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Elemental Chemistry Learning Outcomes through Problem Based Learning for Tenth Grade Vocational School Students

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Abstract: The implementation of problem based learning to increase student's learning outcomes is explained. This research aimed to determine the implementation of problem based learning to improve the student outcomes in senior high school (SHS) in studying chemistry. This research is conducted in SMKN 2 Palembang which the subject of research is students in tenth grade. The populations are class X TKJ 3, while the subjects were 34 students. The research is conducted by teaching students with problem based learning model followed by evaluation test in the end of each cyle to obtain learning outcomes. The results showed that the average value of Evaluation-Test for first cycle is 67,21 with the second cycle is 83,14.. The students total average of the achievement showed that the percent affectivity of problem based learning implementation showed there is significant differences between teaching by using problem based learning. So, we obtained that teaching chemistry subject by using problem based learning model is quite effective.

Keywords: problem based learning, learning outcomes, elemental chemistry, classroom action research.

▪ INTRODUCTION

Vocational High School (SMK) is a continuation of junior high school which aims to immediately enter the world of work. Therefore, one of the efforts to prepare SMK students to immediately enter the world of work is to improve the quality of education held at SMK (Wulandari, 2013). The quality of human resources is more or less influenced by the field of formal and non-formal education which plays a very important role in creating quality individuals. According to the results of interviews with teachers at SMK Negeri 2 in Palembang, it turned out that students' chemistry learning outcomes were still low, namely only 60% of the total number of students who passed the minimum completion criteria, where the minimum completion criteria for chemistry subjects at SMA Negeri 2 Palembang was 75.

The learning outcomes of students at SMK Negeri 2 Palembang have monitored scores that are still below the minimum completion criteria, which is as much as 40%. Based on Permendikbud No. 104 of 2014 in Article 9 concerning Stipulation of Minimum Completeness Criteria is approximately 67. So, schools must establish Minimum Completeness Criteria (minimum completion criteria) of at least 67 or more and cannot be less than 67. SMK Negeri 2 Palembang sets the minimum completion criteria for Chemistry subject at 75. One of the subjects that is considered difficult for students at the SMA/SMK equivalent level is chemistry, especially if the teacher who teaches does not master the model. -a learning model that makes students take an active role and are interested in learning a subject that is abstract in nature and involves many symbols or chemical reactions and calculations (Rudi, 2013).

Researchers used the PBL model to teach chemistry subject matter in class XI SMK Negeri 2 Palembang because, according to researchers, the PBL model was the best model

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for teaching math material, especially in chemistry subject matter. The Problem Based Learning learning model is a teaching method that focuses on students being able to carry out investigations of the problems given by the teacher. The investigation was carried out based on literature studies from various sources. With the application of this learning model, it is hoped that students will not only have good cognitive values but are also expected to be able to think critically and logically and be able to relate the knowledge they already have with facts and concepts related to the problems given by the teacher (Suprijono, 2011). Based on research that has been conducted by (Abdurrozak, 2016) the problem-based learning model can improve student learning outcomes in colloid material up to 78.74% with an average student achievement score of 83.0. In Assriyanto's research (2014) also showed positive results that student achievement was higher when taught using a problem-based learning model through the inquiry method compared to the experimental method in terms of students' knowledge and attitudes. Based on the explanation above, the researcher chose the problem based learning model to be used in this classroom action research.

The formulation of the problem in this study is, how can the application of the problem-based learning model improve student learning outcomes in chemistry subject matter? at SMK Negeri 2 Palembang.

▪ METHOD

Subject, Time and Place of research

The subjects in the study were 34 class X TKJ 3 Palembang students in the 2017/2018 academic year. The research was conducted from February to June 2018. Data collection was carried out in class X TKJ 3 Palembang in the even semester of the 2017/2018 academic year.

Types of Research

The type of research carried out was classroom action research conducted in collaboration between researchers and chemistry teachers in class X SMK Negeri 2 Palembang. The research will be carried out in two cycles and each cycle will consist of planning, action, observation, and reflection stages.

Research Stage

This class action research stage includes activity preparation, planning, and activity implementation. Preparation of activities, surveys and observations of learning problems and interviews with chemistry tutors at SMK Negeri 2 Palembang. Action Planning and Implementation

Action planning begins with making learning activity instruments, namely learning activity sheets, namely Learning Implementation Plans (lesson plan) and making observation instruments and making student test instruments. Then, teaching and learning activities are carried out using the Problem Based Learning method with a prepared teaching and learning activity plan. Furthermore, the observation stage when the implementation of the action is in progress and reflects on the final activities of each cycle which is a reflection of the research results in each cycle.

Data Collection Technique

Data collection techniques in this study were carried out by observation and evaluation tests. Observation, observation or observation goes hand in hand with

implementation. Observations were made using student activity observation sheets to determine student activity during the learning process which was assisted by a camera device. Evaluation test, is a way to get a score that reflects student learning outcomes. Where the final evaluation of learning is carried out at the end of each cycle.

Research Instruments

The instruments used in this classroom action research are: Observation sheet, this observation sheet is used to collect data about student learning activities in the implementation of learning on Chemistry subject matter using the Problem Based Learning model. Evaluation test questions, given to obtain data on student learning outcomes. The types of questions used in the assessment sheet are essay questions.

Data Analysis Technique

The data analysis technique used in this classroom action research was carried out from the beginning of the research until the end of the research data collection activities. Student learning outcomes are measured using the class average score system on the evaluation results of each cycle using the formula,

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

the calculation of the average test results for each cycle using the formula,

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

Information: Mx = average value of all students, $\sum x$ = total value of all students, N = the total number of students. Guidelines for categorizing student learning outcomes used can be seen in the table below,

Success Indicator

The Minimum Completeness Criteria (minimum completion criteria) set by the SMKN 2 Palembang school in chemistry is 75. The research is said to be successful if ≥85% of students meet the minimum completion criteria, namely ≥75.

▪ RESULT AND DISCUSSION

The research results obtained are in the form of evaluation test results. The evaluation test uses the form of essay questions for each cycle. Evaluation test results are obtained through the final evaluation of learning at the end of each cycle I and II. Student learning outcomes are obtained by conducting evaluation tests at the end of cycle 1. The following is a table of student learning outcomes at each stage of the cycle:

Table 3.1 Recapitulation of student learning outcomes (T_0), (T_1), (T_2)

Siklus	Jumlah Siswa	Jumlah siswa yang belum tuntas (<75)	Jumlah siswa yang tuntas (≥75)	Rerata Nilai	Persentase Ketuntasan Klasikal
Sebelum Tindakan (T_0)	34	14	20	65,11	58,82 %

Siklus I (T_1)	34	10	24	67,21	70,59 %
Siklus II (T_2)	34	4	30	83,14	88,24 %

The score obtained by the students before the action with the PBL learning model was carried out (T0) was obtained from the students' scores on the previous subject matter with an average score of 65.11 and a classical completeness percentage of 58.82%. After that, the researcher used the PBL model to improve student learning outcomes in cycle 1, so that the researcher got the final score of cycle I (T1). 59%. This shows that cycle 1 has not met the indicators of success, where the average value of students must reach the Minimum Completeness Criteria ≥75 with a completeness percentage of ≥ 85%.

In table 3.1, it can be seen that student learning outcomes have increased from cycle I. to cycle II. The mean value increased to 83.14 from the previous cycle I of 67.21. The percentage of learning completeness increased to 88.24% from the previous 70.59%. That is, the results of the final evaluation in cycle II have met the predetermined success indicators, namely the class average score of students fulfilling more than or equal to 75 and a percentage of ≥85% Based on Table 3.1, student learning outcomes with TBK percentage values (Complete Learning Classical) of 70.59% with the average value of the final evaluation of learning in cycle I of 67.21 Then, in cycle II the class average value increased to 83.14, with a TBK percentage of 88.24%. Visually, the increase in learning outcomes can be illustrated in the image below

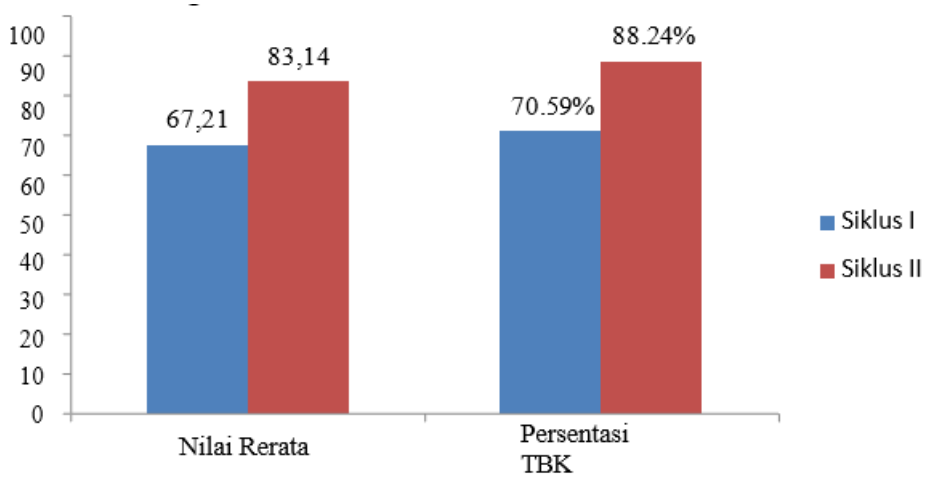

Figure 1 Improved research results

Figure 1 shows that learning chemistry in chemical material by applying the Problem Based Learning model has succeeded in achieving success indicators, because both teachers and students are accustomed to applying the Problem Based Learning model, even though the results obtained are not 100%. Implementation of learning in cycle II was declared successful so there was no need to proceed to the next cycle.

Reflection

In cycle 1 learning, it turned out that the success indicators of classroom action research had not been achieved because the percentage of learning completeness was less than 85%. Researchers realized this was due to several factors, namely the lack of time in the learning process due to students who entered class late because the distance from the

class in the previous subject to the chemistry class was quite far because the school still implemented the moving class system. Apart from these shortcomings, researchers have tried hard to be able to carry out learning as well as possible. Student learning outcomes have not been satisfactory, because there are several students who have not reached the minimum completion criteria. Based on the results of the evaluation test I, there were 10 students who scored less than 75. Some students had not been able to work on the questions given at the end of the cycle evaluation. After reviewing, the low student learning outcomes were caused by several things related to student learning activities, namely: (1) students did not pay attention to teacher guidance; and (2) students do not record important things. The results of this reflection in cycle I will become the basis for continuing research in cycle II with improvements in planning, implementation, and observation, so that cycle II can run better than cycle I. Improvements made to improve student learning outcomes, namely, the need provide interesting learning media such as learning videos that support the material being taught.

And in student learning activities it is necessary to improve by associating problems with everyday life so that students are more interested in learning, it is necessary to guide students to record important things during the learning process and researchers need to approach students who have low thinking skills.

In cycle II, it can be seen that student learning outcomes have increased from cycle I. In cycle II. The mean value increased to 83.14 from the previous cycle I of 67.21. The percentage of learning completeness increased to 88.24% from the previous 70.59%. That is, the results of the final evaluation in cycle II have met the predetermined success indicators, namely the class average score of students fulfilling more than or equal to 75 and the percentage of classical completeness if ≥85% so that it does not need to be done for the next cycle.

The acquisition of learning outcomes in the implementation of chemistry learning shows that applying the Problem Based Learning model can improve student learning outcomes. In the implementation of this classroom action research, students who previously did not understand chemistry lessons, became more understanding of this material as evidenced by the learning outcomes that had reached a minimum completion criteria percentage of ≥ 85% after the Problem Based Learning model was applied

▪ CONCLUSION

Based on the research data, it can be concluded that the Problem Based Learning learning model can improve chemistry learning outcomes for class X TKJ 3 SMK Negeri 2 Palembang. The increase occurred in the average learning outcomes from 67.21 to 83.14 and the classical completeness criteria from 70.59% to 88.24%.

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