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The Influence of The Problem Based Learning Model Assisted with Online-Based Practicum Media on Learning Outcomes in Excretion System Subject Matters

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Abstract*:* This research aims to: 1) determine the differences in student learning outcomes with the conventional model and the PBL model on the excretion system material, 2) determine the differences in student learning outcomes with the conventional model and the PBL model assisted by online-based practicum media on the excretion system material, and 3) knowing that there is a significant influence from the application of the PBL model assisted by online-based practicum media on student learning outcomes in the excretory system material. This research method uses a quantitative approach, using a quasi-experimental design research type, with a non-equivalent control group design research design. The sampling technique was carried out using saturated sampling, and the data collection process used test instruments in the form of pretest and posttest questions. The results of this research are 1) There are differences in student learning outcomes between the conventional model and the PBL model, indicated by the average value of the posttest data of 67.39 < 70.86. 2) There are differences in student learning outcomes between the conventional model and the PBL model assisted by online-based practicum media, shown by the average value of posttest data of 67.39 < 79.00. 3) There is a significant influence from the application of the Problem-Based Learning model assisted by online-based practicum media on student learning outcomes in the excretion system material, shown by the sig value. 0.00 < 0.05.

Keywords: *Problem-Based Learning* (PBL), OLabs, Student Learning Outcomes and Excretory System.

INTRODUCTION

Learning is a process carried out by a person to gain knowledge which results in changes in behavior for the better (Nugraha, 2018). According to

Susanto (2014), learning is an activity that a person carries out deliberately in a conscious state to obtain a concept of understanding so as to enable a person to change their behavior relatively well in thinking, understanding, analyzing knowledge and applying it for problem solving. The aim of carrying out learning activities is to help students understand concepts, develop critical thinking skills, and act towards a problem rather than just remembering isolated facts (Izza, 2020).

One of the subjects that requires critical thinking is biology. Biology is a science that studies living things and their environment (Tammu, 2018). Biology learning must be designed to provide students with opportunities to discover facts, build concepts and discover new values through the process (Utomo, 2018). Another opinion also states that biology learning is learning related to finding out and understanding nature systematically so that biology learning is not only mastery of a collection of knowledge in the form of facts, concepts, but also a process of discovery that requires students to can think critically (Tanjung, 2016). This is in line with the demands of the 2013 curriculum,

This is in accordance with research conducted by Sudjana (2004), learning using the lecture method makes students' activities tend to be passive, just taking notes and listening to the teacher's explanation, resulting in low learning outcomes. Apart from that, in biology subjects there is some material that requires practical activities, so it is not enough for students just to understand the theory and concepts presented but requires action for students to be able to apply these concepts so that they are easy to understand. However, practicum activities at school are hampered due to limited facilities and infrastructure to facilitate practicum activities, as well as time restrictions so that implementation is carried out during class hours, this makes educators feel that the time for carrying out practicum is very limited. In biology subjects there is some material that requires practical activities, so it is not enough for students just to understand the theory and concepts presented but requires action for students to be able to apply these concepts so that they are easy to understand. However, practicum activities at school are hampered due to limited facilities and infrastructure to facilitate practicum activities, as well as time restrictions so that implementation is carried out during class hours, this makes educators feel that the time for carrying out practicum is very limited. In biology subjects there is some material that requires practical activities, so it is not enough for students just to understand the theory and concepts presented but requires action for students to be able to apply these concepts so that they are easy to understand. However, practicum activities at school are hampered due to limited facilities and infrastructure to facilitate practicum activities, as well as time restrictions so that implementation is carried

out during class hours, this makes educators feel that the time for carrying out practicum is very limited.

This obstacle is one of the inhibiting factors in learning biological science which is synonymous with practicum, where practicum is something that can build students' enthusiasm and understanding in receiving the material so that it can improve student learning outcomes. This is in line with previous research which states that practicums carried out in laboratories should be equipped with laboratory equipment to support practicum activities so that carrying out experiments or investigations can run well (Muspiroh, 2012). Apart from that (Riswanto, 2017) states that practicum-based learning can improve scientific process skills and encourage the realization of scientific attitudes so that they have a relationship and influence the achievement of learning outcomes.

One learning model that meets the characteristics of a constructivist approach is the Problem Based Learning (PBL) Model. According to Trianto (2011), the problem based learning model is a learning model that is based on many problems that require authentic investigation, namely investigations that require real solutions to real problems. According to Duch, Allen and White in (Hamruni, 2012), the PBL model provides conditions for improving critical thinking and analysis skills and solving complex problems in real life so that it will create a culture of thinking in students,

The PBL model provides stimulation to stimulate students' curiosity before studying a subject and prepares students to try to solve problems by discussing them in groups so that students are not only able to get a concept by building their own knowledge but also interact with teachers and other students through group work. This is in accordance with the opinion of Arends (2012), who states that the PBL model is learning that presents authentic and meaningful problems to students, which functions as a springboard for investigation and inquiry. All activities carried out by students are directed at seeking and finding their own answers to questions, so that it is hoped that they can improve student learning outcomes. This is also part of one of the syntaxes of the PBL model, where investigations or gathering information can be done by carrying out experiments to find solutions to problems. This ability can be developed through practicum activities (Hidayati, 2012).

In this case, there is a need for innovation in the learning process to achieve maximum learning outcomes, namely by varying learning models and methods. One of the learning models and methods used is the Problem Based Learning learning model accompanied by practical methods. This is in accordance with the opinion of (Sanjaya, 2013) which states that the practicum-based Problem Based Learning learning model is a learning model that uses real problems as a context

for students to develop students' abilities. In solving these problems students are directed to carry out authentic investigations, through student practicums. will be able to carry out experiments based on the theory they have learned so that students can find real solutions to problems.

Based on the results of research conducted by Novianti (2019), the application of the PBL model using practicum methods on ecosystem material has an effect on student learning outcomes, because students remember their understanding of the material taught better and encourage students to think. Apart from that, research conducted by Nanik (2016) stated that the application of a practicum-based PBL model can also improve students' cognitive learning outcomes. However, according to Hasruddin and Rezeqi (2012) learning using the practical method has several obstacles. The problem faced is the lack of time available for carrying out practicums. Then followed by poor room conditions with problems with laboratory equipment and laboratory equipment.

The effort to overcome this problem is by carrying out online-based practicums. Online-based practicums are designed to assist the practicum role if the facilities/infrastructure for carrying out the practicum directly are not possible to carry out. Online-based practicums are designed to increase students' understanding of the concepts of material that will be provided through videos that describe the implementation of a practicum (Rante et al, 2013). Online-based practicums are also more effective during learning because students can use them at any time and the time needed to do the practicum is more efficient. As with online-based practicums, there are explanations regarding the use of practicum tools and materials and there are trials of practicum implementation (Erniwati et al, 2014).

Based on this description, it is necessary to conduct a study regarding the influence of the Problem Based Learning (PBL) model assisted by online-based practicum media on the learning outcomes of class XI students, especially on excretory system material.

METHOD

This research is quantitative research using a design*Quasi Experimental.*The research design used in this study was a non-equivalent control group design. The sampling technique was carried out using Saturated Sampling. The sample used in this research was class Problem Based Learning (PBL) only, and class XI MIA 3 as the control class (-), namely the class where the conventional learning model is applied.

The data collection techniques used in this research are observation, interviews, documentation and tests. The instruments in this assessment are the

lesson plan implementation sheet, pretest-posttest questions and affective and psychomotor observation sheets.

Carry out data collection analysis, including pretest-posttest assessment and hypothesis testing. Normality test (Kolmogorov Smirnov) and homogeneity test (Lavene Test) and ANCOVA (Analysis of covariance) were used to test the hypothesis. All data analysis was carried out using statistical software in SPSS.

RESULTS AND DISCUSSION

Research result

Descriptive Analysis

a) Cognitive Domain Learning Outcomes

Students' cognitive learning outcomes can be determined by using a multiple choice question instrument with a total of 20 questions that have been tested and validated. The student learning outcome scores in the cognitive domain of the three classes were taken from the pre-test and post-test scores. Data*pre-test*and post-test for the three classes on the excretory system material which is presented in the table below:

Table 1. Descriptive Student Learning Outcomes on Excretory System Material

Statistics	Experiment		Positive Control		Negative Control	
	Pre-test	*Post-test*	*Pre-test*	*Post-test*	*Pre-test*	*Post-test*
Number of Samples	25	25	35	35	23	23
Score Mak	55	95	80	85	50	80
Min Score	15	60	15	55	15	50
Mean	36.80	79.00	49.15	70.86	28.70	67.39
Standard Deviation	11,446	9,465	19,684	9,194	9,441	9,029

To make it easier to see the differences in the average value of learning outcomes in the cognitive domain of students from the three samples, it can be seen in Figure 1. Based on Figure 1 above, it can be seen that there has been an increase in the average value of students' cognitive learning outcomes from the data*pre-test*and post-test of the three samples.

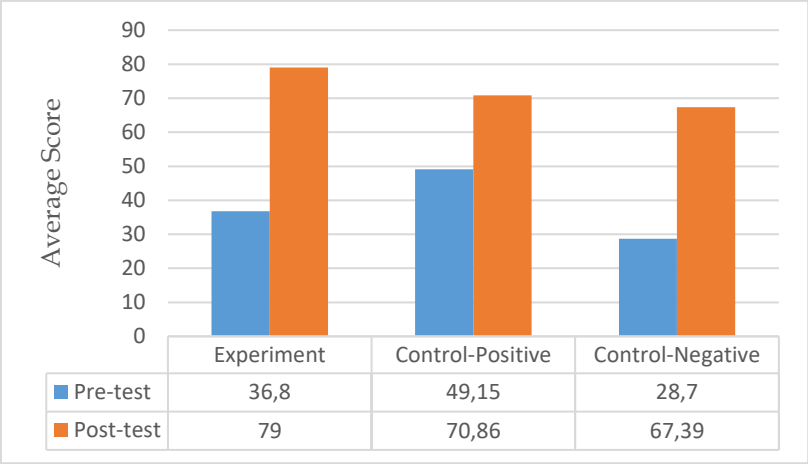

Figure 1. Graph of Average Learning Outcomes in the Cognitive Domain

b) Affective Domain Learning Outcomes

Students' affective learning outcomes can be determined by using an observation sheet instrument which is assessed by observers at each learning meeting. The results of the research show that in each class there was an increase at each meeting as presented in Table 2 below:

Table 2. Recap of Student Learning Outcomes in the Affective Domain

Class	Meeting	Mark	Average	Criteria
Experiment	I	70.60	75.60 %	Good
	II	73.80		
	III	82.40		
Positive Control	I	66.85	70.10 %	Good
	II	67.43		
	III	76.00		
Negative Control	I	67.17	69.64 %	Enough
	II	68.48		
	III	73.26		

The student learning outcomes in the experimental class obtained an average percentage of 75.60% with the criteria for a good score being >70 in the affective domain. Likewise, in the positive control class, an average percentage of 70.10% was obtained with good criteria because it was >70 in the affective domain. Meanwhile, in the negative control class, the percentage score was 69.64% with sufficient criteria because it was<70 in the affective domain.

c) Psychomotor Learning Outcomes

Students' psychomotor learning outcomes can be determined using an observation sheet instrument which is assessed by observers at each learning meeting. To make it easier to see the increase in students' psychomotor scores in

each class from each aspect measured at each meeting, it can be seen in Tabel 3. below:

Table 3. Recap of Student Learning Outcome Values in Domain Psychomotor

Class	Meeting	Mark		Average		Criteria
Experiment	II	72.50	71.50	80.00	78.50	
	III	87.50	85.50	%	%	Good
Positive	II	74.64				
Control	III	80.35		77.50 %		Good
Negative	II	67.93				
Control	III	78.80		73.37 %		Good

The results showed that the experimental class obtained a psychomotor score with an average of 78.50%. However, in the special category for the experimental class, psychomotor scores were obtained with an average of 80.00%. In the positive control class, the average score was 77.50%, while in the negative control class, the average score was 73.37%. Where these three classes are included in the good criteria because they are > 70 in the psychomotor domain.

Research Data Analysis

a) Research Data Normality Test

The Normality test used uses the help of a computer statistical program*SPSS version 25 for Windows* with Kolmogorov Smirnov test statistics. Data is said to be normally distributed if the value (Sig) > 0.05. The results of data analysis show the following results:

Table 4. Normality Test Results

Learning outcomes	Class	Value (Sig)	Sig α	Conclusion
Pre-test	Experiment	,060	> 0.05	Normally distributed
	Positive Control	.173*		
	Negative Control	,200		
Post-test	Experiment	,200*		
	Positive Control	,094		
	Negative Control	,200		

Based on Table 4.3, it shows that the learning outcomes data for both the experimental class, positive control class and negative control class have a value (Sig) > 0.05, so it can be concluded that the result data group*pretest*and the posttest was normally distributed. Therefore, the hypothesis testing can be done parametrically with the Ancova test.

b) Homogeneity Test

After carrying out the normality test, a homogeneity test is then carried out, which aims to see whether the research data is homogeneous or not. This test is carried out with*Levene test*. The results of the homogeneity test analysis can be seen in the following table:

Table 5. Homogeneity Test Results

		Levene Statistics	df 1	df2	Sig.
Pretest Learning Results	Based on Mean	11,744	2	80	,000
	Based on Median	8,594	2	80	,000
	Based on Median and with adjusted df	8,594	2	62,645	,001
	Based on trimmed mean	11,743	2	80	,000
Posttest Learning Results	Based on Mean	,041	2	80	,959
	Based on Median	,049	2	80	,952
	Based on Median and with adjusted df	,049	2	79,388	,952
	Based on trimmed mean	,039	2	80	,962

Based on Table 4.5 above, it is known that the output value (Sig.) *Baased on Mean*for the pretest variable for student learning outcomes is 0.00 <0.05, it can be concluded that the variance in pretest data for student learning outcomes is not homogeneous. Meanwhile, in the posttest, student learning outcomes were 0.959 > 0.05, so it can be concluded that the variance in the posttest data on student learning outcomes was homogeneous.

c) Hypothesis testing

Based on the results of the prerequisite tests, the pretest and posttest data on student learning outcomes did not meet the requirements to proceed to ANCOVA analysis so they were analyzed using non-parametric statistical tests. Summary of parametric test results no*Quade's Rank Analysis of Covariance*Student learning outcomes are presented in Table 6. Based on the results of the analysis, a value (Sig) of 0.00 < 0.05 was obtained, meaning that there were significant differences between the three treatments on student learning outcomes. Data analysis then proceeded to the LSD test which is presented in Table 6.

In the output table above, it is known that the hypothesis test results are significant at 0.00 < 0.05 so it can be concluded that H0 is rejected and Ha is accepted. Thus, it can be concluded that there is a significant (real) difference between the average student learning outcomes between the experimental class and the control class.

Table 6 Analysis Of Covariance Test Results Student Learning Outcomes

Source	*Sum of Squares*	*Df*	*Mean Square*	**F**	*Sig.*
Between Groups	9390.368	2	4695.184	16,359	,000
Within Groups	22960.977	80	287,012		
Total	32351.344	82			
Experiment			8.143 a		
Positive Control			-8.143 a		
Negative Control			-11,609 b		

Discussion

This research aims to determine the magnitude of the influence of the Problem Based Learning (PBL) learning model on student learning outcomes in excretory system material. By analyzing experimental research that has been carried out previously regarding the use of PBL models. This research is limited to the Problem Based Learning model which is classified into two types in terms of implementation, namely Problem Based Learning assisted by online-based practicum media and Problem Based Learning only. Learning outcomes are limited to learning outcomes which are classified into three domains, namely cognitive, affective and psychomotor aspects.

Based on the data analysis that has been carried out, the results obtained from the LSD further test of student learning outcomes are listed in Table 6. In this table it can be seen in the column *mean difference* through LSD test results where values that are significantly different are marked with an asterisk after the number and those that are not different are not marked. According to the data description, it has been stated with a value of (8.143) for the experimental class and the positive control class, which means there is no significant difference, with a value of (-8.143) for the positive control class and the negative control class, which means there is no significant difference, and with a value of (- 11,069) for the negative control class and the experimental class, which means that there is a significant difference between the experimental class and the negative control class.

There is a significant difference in learning outcomes in the experimental class and the negative control class, this can occur because the treatment given to each class is different, where in the experimental class learning is carried out using the Problem Based Learning (PBL) model assisted by online practicum media, while in the negative control class learning is carried out using conventional models. Judging from the value *post-test* the learning outcomes of the experimental class > those of the negative control class.

Where the PBL learning model based on practical activities requires students to actively discuss and the teacher must present authentic problems from the material to be presented to students. Students are given problems by the teacher according to the lesson material, then students actively search for as much information as possible, carry out investigations to find their own explanations and solutions to the problem. After students can find a solution to the problem, the teacher and students reflect or evaluate their investigation and the processes used. Students will be motivated to learn the material because they will be interested and participate directly in solving problems. Students' scientific attitudes will also be formed through discussion activities in groups and experiments carried out. The PBL learning model based on practical activities will also hone the teacher's ability to present problems or orient students to authentic problems, namely real, everyday life problems. This is in accordance with Ibrahim's opinion in (Trianto: 2011) that in PBL classes, the teacher's role is different from conventional classes. The teacher's role in the PBL class is to pose problems or orient students to authentic problems, facilitate/guide investigations, for example making observations or conducting experiments/experiments, facilitating student discussions, supporting student learning. The PBL learning model based on practical activities will also hone the teacher's ability to present problems or orient students to authentic problems, namely real, everyday life problems. This is in accordance with Ibrahim's opinion in (Trianto: 2011) that in PBL classes, the teacher's role is different from conventional classes.

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In line with this, Arnyana's (2006) research results show that the problem-based learning model has a significant influence in improving learning outcomes. Students who build their own knowledge and at the same time apply it in real life make learning very meaningful because students can remember, understand and apply the knowledge learned, carry out analysis, synthesis and evaluation of everything they learn. Apart from that, online-based practicums are designed to help the practicum role if the facilities/infrastructure for carrying out direct practicums are not possible to carry out. Online-based practicums are designed to increase students' understanding of the concepts of material that will be provided through videos that describe the implementation of a practicum (Rante et al, 2013). Online-based practicums are also more effective during learning because students can use them at any time and the time needed to do the practicum is more efficient.

In contrast to classes where learning is carried out using conventional models, they tend to have lower learning outcomes than experimental classes. This is because in conventional learning, in the learning process the teacher conveys all the material to be studied to the students and the students listen to what the teacher says regarding the material being taught. So that teaching activities in conventional learning tend to be directed at the flow of information from teacher to student, and the use of the lecture method seems very dominant. According to (Sriyono, 1992:99), the lecture method is the teacher's narrative and explanation orally. Where in its implementation teachers can use teaching aids to clarify the descriptions given to students. The teaching method implemented in this research is the conventional method (lecture). Using inappropriate teaching methods will result in a less than optimal impact on student learning outcomes.

CONCLUSION

Based on the results of the research and discussion that have been described, the following conclusions can be drawn: Based on the average value of learning outcomes treated with the conventional learning model, there is no significant difference with the Problem Based Learning (PBL) model on the excretion system material. Judging from the average value of learning outcomes for treatment with the conventional model, there is a significant difference with

Problem Based Learning (PBL) assisted by online-based practicum on excretory system material. Based on the results of the significant hypothesis test of 0.00 < 0.05, it can be concluded that H0 is rejected and Ha is accepted. Thus, there is a significant (real) difference between the average student learning outcomes between the experimental class and the control class.

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