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Implementation of Learning Cycle to Improve Electrochemistry Learning Outcomes for 10th Graders of Vocational High Schools

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Abstract: Improving Student Chemistry Learning Outcomes through Learning Cycle Models in SMK. This research aims to determine whether Learning Cycle can improve students' chemistry learning outcomes in class X SMK Negeri 4 Palembang. This Research use Subject at students of class X TKR 1 SMK Negeri 4 Palembang, amounting to 30 students. This research is a Classroom Action Research (PTK) which is implemented in two cycles. Data obtained from each cycle were analyzed to determine the development of learning and as a correction thing in the next cycle. Data collection is done through an evaluation test at the end of each learning cycle. The collected data was analyzed statistically using class average and percent student's classical. In the first cycle the average score of students is 63.67 and the percentage of students' classical is 43.33%. While in the second cycle there is an increase in student learning that can be seen from the average score of students by 82 and percent classical student to 86.67%. Therefore, the application of Leaning Cycle learning model in chemistry learning, especially electrochemical learning can improve student learning outcomes.

Keywords: learning cycle, learning outcomes, electrochemistry, classroom action research.

▪ INTRODUCTION

Basically education does not only function to develop children in the academic field through learning delivered by educators. However, education can also perfect individual development in habits, attitudes and so on. The ongoing learning process in schools cannot be ensured that everything goes well. There are many problems encountered during the learning process both faced by educators and their students, especially in chemistry lessons at SMK. One of the problems faced in this SMK chemistry lesson is that students' chemistry learning outcomes are low because students only focus on their areas of expertise. Students assume that chemistry lessons are only additional lessons that do not play an important role in their education.

Based on the results of observations obtained from teachers at SMK Negeri 4 Palembang that the lack of interest and interest in students in chemistry lessons is because: a) students prioritize practice in their majors to hone their skills compared to general subjects such as chemistry; b) lack of availability of facilities and infrastructure for learning chemistry. While the results of observations from students of SMK Negeri 4 Palembang obtained several facts that: a) teachers are still doing conventional learning so that students are passive in learning; b) the lack of availability of chemistry books which are a source of learning for students. This is what causes the low learning outcomes of students which is evident that only 40% of students achieve minimum completion criteria scores where ideally students who achieve minimum completion criteria should be 85%. The high minimum completion criteria score that must be achieved by students requires that teachers must be creative and innovative in conveying learning both with the right learning model and media or the method of delivering learning to students.

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The Learning Cycle learning model is a learning model that contributes to involving students in maximizing the learning process and increasing students' ability to think. This learning model has 5 stages known as 5E. The stages of the 5E are engagement, exploration, elaboration, and evaluation. This learning model can involve students to obtain the meaningfulness of learning so that understanding of concepts will be more accessible to students (Huda, 2010).

In the research of Amaliyah, Zubaidah & Lestari (2012), the Learning Cycle learning model can improve student learning outcomes by 6.95% where in cycle I it reaches 83.13% while in cycle II it reaches 88.91%. In Dewi, Redjeki & Mulyani's (2015) research, it was possible to improve students' learning achievement in the knowledge aspect in cycle I, which resulted in mastery learning of 52.63% and in cycle II it increased to 84.21%. In Ningsih, Masyukri & Utami's research (2012), concluded that the application of the Learning Cycle learning model can improve student learning outcomes, where in cycle I it reaches 72.9% while in cycle II it reaches 85%. This study has limitations that are studied, namely focusing only on student learning outcomes in the cognitive aspect of electrochemical material and the learning model used is the Learning Cycle. The cognitive aspect is seen from the results of the students' learning tests given at the end of the cycle. The formulation of the research problem is how are the learning outcomes of students through the application of the Learning Cycle learning model to electrochemical material in class X SMK Negeri 4 Palembang?

The purpose of this research is to improve student learning outcomes through the Learning Cycle learning model on Electrochemical material; describes the application of the Learning Cycle learning model for class X Palembang State Vocational School. The results of this study are expected to be useful for tutors as information and input as well as materials for assistance for teachers to provide teaching materials; for researchers to broaden knowledge, and become a resource for increasing competence as prospective teachers; and for schools to provide input to schools as an effort to improve the learning process on Electrochemical material.

▪ METHOD

Time and Place of Research

This Classroom Action Research has been carried out at SMK Negeri 4 Palembang Jl. Sergeant Sani No.1019, Pipa Jaya, Kemuning, Palembang. This research began in the even semester of the 2017/2018 Academic Year.

Subject and Types of Research

The sample of this research is class X TKR 1 SMK Negeri 4 Palembang, totaling 30 people. The type of research carried out was classroom action research conducted in collaboration between researchers and chemistry teachers in class X TKR 1 SMK Negeri 4 Palembang. This research was conducted in 2 cycles where in each cycle there were 4 stages that had to be carried out, namely the planning, implementation, observation and reflection stages.

Implementation of Activities

This Classroom Action Research was carried out in up to two cycles, where each cycle consisted of planning, implementing, observing, and reflecting. Planning: what needs to be prepared is making learning tools such as Learning Implementation Plans (lesson plan), Student Activity Sheets (students’ worksheets), compiling research

instruments and compiling teacher and student observation sheets. Action: all of these learning tools are applied to the learning process, where lesson plans and worksheets are reference materials for researchers to carry out learning in the Learning Cycle learning model. At the end of the lesson, students are given a learning evaluation test that is done individually to see how the learning outcomes of students are increased with the Learning Cycle Observation learning model: the observation sheet is used by the observer to observe how the learning process is taking place. Observer here is a trusted colleague. After learning is complete and each observation has been collected, then what is next is a discussion between the observer and the teacher to evaluate each learning process so that reflection is obtained. Reflection: draw up action plan decisions for further learning based on experience and evaluation results from cycle I. The conclusions drawn are then used as the basis for the planning stage to be carried out in cycle II.

Research Instruments dan Data Analysis

The instrument used in this study was in the form of 10 multiple choice questions about electrochemistry. This question will be given to students to work on at the end of the learning process. The techniques used to analyze completeness data both individually and classically are as follows:

Mastery Level of Learners

$$\text{Tingkat penguasaan peserta didik (nilai)} = \frac{\sum \text{jawaban yang benar}}{\sum \text{skor maksimal}}$$

After obtaining the value of each student, it can be seen the level of mastery of students towards learning that is in accordance with the learning objectives to be achieved. The mastery categories of students are as follows:

Percentage of Classical Mastery

$$\text{Persentase ketuntasan klasikan PKK} = \frac{\sum \text{siswa yang KB} \geq 75\%}{\sum \text{subjek penelitian}} \times 100\%$$

Mastery learning students individually and classically as follows. A student is said to have completed learning if the student has achieved a score of at least 75% of the total score. A class is said to have completed learning if the class achieves a score of at least 85% of the total number of students who have achieved a score of 75%.

Calculating the Average Value of Students

$$\text{nilai rata-rata peserta didik} = \frac{\sum Xi}{N}$$

Information:
$\sum Xi$: Total value of students
N : Number of students

The average value of students is calculated on each test given to see whether there is an increase in scores between the learning outcomes test I (cycle I) and the learning outcomes test II (cycle II)

Success Indicator

This study was planned to consist of 2 cycles. If the conclusion of the classical learning outcomes of students has reached 85% completeness with the acquisition of a minimum completion criteria score of 75, then the cycle has been successful. However, if the completeness is not successful then it needs to be continued to the next cycle.

▪ RESULT AND DISCUSSION

Mastery Level of Learners

After learning with the Learning Cycle learning model in class X TKR 1 SMK Negeri 4 Palembang on Electrochemical material, it was obtained that in cycle 1 there were 15 students who mastered learning and 15 students who did not master learning. Whereas in cycle 2 there were 27 students who mastered learning and 3 students who did not master learning. The level of students learning mastery can be seen in table 2.

Table 2. Mastery level of learners

Siklus	Nilai							kategori				keterangan	
	40	50	60	70	80	90	SR	R	S	T	ST	M	TM
I (jlh siswa)	6	4	6	1	13	0	10	6	1	13	0	15	15
II (jlh siswa)	0	0	3	1	13	13	0	3	1	13	13	27	3

Percentage of Classical Mastery

After learning with the Learning Cycle learning model in class X TKR 1 SMK Negeri 4 Palembang on Electrochemical material, it can be seen that the learning completeness of students individually and classically. In cycle 1 there were 13 students who completed and 17 students who did not complete. Whereas in cycle 2 there were 26 students who completed and 4 students who did not complete. While the classical completeness of students in cycle 1 was 43.33% and in cycle 2 was 86.67%. The learning completeness of students towards learning can be seen in table 3 below.

Table 3. Percentage of completeness of students

Siklus	Nilai				Keterangan				% Klasikal
	40	50	60	70	80	90	T	BT	
I	6	4	6	1	13	0	13	17	43,33%
II	0	0	3	1	13	13	26	4	86,67%

Calculating the Average Value of Student Learning Outcomes

Based on the results of research that has been carried out using the Learning Cycle learning model in class X TKR 1 SMK Negeri 4 Palembang, the average learning outcomes of students in cycle 1 and cycle 2 are shown in table 4.

Table 4. Average student learning outcomes

Siklus	Nilai Rata-rata
1	63.7
2	82

The Learning Cycle learning model is an effective learning model used in chemistry learning at Vocational High Schools, especially in electrochemical material. This learning method is able to increase the curiosity of students in learning, is able to make students become active because all of them have the opportunity to ask questions, answer or discuss in groups. In addition, students are also able to express opinions with what they have found through discussion. What is no less important is that students are able to apply learning in everyday life. For example, iron corrosion can be prevented by painting, coating with other metals, batteries that use voltaic cells, and so on. (Fajaroh, 2008)

This research consisted of 2 cycles, each cycle consisting of 2 meetings. The first cycle studied the topic of voltaic cells while the second cycle studied the topic of corrosion. Based on the data obtained from cycle I and cycle II, it can be seen that the application of the Learning Cycle learning model can improve learning outcomes in chemistry subject matter Electrochemistry in class X TKR 1 SMK Negeri 4 Palembang. The learning outcomes in question are the learning completeness of students in the cognitive aspect. In cycle I, students who did not complete were more than students who completed, where 13 students completed, while 27 students did not complete. While the range of values obtained by students in cycle I was 40-80 and the class average value was 63.67. So that after calculating, the percentage of completeness of the classical class only reached 43.33%. The classical completeness percentage that must be achieved is 85%. This shows that even better improvements must be made in cycle II so that the target can be achieved

Acquisition of scores that are still low is caused by students who are still not serious in learning. Students are still confused or do not understand the stages of learning because they usually study conventionally. So students just sit quietly and listen to what the teacher says. Meanwhile, in the learning model applied to this study, students are required to be active. This is one of the causes of miscommunication between teachers and students so that time runs out but there are several groups that have not finished discussing students' worksheets. This is what causes students not to understand the material which results in the value they get is also low. However, there were some students who scored high and above the minimum completion criteria, this happened because their group was serious about working on the students' worksheets and the group members consisted of smart students. In addition, another thing that causes low scores is that students are not allowed to be burdened with homework on the grounds that the school has implemented a full day system, so they only study fully at school. According to the researcher, this greatly influenced the grades obtained by the students so that in the next cycle the researcher prepared even better in terms of time division in applying the model in class.

In cycle II, student learning outcomes increased and reached the criteria. Students who completed as many as 26 people while who did not complete as many as 4 people. While the range of scores obtained by students in cycle I was 60-90 and the class average value was 82. So after calculating, the percentage of classical completeness class only reached 86.67%. This figure shows that the percentage of completeness of the classical class has reached the criteria. This achievement occurred because in cycle II students already understood and were familiar with the learning model that was applied so it did not take much time to direct them to discuss. In cycle II, a group reshuffle was also carried out, where each group had students with high, medium and low abilities so that each student in the group was enthusiastic in discussing, asking questions and also giving answers to questions given by the teacher or other group mates. That is why this class

action research was only conducted up to 2 cycles. The increase in completeness and the average cognitive learning outcomes of students can be presented in graph 1.

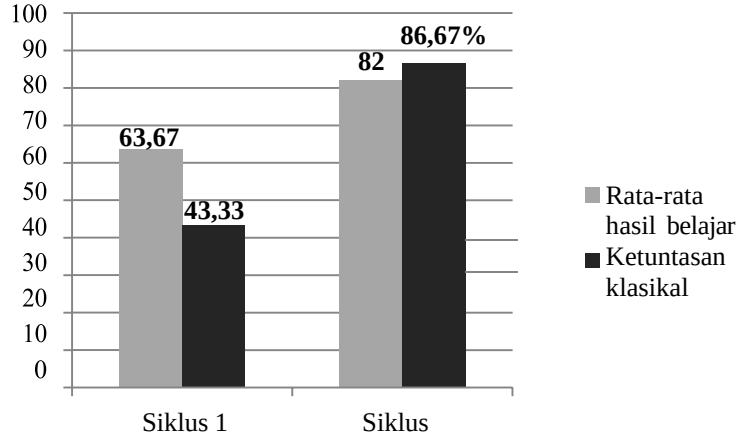

Figure 1. Improved mastery and average learning outcomes of students in cycles 1 and 2

The increase in the percentage of classical completeness in learning is caused by several factors. One of the factors that causes an increase in student learning outcomes is the learning model used in the learning process. As expressed by Utami, Hastuti, Yamtinah, Padmini, & Arroyan (2013) in their journal, it is explained that the application of the constructivism-based Learning Cycle learning model so that students can learn material meaningfully by working and thinking, knowledge is constructed from students' experiences through investigation and discoveries to solve problems, then students can express concepts that are in accordance with their experiences and use the understanding that has been obtained to solve other problems related to everyday life. Based on the description above, it can be seen that the completeness of the learning outcomes of students at the end of the cycle has reached the planned target. The results of the study (Sari, Martini & Yamtinah (2013) show that the Learning Cycle learning model can improve the quality of students' learning processes in the aspect of achievement motivation and can improve the quality of student learning outcomes, namely student achievement in cognitive, affective and psychomotor aspects Likewise the results of research (Sari, Mulyani & Utami (2013) that the Learning Cycle learning model can make students more active so as to improve the quality of student learning processes and outcomes.

▪ CONCLUSION

Based on the research data, it can be concluded that the application of the Learning Cycle learning model can improve chemistry learning outcomes for class X students of SMK Negeri 4 Palembang. From the results of the learning process, there are several stages that can be concluded, namely: Early stages, students pay attention to the teacher's directions and during apperception, students can answer every question given by the teacher; Engagement, at this stage students are enthusiastic about giving answers when the teacher gives questions about some applications of voltaic cells and corrosion in life; Exploration, at this stage there are several students in the group who do not participate in the discussion because the discussion is controlled by students who are highly capable and this has been reprimanded by the teacher; Explanation, at this stage students are able

to explain what they have obtained from the results of collecting data from books and the internet about voltaic cells and corrosion; Extention, at this stage students work together in discussing problems or questions given in students' worksheets, there are some students who are noisy but are immediately reprimanded by the teacher; Evaluation, not all groups present the results of the discussion because there is not enough time, but the teacher instructs if there is a wrong delivery by the advanced group then the other groups can refute or ask questions; In the final stage, students work on evaluation questions seriously and without cheating because they are closely supervised by the teacher.

The Learning Cycle learning model can be applied to electrochemical material because it can improve student learning outcomes. It is better for students to be able to control themselves and be serious in groups when learning so that the classroom atmosphere remains conducive so as to improve student learning achievement.

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