the Problem Based Learning learning model, design Student Worksheets (LKPD) for learning activities in cycle 1, prepare observation sheets for student activities, prepare evaluation test instruments at the end of cycle 1.

Action Stage

In this action stage, three activities will be carried out, namely preliminary activities, core activities and closing activities. In this preliminary activity, the teacher conditions students so they are ready to learn physically and mentally. Then the teacher provides apperception, motivation and learning objectives that will be achieved in the learning process. Then in the core activities, the teacher carries out all the steps contained in the RPP that has been created, starting from using media, providing LKPD to students, providing instructions to students in solving problems to developing discussion results and collecting LKPD again. In the closing activity, students, with the guidance of the teacher, conclude their learning and carry out evaluation tests and give homework to students.

Observation Stage

The observation stage is carried out when the learning process takes place in the classroom through implementing the PBL learning model. Observations were carried out using observation sheets that had been made at the planning stage. This observation is assisted by colleagues to observe students during the learning process activities. In the observation process, photographs are provided during learning activities as research evidence.

Reflection Stage

Reflection is carried out to evaluate the results of actions that have been taken during the implementation of learning so that it can be determined what actions need to be improved for the next cycle. The results of observations during the two meetings will be reviewed and analyzed against all data obtained.

Research Instrument

The data collection technique in this research was carried out using tests. The test in the research was used to measure chemistry learning outcomes after following the learning process using the Problem Based Learning model. The form of test used in this research is an essay at the end of each cycle. The test results will be used as quantitative data to measure the cognitive domain.

Data Collection Technique

The data analysis technique used to obtain learning outcomes is to compare learning outcomes before being given treatment with after being given action. The first step is to find the average score of students using the following formula:

$$\text{Skor siswa (N)} = \frac{\text{skor perolehan}}{\text{skor maksimum}} \times 100$$

And calculating the average test results for each cycle using the formula,

$$Mx = \frac{\sum x}{n} \times 100\%$$

Note:
Mx = average score of all students

$\sum x$ = the total score of all students
n = total number of students

Guidelines for categorizing student learning outcomes used can be seen in the table below,

Table 1. Guidelines for categorizing student learning outcomes

Tingkat Penguasaan	Kategori
81-100 %	Sangat tinggi
61-80 %	Tinggi
41-60 %	Sedang
21-40 %	Rendah
0-20 %	Sangat rendah

And classical learning completeness can be calculated using the formula,

$$P = \frac{\sum \text{siswa yang tuntas belajar}}{\sum \text{siswa}} \text{ X } 100\%$$

After data analysis, it can be concluded that the success of the research that has been carried out is said to be successful if ≥85% of students meet the KKM, namely ≥75.

▪ RESULT AND DISCUSSION

Research Results Data

This Classroom Action Research was carried out at SMK N 2 Palembang by applying the Probe Based Learning (PBL) learning model. This research was carried out in two cycles and each cycle consisted of two meetings. Data on student learning outcomes before being given action was taken from daily test scores on electrochemical material with very low learning mastery and low average learning outcomes.

Data on student learning outcomes after being given action using the Problem Based Learning (PBL) learning model is obtained from the results of tests carried out at the end of each cycle. After the calculations were carried out, the average student learning outcomes and classical completion criteria for class.

Table 1. Recapitulation of student learning results

Siklus	Jumlah Siswa	Jumlah siswa yang belum tuntas (<75)	Jumlah siswa yang tuntas (≥75)	Rerata Nilai	Persentase Ketuntasan Klasikal
Sebelum Tindakan (T_0)	34	22	12	61	35.29%
Siklus I (T_1)	34	10	24	74	70,59 %
Siklus II (T_2)	34	5	29	80	85,29 %

From the table it can be seen that there was an increase in student learning outcomes from cycle 1 to cycle 2. The average score obtained in cycle 1 and cycle 2 increased from 74 to 80. Likewise with the students' classical completeness criteria there was an increase from cycle 1 to cycle 2 by 70.59% to 85.29%. These results indicate that the work indicators in this classroom action research have been achieved, namely greater than 85%.

Discussion

The cognitive learning results of students in cycle 1 can be seen from the end of cycle test. The average cognitive learning result in cycle 1 was 74 and classical completeness was 70.59%, with details of 24 students who had completed it and 10 who had not completed it. In cycle 1, there was an increase in students' cognitive learning outcomes when compared to the cognitive learning outcomes obtained in the lesson before the Problem Based Learning learning model was used, seen from the daily test scores with only 12 students completing the electrochemical material.

In the implementation of cycle 1, planning, action implementation, observation and reflection were carried out. In this planning activity, what is done is determining the learning material, namely colloids, preparing a lesson plan regarding the material that will be studied at meeting 1 (specificities of carbon atoms, distinguishing between primary, secondary, tertiary and quaternary carbon atoms, and grouping compounds based on bond saturation, and determining general formula and names of alkane, alkene and alkyne compounds) and meeting 2 (isomers, as well as the impact of burning hydrocarbon compounds and how to overcome them) in accordance with the learning model used, namely Problem Based Learning, making LKPD, compiling research instruments in the form of observation sheets for learning activities, create a grid of final evaluation test questions and answer keys for cycle 1 final test questions.

The next stage is the implementation of the action which consists of two meetings with a time allocation of 3 x 45 minutes. Learning activities are carried out in accordance with the RPP which has been prepared at the planning stage. In the initial activities, the teacher conditions students to learn starting from saying hello, praying, checking the neatness of the class, and taking attendance of students. Then the teacher provides apperception, motivation and conveys the learning objectives to students according to what is written in the lesson plan.

After the initial activity, the teacher forms a discussion group consisting of 5-6 people. Then start learning according to the Problem Based Learning syntax. Phase 1 is providing problem orientation to students by providing LKPD containing case studies that must be completed by students. Phase 2 is organizing students to study, looking for literature or learning resources related to the problem case given. Then enter phase 3, namely guiding students in carrying out investigations through the literature that has been obtained and making temporary conclusions. Next, phase 4, presents and communicates the results of the discussion through presentations in front of the class. Other groups are given the opportunity to respond or provide suggestions, comments to the group that is presenting. Then phase 5, namely analyzing and evaluating the results by guiding students to conclude solutions to problems in the LKPD. Then carry out closing activities by giving assignments and saying hello.

Next, make observations according to the observation sheet format that was created previously. Then reflect on the implementation of cycle 1 after analyzing the data.

Judging from the results of observation and reflection during the implementation of cycle 1, it was found that there were still many shortcomings. Several shortcomings in the implementation of learning were found, namely that researchers had not familiarized students with reading and writing in a variety of ways through certain tasks. However, there are some students who write things they consider important based on the students' own initiative. Apart from that, the researcher in delivering the material seemed to be in a hurry, this was caused by a lack of time in the learning process because students entered the class late because the distance from the class in the previous subject to the chemistry class was quite far because the school still implemented a moving class system. .

Cycle 2 was carried out by considering the results of observations and reflections on the cycle In implementing cycle 2, the things carried out are the same as the stages in cycle 1, namely starting from the planning stage by making RPP material about petroleum, making teaching materials, LKPD, assessment instruments, evaluation questions, and answer keys. Next is the action implementation stage, namely carrying out learning in accordance with the learning model that has been prepared at the planning stage. When carrying out the action, observations are also carried out by the observer according to the format that has been created. The final stage in cycle 2 is reflecting and analyzing data.

As with cycle 1, cognitive learning outcomes are obtained through end-of-cycle tests. From the picture above, the criteria for classical completion in cycle 2 reached 85.29% with the class average being 80, and the number of students who had completed it was 29 people and 5 students who had not completed it. Compared with cycle 1 with the average student learning outcome being 74 and the classical completeness criteria being 85.29%. From the results of data analysis of cognitive learning outcomes in cycle 2, it was concluded that the research target had been achieved in this cycle so the research was stopped only until cycle 2.

Below is a comparison picture of students' cognitive learning outcomes in cycle 1 and cycle 2.

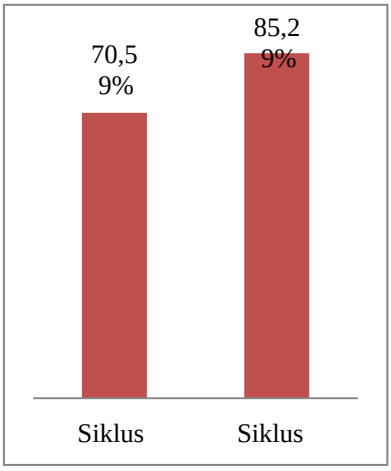

Figure 1. Classical completion graph of cognitive learning outcomes

Based on the results of research and data analysis that has been carried out at SMK N 2 Palembang, it can be concluded that the application of the Problem Based Learning learning model can improve the chemistry learning outcomes of class X TKR 2 SMK N

2 Palembang students. This increase in cognitive learning outcomes can be seen from the increase in students' average scores and classical completion criteria in cycle 1 to cycle 2. This occurs because of improvements in the learning process in cycle 2 from the results of observations and reflections carried out in cycle 1.

By implementing the Problem Based Learning learning model, it creates new experiences for students because during the learning process students are given the opportunity to investigate problems given through literature studies from various sources. This causes students to think more critically and logically in solving problems. Apart from that, students become more unified because the learning process trains them to work together and be active in discussions.

▪ CONCLUSION

Based on the research data, it can be concluded that the Problem Based Learning learning model can improve the chemistry learning outcomes of class X TKR 2 SMK Negeri 2 Palembang students. An increase occurred in the average learning outcome from 74 to 80 and the classical completeness criteria from 70.59% to 85.29%.

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