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Application of the Problem Based Learning Model to Improve Chemistry Learning Outcomes for Class X SMK Negeri 2 Palembang

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Abstract: The implementation of Problem Based Learning model to increase students learning outcomes in tenth grade of SMK Negeri 2 Palembang. This study aims to improve student learning outcomes using learning Problem Based Learning (PBL) method. Research was done by two cycle and every cycle conducted two meetings with including planning stage, implementation, observation, and reflection. Subject of research is thirty four students of X grade of SMK Negeri 2 Palembang. The instrument used is observation sheet for both learners and learning outcome test. The result of the study is students learning outcomes increase with 44,118% classical completeness in first cycle and 85,294% in the second cycle. The result is supported by students activity during learning process. In the first cycle, the percentage in the first meeting is 53,6332% and in the second meeting is 57,2664%. In the second cycle, first meeting is 64,1869% and in the second meeting is 69,3772%. Based on the result of research showed that the Problem Based Learning can improve students learning outcomes in the X grade students of TITL 3.

Keywords: class treatment study, problem based learning, results of students learning

▪ INTRODUCTION

Education is very important for the progress of the nation, where with education we can improve our quality for the better. For this reason, everyone has the right to receive a decent education. This is stated in the 1945 Constitution, namely "to make the nation's life intelligent". To realize the progress of a nation, the government must improve the quality of education by making changes to the education system, curriculum structure and learning patterns that will be implemented.

Currently the government has implemented the 2013 curriculum for the learning process using a scientific approach, namely the learning process emphasizes students to be more active and teachers only as facilitators. Apart from that, as a facilitator, teachers must also instill educational character in students because in the learning process they must

contains 3 domains, namely affective, cognitive and psychomotor domains. These three domains are interrelated and cannot be separated.

According to Rusman (2017), learning with a scientific approach is learning that emphasizes student activities through observing, asking, reasoning, experimenting and communicating. This learning approach provides opportunities for students to actualize their abilities through learning activities that have been designed by the teacher. So that it can encourage students to think critically, accurately in identifying, understanding and solving problems.

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In learning, there are many components that can influence learning outcomes, namely teaching methods, learning models, students, teachers and the material taught. These components are interrelated so that weakening one component will affect the achievement of lesson objectives (Sudjana, 2009).

Based on learning theory according to Mulyasa (2004), students are successful if they are able to master at least 65% of all learning objectives. Meanwhile, class success is seen from the number of students who are able to reach at least 85%.

Based on initial observations carried out by researchers on chemistry subject teachers at SMK Negeri 2 Palembang, several problems were found in the classroom learning process. These problems include: interest in learning, understanding of concepts and learning outcomes. In this research, researchers will conduct research on the problem, namely student learning outcomes. From the data obtained, students at SMK Negeri 2 Palembang achieved Minimum Completion Criteria (KKM) of 60% and 40% did not complete out of 32 students with ideally reaching 85%.

What causes students' learning outcomes to not reach the KKM in chemistry subjects is because they are less able to receive calculation material, understand chemistry concepts and students are less active due to their interest in studying chemistry subjects. So achieving the expected educational goals is still far away. This is due to students' readiness to receive learning, ability to communicate and understand chemistry learning concepts as well as situations and conditions both internal and external.

Based on this data, special attention needs to be paid in efforts to improve student learning outcomes. One way is by using appropriate and appropriate learning models that can increase the effectiveness of learning in the classroom. One learning model that can be applied in the subject of compound nomenclature is the Problem Based Learning learning model.

This PBL learning model is a problem-based learning model that requires students to be able to solve problems needed in everyday life. In solving problems students work in groups. By providing problems, it can stimulate students to increase their skills in achieving learning material. By providing stimulus, it is hoped that students will arouse their curiosity about existing problems. So that students are more enthusiastic in the learning process (Darmadi, 2017).

Several studies that have been conducted using the learning model, namely Erni (2018), concluded that the Problem Based Learning learning model can improve student learning outcomes in chemistry subjects in class learning outcomes of each cycle. Desriyanti and Lazulva (2016) showed that there was an influence of the application of the Problem Based Learning model on the learning outcomes of class XII students at SMA Negeri 4 Pekanbaru on salt hydrolysis material with an influence of 9.35%

From the description above, researchers are interested in conducting research using the Problem Based Learning learning model which is expected to improve student learning outcomes. The title of this research is "Application of the Problem Based Learning Model to Improve Chemistry Learning Outcomes for Class X SMK Negeri 2 Palembang".

Based on the description above, the problem in this research can be formulated as how to improve student learning outcomes using the Problem Based Learning (PBL) learning model? The aim of this research is to improve student learning outcomes using the Problem Based Learning (PBL) learning model.

▪ METHOD

Subject, Time and Place of Research

The research subjects were 34 class X TITL 3 students, consisting of 2 female students and 32 male students. Research implementation began on April 9–30 2018 at SMK Negeri 2 Palembang.

Planning Stage

The planning stage that the researcher will carry out is to create a series of necessary equipment, including subject matter learning units, Learning Implementation Plans (RPP), Student Worksheets (LKPD), Student observation sheets, and final evaluation test instruments.

Implementation Stage

Carry out the RPP that has been designed and hold a final evaluation test with optional essay questions. In implementation, the teaching and learning process is carried out in accordance with the RPP that has been designed (RPP attached).

Observation Stage

Observation activities are carried out simultaneously with the implementation of learning in class. This observation uses an instrument in the form of a student observation sheet. Observation activities aim to observe situations and conditions during the action, such as students' activities during the lesson, note the obstacles faced by students during the lesson, and see the effects resulting from class actions.

Reflection Stage

The results obtained from the first test are analyzed and studied so that researchers can reflect on themselves to determine appropriate actions in cycle II. In addition, reflection is carried out to identify things that have been achieved and have not been achieved in cycle I as a guide for making improvements in cycle II.

Data collection technique

The method used by researchers to collect data uses several instruments needed to obtain research data. The instruments used include student observation sheets, student worksheet (LKPD) and evaluation sheets.

Data analysis technique

Analyzing Student Observation Data

Students' activities in learning activities are observed based on visible descriptors, for the percentage of activity in each descriptor the formula is used:

$$\textit{Persentase Keaktifan} = \frac{\textit{skor aktifitas}}{\textit{skor total aktivitas}} \textit{ X } 100\%$$

From the data above, the percentage of class activity can be obtained, using the formula:

$$\textit{Persentase Keaktifan} = \frac{\textit{rata – rata aktivitas siswa}}{\textit{Jumlah siswa dikelas}} \textit{ X } 100\%$$

To determine the value of observations of student learning activities, it can be expressed using categories and values which can be seen in Table 2.1.

Table 2. Criteria level of learning activity

Tingkat Aktifitas (%)	Arti
80 ≤ - 100	Sangat tinggi
60 ≤ - < 80	Tinggi
40 ≤ - < 60	Sedang
20 ≤ - < 40	Rendah
0 - < 20	Sangat Rendah

Analyzing Learning Results Average Value

$$X = \frac{\sum xi \; x}{n} \; 100\%$$

Information :
X : average value
$\sum xi$: number of values
N: number of students

Classical absorption capacity

$$Ds = \frac{Ns \; x \; 1}{s \;\; N1} \; x \; 100\%$$

Information :
Ds: students' absorption capacity
Ns: student's score is more than or equal to 75
s: number of test takers
N : ideal value

Mastery learning

$$KB = \frac{Ns}{s} \; x \; 100\%$$

Information :
KB: complete learning
Ns: student's score is more than or equal to 75
s: number of test takers

Indicators of Researcher Success. Learning completion is said to be successful if students obtain the following grades:
a. For individuals: if you get a score ≥75
b. For classical: if 85% get a score ≥75

▪ RESULT AND DISCUSSION

Research Result

The research results include initial observations, learning outcomes and student activities from cycles I and II. The results for each cycle are described as follows:

Initial Observations

Initial observation data was obtained from students' mid-semester results, there were still many students who had not achieved learning completeness. The mid semester results of class X TITL 3 students can be seen in table 3.1.

Table 3 Data on students' mid-semester results

Hasil Tes	Pencapaian
Nilai terendah	40
Nilai tertinggi	82
Rata-rata nilai	63,4706
Jumlah peserta didik kelas X TITL 3	34
Jumlah peserta didik yang tuntas	13
Persentase tuntas belajar secara klasikal	38,235%

Based on the table above, it is known that the average score of students reached 63.4706 with classical learning completeness of 38.235%. So they haven't reached learning completeness.

Results of Research Cycle I Planning Phase

Based on the problems identified in the initial observations, learning was planned on the subject of hydrocarbons using the Problem Based Learning (PBL) learning model.

Implementation Stage

In cycle I, action was carried out on 9 and 16 April 2018 on the subject of hydrocarbons which took 6 hours of class with 2 meetings. The results of the first cycle test can be seen in table 3.2 below.

Table 3. Data on cycle 1 student test results

Hasil Tes	Pencapaian
Nilai terendah	25
Nilai tertinggi	84
Rata-rata nilai tes	63,191
Jumlah peserta didik kelas X TITL 3	34
Jumlah peserta didik yang tuntas	15
Persentase tuntas belajar secara klasikal	44,118%

Based on the table above, it is known that the average score of students reached 63.191 with classical learning completeness of 44.118%. This does not yet meet the achievement indicators.

Observation Stage

Observations are carried out so that they can be used as a reference in observations to find out deficiencies made by students during the learning process. The results of observations of cycle I student activities can be seen in table 3.3 below.

Table 3. Data on the results of cycle I student activities

Pertemuan	Skor	Persentase
1	18.2353	53.6332%
2	19.4706	57.2664%

Based on the table above, it is known that student activity is still at sufficient criteria, which is indicated by an increase in the percentage level of student activity for each meeting.

Reflection Stage

Based on data on students' learning completeness in cycle I, the average score reached 63.191 with a classical learning completeness of 44.118%. This can be seen from the data resulting from observations of student activity that has not been seen during the learning process. Students are not yet accustomed to the group learning model and still appear to be individuals. From analysis data in cycle I, re-explanation and feedback are needed. This means that some students do not respond to the feedback given by researchers.

Results of Research Cycle II Planning Phase

Based on the results of reflection in cycle I, researchers must increase students' activeness in the learning process, both in solving problems during discussions and when presenting the results of discussions. And improvements in techniques for providing motivation and feedback are needed.

Implementation Stage

Cycle II carried out actions on 23 and 30 April 2018 on the subject of petroleum and polymers which required 6 hours of lessons with 2 meetings. The results of the second cycle test can be seen in table 3.4 below.

Table 3. Data on cycle II student test results

Hasil Tes	Pencapaian
Nilai terendah	52,5
Nilai tertinggi	100
Rata-rata nilai	79,456
Jumlah peserta didik kelas X TITL 3	34
Jumlah peserta didik yang tuntas	29
Persentase tuntas belajar secara klasikal	85,294%

Based on the table above, it is known that the average student score reached 79.456 with classical learning completeness of 85.294%. This has met the indicators of learning completeness.

Observation Stage

The results of observing the activities of cycle II students obtained more improved criteria. It can be seen in table 3.5 below.

Table 3. Data on the results of cycle II student activities

Pertemuan	Skor	Persentase
1	21.8235	64.1869%
2	23.5882	69.3772%

Based on the table above, it is known that student activity is in the high criteria, which is indicated by an increase in the percentage of student activity compared to cycle I. This is because students are used to the group discussion learning process and are brave in presenting the results of the discussion and are able to provide responses to their friends' presentations in front of them. class.

Reflection Stage

From the results of students' learning tests in cycle II, the average score of students reached 79.456 with classical learning completeness of 85.294%. This has met the indicators of learning completeness. And data from observations of student activities shows that there is an increase in activity and the feedback provided by researchers can be understood by students. Apart from providing the correct answer, the researcher also explained how to obtain the answer.

Discussion

From the initial observation data in table 3.1, students' scores have not yet reached learning completeness because the average student reached 63.4706 with classical learning completeness of 38.235% (13 students completed out of 34 students). In the learning process,

The teacher provides motivation that links several examples in everyday life that are related to the problems in the material to be taught. The teacher provides opportunities for students to observe and ask questions about these problems. Observing activities in a scientific approach aim to increase students' curiosity, while questioning activities aim to train students to think critically (Kemdikbud, 2013). With this scientific approach, students can be active during the learning process so that creative learning is obtained (Sitiatava, 2013).

Students' cognitive assessments are obtained from tests at the end of each meeting and averaged from each meeting to obtain the final score for each cycle. After implementing the PBL learning model, students' learning outcomes experienced an increase as evidenced in table 3.2. It is known that the average score of students reached 63.191 with classical learning completeness of 44.118%, namely 15 students who completed it whereas before the learning model was implemented only 13 students which is complete.

The increase in learning outcomes in cycle I does not yet meet the completeness of classical learning outcomes because it is less than 85%. This is also accompanied by student activity in table 3.3, namely at the first meeting the percentage was 53.6332% and at the second meeting 57.2664% was in the sufficient category.

Based on these weaknesses, which resulted in the students' learning outcomes not yet being achieved in cycle I, corrective actions were continued in cycle II. Researchers must improve techniques in the learning process by providing feedback to students by providing answers that are correct but also accompanied by explanations so that students better understand the material presented.

According to Gunawan (2003), providing feedback is not only done to provide correct answers, but can increase students' motivation in learning activities. Providing

feedback aims to ensure that students know where their mistakes are so that in the end students can work on questions according to the instructions given and not repeat the same mistakes.

Yuliati (2005) in her research stated that providing feedback to students can improve learning outcomes. Improving learning outcomes is also supported by several factors, namely the learning methods and models used.

In cycle II, 29 students who completed experienced improvement and only 6 students who did not complete. In table 3.4 it is known that the average score of students reached 79.456 with classical learning completeness of 85.294%. This shows that there was an increase in student learning outcomes from cycle I to cycle II. So that in cycle II, the application of the PBL learning model meets the indicators of students' learning completeness.

This increase in learning outcomes is accompanied by an increase in student activity during the learning process. From table 3.5 at the first meeting the percentage was 64.1869% and at the second meeting 69.3772%. This is also shown by each implementation of the PBL syntax increases. Students are more enthusiastic in working together to solve the problems given. And during presentations by other groups, students were enthusiastic in responding or providing input on the results of the discussions presented and students also responded to the evaluations given.

According to Sanjaya (2006), the advantage of implementing the PBL learning model is that problem solving can increase student activity, problem solving can develop new knowledge and take responsibility for the learning they do, and can give students the ability to apply the knowledge they have in the real world.

Apart from that, similar research has been carried out using the PBL learning model. According to Ikawati (2015), the application of the Problem Based Learning model can increase student activity and competency achievement. From the results of the research and discussion above, it can be concluded that the application of the Problem Based Learning learning model can improve chemistry learning outcomes in class X of SMK Negeri 2 Palembang.

▪ CONCLUSION

From the results of research using the Problem Based Learning learning model for class X TITL 3 students, the following conclusions were obtained. The data results in the first cycle of students who got a score of 75 were 15 people with an average score of 63.191 and a classical completion percentage of 44.118% and supported by student activities at meeting I with a percentage of 53.6332% and meeting II with a percentage of 57.2664% .

In the second cycle, there were 29 students who got a score of 75 with an average score of 79.456 and a classical completion percentage of 85.294% and supported by student activities at meeting I with a percentage of 64.1869% and meeting II with a percentage of 69.3772%. Based on data from cycles I and II, the Problem Based Learning learning model can improve student learning outcomes in class X TITL 3.

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