The Effect of Problem Based Learning Model on Students' Learning Outcomes in the "*Belajar dan Pembelajaran*" Course

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Abstract

Problem Based Learning Model is a learning model that is intensively promoted at the University of Jambi at this time. This study aims to determine whether there is a significant effect on the learning outcomes of English study program students taught with the Problem Based Learning Model in the course of "*Belajar dan Pembelajaran (Learning and Instruction).* The research design used is Quasi-Experimental Research. This design involves two groups: one as the control group and one as the experimental group. The data obtained from this research is processed by calculating the gain or difference between the pretest and post-test scores. For time efficiency, data were analyzed using the SPSS (Statistical Product and Service Solution) program for Windows version 24. Because of the Asymp value. Sig. (2-tailed) 0.381, which means greater than 0.025, it can be decided that H0 is accepted. So it can be concluded that the PBL learning model used in the experimental class is not effective enough to improve student learning outcomes in "*Belajar dan Pembelajaran*" courses.

Keywords: effect, project based learning, learning

Abstrak

Model Problem Based Learning merupakan model pembelajaran yang sedang gencar-gencarnya digalakkan di Universitas jambi saat ini. Penelitian ini bertujuan untuk mengetahui apakah ada pengaruh signifikan antara hasil belajar mahasiswa prodi bahasa Inggris yang diajarkan dengan Model Pembelajaran Problem Based Learning pada mata kuliah "Belajar dan Pembelajaran". Desain penelitian yang digunakan adalah Quasi-Eksperiment Research atau Eksperimen semu. Desain ini melibatkan dua grup. Satu sebagai grup kontrol dan satu sebagai grup eksperimen. Pengolahan Data untuk data yang diperoleh dari pada penelitian ini adalah dengan cara menghitung gain atau selisih antara skor pretest dan postest. Untuk efisiensi waktu, pengolahan data dianalisa dengan menggunakan program SPSS (Statistical Product ang Service Solution) for windows versi 24. Karena nilai Asymp. Sig. (2-tailed) 0,381 bearti lebih besar dari 0,025, maka bisa diputuskan H0 diterima. Jadi dapat disimpulkan bahwa model Pembelajaran PBL yang digunakan dikelas eksperimen tidak cukup efektif untuk meningkatkan hasil belajar mahasiswa pada mata kuliah Belajar dan Pembelajaran.

Kata Kunci: *pengaruh, project based learning, hasil belajar*

1. Introduction

The subject "Belajar dan Pembelajaran" is a compulsory subject that all students must take at the Faculty of Teacher Training and Education (FKIP) Unja (Universitas Jambi). There is no exception for the English Education study program students who are part of the FKIP itself. This course is offered in the third semester in the English Education Study Program with 2 (two) credits.

The learning system that is applied so far is generally a discussion model where the lecturer provides topics that are included in the syllabus. Each topic must be presented per group at each meeting. During the discussion, other students who did not attend the presentation had to listen, and after the presentation, they were given the opportunity to ask questions to the presenter. Usually, in the first session, the opportunity to ask, comment, or give advice regarding what has been discussed is opened. Questions are limited to 3 questions. Suppose all three questions have been answered by both the presenter or other students as discussion participants. In that case, the lecturer as the controller and the discussion manager will also contribute suggestions regarding what was discussed in the first discussion session. If there is still time for learning, a second question session will be opened. If not, it will end with a closing statement, both from the group representatives who appear and from the supporting lecturer..

If examined further, the question arises "Does the learning model that has been applied so far in the Belajar dan Pembelajaran course above accommodate the wishes voiced in the Decree of the Minister of Education and Culture Number 754/P/2020 and the strategic plan of the Ministry of Education and Culture mandated by Permendikbud no 22 The year 2020?" namely regarding the fulfillment or achievement of the Main Performance Indicators of Higher Education, KPI (key performance indicators) 7 in the form of collaborative and participatory classes (Direktorat Jenderal Pendidikan Tinggi, 2021)

Moving on from that thought and responding to what the university has to offer regarding institutional activities to follow up on the implementation of the IKU (Indikator Kinerja Utama) 7 or KPI 7 in the form of holding a Project Based Learning Innovation Research Grant (Project Based Learning-PjBL) Jambi University in 2021, researchers are encouraged to participate involved in it. With the hope of improving the quality of researchers as teachers and learning in the future, especially in the subjects taught, namely Belajar dan Pembelajaran.

Based on the explanation above, the researchers want to see whether there is a significant influence between the learning outcomes of students in the English language study program taught by the Project-Based Learning Learning Model in the "Belajar dan Pembelajaran" course.

Literature Review

General Learning Concepts

This part reviews the concept of the Project-Based Learning Model which is the central topic in accordance with the broad umbrella of research offered by the university. Two more learning concepts are offered under this umbrella, namely Case Method (which is also known as Problem Based Learning (learning based on problems) and Team-Based Project (TIM Penyusun, 2021). After the researchers tried to explore the literature further, it turned out that the concepts of Project-Based Learning (PBL) and Problem Based Learning (PBL) could be said to be " same but not similar". In various literature such as (Doppelt, 2003); Krajcik, Joseph S. and Czerniak (2018: 1); Leat (2017) uses the abbreviation PBL to refer to Project-Based Learning, while Cindy E. Hmelo-Silver1 (2004), Allen, D. E., Donham, R. S., & Bernhardt (2011); (Ansarian, Loghman and Lin, 2018)use the same abbreviation for different things, namely Problem Based Learning.

The abbreviation equation and the difference in length are sometimes a little confusing for some people, including researchers at first. The explanation of the location of the similarities and differences between the two terms of the learning model is referred as proposed by Larmer (2015) as shown in the picture below:

Table 1. Project Based Learning vs. Problem Based Learning

Project Based Learning vs. Problem Based Learning	
Similarities	
Both PBLs: • Focus on an open-ended question or task • Provide authentic applications of content and skills • Build 21st century success skills • Emphasize student independence and inquiry • Are longer and more multifaceted than traditional lessons or assignments	
Differences	
Project Based Learning	**Problem Based Learning**
Often multi-subject	More often single-subject, but can be multi-subject
May be lengthy (weeks or months)	Tend to be shorter, but can be lengthy
Follows general, variously-named steps	Classically follows specific, traditionally prescribed steps
Includes the creation of a product or performance	The "product" may be tangible OR a proposed solution, expressed in writing or in a presentation
May use scenarios but often involves real-world, fully authentic tasks and settings	Often uses case studies or fictitious scenarios as "ill-structured problems"

Source: (Larmer, 2015)

The position of problem-based *learning* is decided as part of a set of project-based learning that is used by the teacher to solve problems. However, it cannot be denied that PBL (*Problem Based Learning*) has a history and a series of procedures that are usually followed, which is more formally observed than in other types of projects. For this reason, the concept presented by Larmer (2015) is in line with what is in the proposal writing guidebook (TIM Penyusun, 2021). Thus, it is a scientific reason for the researchers to employ the concept of *Problem Based Learning* in the explanation of the theory in this proposal. Besides, because there are similar concepts between the two and this is a follow-up of what is offered in the proposal writing guidebook

A Brief History of Problem Based Learning (PBL)

In response to complaints that standard lectures do not adequately prepare medical students for problem-solving in a clinical context, problem-based learning (PBL) was created in the 1950s. PBL is a non-traditional, active, inductive, and student-centered approach that places a strong emphasis on introducing problems from the real world. In PBL, the instructor's function changes from that of a content provider to that of a facilitator who bridges the problem-solving process.

Cindy E. Hmelo-Silver1 (2004) views that PBL can lead students to build a broad and flexible knowledge base, beyond common knowledge, providing opportunities for them to apply that knowledge in various situations. Therefore, educators claim that the conceptual knowledge brought by PBL can better prepare students for future careers. This is because PBL enables students to go beyond simple comprehension and learn how to apply information in actual situations.

Additionally, because the context that necessitates the employment of problem-solving abilities is tightly tied to knowledge.

More has been done using PBL in recent decades. This indicates that it is used in a variety of academic subjects, including K–12 education, chemistry, engineering, teacher preparation, educational psychology, architecture, legal studies, and business, in addition to the medical and medical industries (Hung, W., Jonassen, D., & Liu, 2008). Over the past two decades, the National Science Foundation has focused more on and supported the implementation of problem-based learning in the domains of science, technology, engineering, and mathematics (STEM) education (Eberlein et al., 2008). Students will learn and remember information more efficiently when it is presented, discussed, and applied to real-world situations, which is the core justification for utilizing PBL in STEM education, just as it is in other subjects. Steps for Problem-Based Learning (PBL).

Referring to the research guidebook of the Jambi University Research and Community Service Institute (TIM Penyusun, 2021), the steps for implementing PBL are as follows:

1. Problem formulated. Lecturers provide guidance to students in finding problems that they will solve during the learning process. Although in essence the problem has been formulated in advance by the lecturer concerned.
2. Problem analyzed. The lecturer asks students to look at and examine the existing problems carefully from various perspectives.
3. Hypothesis is made. Lecturers ask students to make various alternative problems that have been found previously armed with the knowledge that already exists in them.
4. Data is collected. The lecturer asks students to collect as much supporting information as possible from various sources in order to solve the problem.
5. The hypothesis is tested. The lecturer asks students to draw conclusions.
6. Solutions for troubleshooting are created. The lecturer asks students to make recommendations according to the formulation of the results of hypothesis testing and the formulation of conclusions.

Learning Outcomes

The nature of teaching and learning processes, as well as the types and frequency of evaluations of courses and subjects, are all significantly influenced by learning outcomes, according to (Harris & Clayton, 2019). Winataputra, US and Rosita (1997: 177) added that the notion of learning outcomes cannot be separated from what happens in learning activities both in the classroom, at school, and outside of school. Furthermore, he added that the learning outcomes obtained by students or students can be classified into mastery results moment and also mastery which is sustainable. The mastery which moment obtained in one learning activity. On the other hand, continuous mastery must be carried out continuously in almost every activity Learning. Winataputra, US and Rosita (1997: 178) divide learning outcomes into two, namely cognitive and affective learning outcomes. There are six levels of cognitive learning outcomes according to Bloom in Winataputra, US and Rosita (1997:178), which are: knowledge, comprehension, application, analysis, synthesis, and evaluation

The six levels above are hierarchical which means they are graded or sequentially from the lowest number 1 to the highest number 6. Meanwhile, affective learning outcomes are divided into five levels according to Krathwohl & Anderson (2010), namely: receiving, responding, appreciation, organizing, characterization and internalization). Thus, the learning outcomes can actually be graded from the lowest level or the lowest level to the highest level which can be categorized as a difficult level.

Previous Researches

The first is the study "Problem-based Learning: Influence on Students' Learning in an Electrical Engineering Course" by Yadav et al., (2011). The impact of problem-based learning (PBL) on electrical engineering students' conceptual comprehension and perceptions of PBL learning is examined in this research. The participants in this study were 55 electrical engineering students at a university in the Midwest. In subjects where traditional lectures serve as the fundamental phase and problem-based learning serves as the experimental phase, this study employs the ABAB research design. Pre- and post-tests on the four study-related themes were completed by participants, along with the Student Assessment of Learning Gains (SALG) survey. The findings revealed that PBL had twice as good learning outcomes as conventional learning.

The second is a study conducted by Argaw et al., (2017) with the title "The Effect of Problem Based Learning (PBL) Instruction on Students' Motivation and Problem-Solving Skills of Physics". The purpose of this study is to ascertain how problem-based learning methodologies affect students' problem-solving abilities and how they contribute to motivational growth. According to this study, PBL strategies should be carefully modified in schools in order to raise student accomplishment.

The previous studies indicate that there are similarities with the research to be carried out. The similarities are that they both apply the concept of Problem Based Learning (PBL) and they both conduct experiments. What distinguishes it is the first place and subject of research. Furthermore, the subjects are also different here. The first research conducted research on the application of PBL for Electrical Engineering courses and the second for Physics Subjects. Meanwhile, what will be done at this time is on the subject of Belajar dan Pembelajaran.

2. Method

The subjects that will be discussed in this part are research design and procedures, data and data sources, data collection techniques and data analysis.

Research Design

The research methodology employed was experimental. Experimental research is the only sort of research that can establish a cause-and-effect relationship by testing hypotheses (Gay, LR and Airisian, 2000). This indicates that only experimental research can be used to evaluate hypotheses and demonstrate cause-and-effect correlations. The experiment is a scientific examination in which one or more independent variables are manipulated (Ary et al., 2009). Observing the effect of a manipulation on the dependent variable while controlling all other relevant factors. In this study, the hypothesis was investigated to determine the significance of the

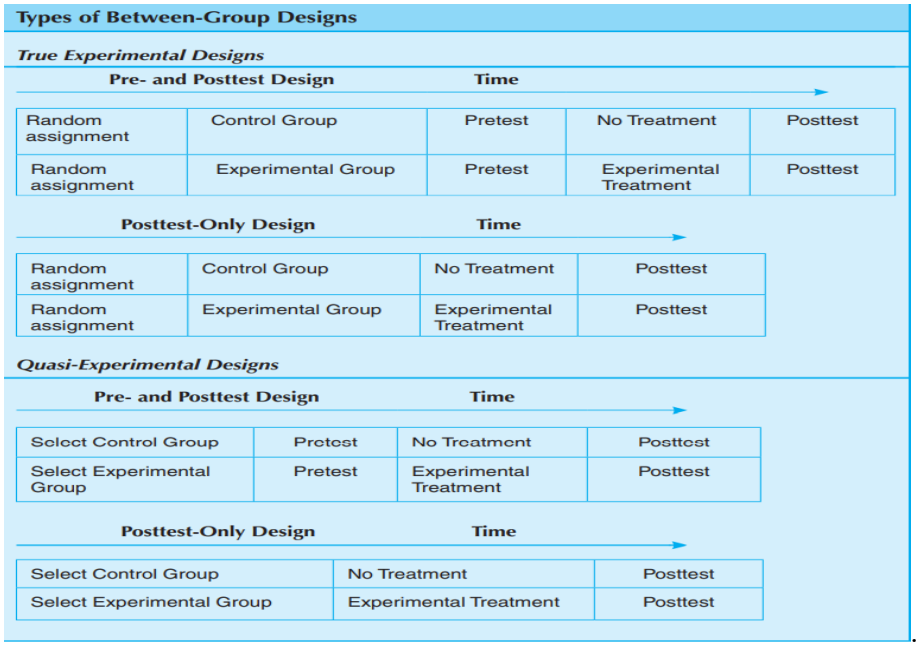
relationship between Project-Based Learning and Students' Learning Outcomes in "Belajar dan Pembelajaran." One variable that was subject to manipulation. This is how the hypothesis is formulated:

Ho : There is no Effect of Project-Based Learning Model on Student Learning Outcomes in the "*Belajar dan Pembelajaran*" Course

Ha : There is No Effect of Project-Based Learning Model on Student Learning Outcomes in the "*Belajar dan Pembelajaran*" Course

Two groups, including a control group and an experimental group, participated in the quasi-experimental research design. The following table provides additional information derived from Creswell's book (2012:310):

Table 2. Types of Between-Group Design



Types of Between-Group Designs

True Experimental Designs

Pre- and Posttest Design **Time**

Random assignment	Control Group	Pretest	No Treatment	Posttest
Random assignment	Experimental Group	Pretest	Experimental Treatment	Posttest

Posttest-Only Design **Time**

Random assignment	Control Group	No Treatment	Posttest
Random assignment	Experimental Group	Experimental Treatment	Posttest

Quasi-Experimental Designs

Pre- and Posttest Design **Time**

Select Control Group	Pretest	No Treatment	Posttest
Select Experimental Group	Pretest	Experimental Treatment	Posttest

Posttest-Only Design **Time**

Select Control Group	No Treatment	Posttest
Select Experimental Group	Experimental Treatment	Posttest

Source: Creswell (2012)

Following the above table, the study design to be implemented is as follows:

Table 3. Quasi-Experimental Design

Control Group	Pre-test	No treatment	Post-test
Experimental Group	Pre-test	With treatment	Post-test

Source: Creswell (2012)

The Subject of the Research

Population

Population, according to Ary, D., Jacobs, LC, and Razavieh (2002: 163), is a broader collection of people, activities, or items from which generalizations can be derived. He also uses the term "population" in another line. Bless et al. (2013) argue that study findings should be

generalized to a population rather than a specific individual. All third-semester English students in academic year 2021/2022 were included in this study. According to the information in Siakad, there were 82 persons in total, divided into three classes.

1. Sample

Leedy, Paul D. and Ormrod (2015) stated that a sample is a subset of a population. Ary, D., Jacobs, LC, and Razavieh (2002: 163) and Margono (1997) said that the sample is part of the population. For this study, two classes were used as samples in which one class is the control class and the other is the experimental class. The system for determining the two classes is conducted randomly (cluster random sampling).

Table 4. Sample

Control Group	**Class R-001**	**28 people**
Experimental Group	Grade R-002	36 person

The Technique of Data Collection

Data were collected by giving pretest and posttest. Two kinds of essays were prepared, that was two essays used for pre-test and the other was for post-test. The topic was under the theme of the Belajar dan Pembelajaran course. These questions requires students' critical analysis related to the problems that have been formulated. This, this is in line with the PBL concept itself where students are required to find solutions to existing problems.

When the pretest has been carried out, it is continued with treatment for the experimental class and the control class. The learning activity was conducted through a discussion system: presentation, question and answer, conclusion.

In addition to tests, data were also collected in the form of documentation in the form of the results of their learning process at each meeting, both individually and in groups. Where in the control class there is a discussion report every meeting who is actively asking, responding and answering questions asked. Meanwhile, in the experimental class, there was a report of the problem-solving solutions- that are found at each meeting. The steps for implementing Learning in the experimental class follow the PBL.

The Technique of Data Analysis

Statistical calculations were used to evaluate and interpret the data gathered in the field. This ensures that the obtained data answer research questions. The statistical analysis of inference was used to test hypotheses and draw conclusions. Inferential statistics, also known as inductive statistics, are statistics used to study sample data and generalize or draw conclusions about the population based on the origin of the sample (Sutopo, Y and Slamet, 2017). Inferential statistics provide an objective method for collecting, processing, and analyzing quantitative data, as well as for drawing conclusions about the characteristics of a population based on the examination of a random sample drawn from that population.

Data processing for the data obtained from this research is by calculating the gain or difference between the pretest and posttest scores. For time efficiency, data processing was analyzed using the SPSS (Statistical Product and Service Solution) program for Windows version 24.

The steps of data processing are described as follows:

1. Descriptive Analysis
2. Normality Test
4. Wilcoxon test (if the data is not normal)
5. Homogeneity Test
7. Mann Whitney test (if the data is not normal)

3. Results and Discussion

Table 5. Recapitulation of Pre-Test and Post-Test Results of Experimental Class

student	**Experiment Class (Problem Based Learning/PBL)**	
	Pre-Test	**Post Test**
	33	33
Amount	2616	2804
Average	74.77	80.11
Maximum Score	79	73
Minimum Score	70	98

Table 5 above shows the total score of pre-test is 2,616 and the number score of post-test is 2,804. The mean score of pre-test is 74.77 and post-test is 80.11. The maximum score for pre-test is 79 and post-test is 98. The minimum score for a pre-test is 70 and post-test is 73. The experiment class consisted of 36 students. Since there were three students who do not take one of the tests, either pre-test or post-test, they are excluded from the data analysis. Thus, the number of students used is as many as 33 students according to the data mentioned in the previous sample table.

The following is a description of the acquisition of pre and post-test scores for the experimental class in graphic form.

Table 6. Recapitulation of Pre-test and Post-test Results of Control Class

Student	**Control Class (Discussion)**	
	Pre-test	**Post Test**
	24	24
Amount	1874	1961
Average	74.96	78.44
Maximum Score	79	84
Minimum Score	73	75

Table 6 above shows the total score of pre-test is 1,874, and the number score of post-test is 1,961. The mean score of pre-test is 74.96 and the post-test is 78.44, the maximum score for pre-test is 73 and the post-test is 84, the minimum score for a pre-test is 73 and the post-test is 75. The experiment class consisted of 27 students. Since there were four students who did not take one of the tests, either pre-test or post-test, they were excluded from the data analysis. Thus, the number of students used is as many as 24 students according to the data mentioned in the previous sample table. The following is a description of the pre- and post-test scores of the experimental class.

Descriptive Analysis

Basic Concepts of Descriptive Analysis

Research data can be described using descriptive statistical analysis, such as the total number of data points, the maximum score, the minimum score, the average score, and so on.

Descriptive Analysis with SPSS

Table 7. Descriptive Statistic

	N	Minimum	Maximum	mean	Std. Deviation
Pre-test Experiment	35	70	79	74.74	2.049
Post-test Experiment	35	73	98	80.11	5.389
Pre-test Control	25	73	79	74.96	1.837
Post_Test Control	25	75	84	78.44	2.485
Valid N (listwise)	25				

Tables 5 and 6 provide information on how the experimental and control groups obtained pre- and post-test scores. Table 6 is described again by combining the two in one table. The result is the same as in the previous two tables. However, the standard deviation score is added here.

Normality Test

Basic Concepts of Normality Test

1. The normality test was carried out in order to ascertain whether or not the data from the research were normally distributed.
2. Before carrying out a parametric Shapiro analysis, we are required to have normal data (paired-sample t-test and independent-sample t-test).
3. The Shapiro-Smirnov test and the Shapiro-Wilk test are two forms of normality tests that are frequently utilized in parametric Shapiro analysis.

Table 8. Normality Test Results With SPSS

Tests of Normality

	Class	Kolmogorov-Smirnov a			Shapiro-Wilk		
		Statistics	df	Sig.	Statistics	df	Sig.
Learning Student Outcomes	Pre-test Experiment (PBL)	.150	35	.045	.971	35	.461
	Post-testExperiment (PBL)	.194	35	.002	.837	35	.000
	Pre-testControl (Discussion normal)	.211	25	.005	.873	25	.005
	Post-testControl (Discussion normal)	.119	25	.200 *	.951	25	.261

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Normality Test Interpretation

1. In light of the fact that the significance score (Sig.) is not the same for all of the data on the Kolmogorov-Smirnov test and the Shapiro-wilk test, and that both of these tests have a value greater than 0.05, it is possible to draw the conclusion that the research data were NOT NORMALLY distributed.
2. In order to conduct an analysis of the study data, we resorted to a non-parametric statistic known as the Mann-Whitney test. This was necessary because the data did not follow a normal distribution.

Mann Whitney Test with SPSS (if the data is not normal)

Basic concepts

1. The objective of the Mann-Whitney test is to assess whether or not there is a significant difference between the means of the two samples that are not paired.
2. There is no requirement that the quantity of samples utilized be identical.
3. Since the Mann-Whitney test belongs to the non-parametric statistics category, it is not necessary to have research data that is normally distributed and homogenous in order to use the Mann-Whitney test.
4. If the study data are not normally distributed and are not homogeneous, the Mann Whitney test is utilized as an alternative to the independent sample t-test.

Table 9. Mann Whitney Test Results With SPSS

Ranks

	Class	N	Mean Rank	Sum of Ranks
Post-test	Experiment	35	32.16	1125.50
	Control	25	28.18	704.50
	Total	60		

Table 10. Test Statistics

Test Statistics a

	Post-test
Mann-Whitney U	379,500
Wilcoxon W	704,500
Z	-.876
asymp . Sig. (2-tailed)	.381

a. Grouping Variable: Class

Mann Whitney Test Results Interpretation

Comparing the score of Sig. Independent test Mann Whitney U test with a probability score of 0.025(2-Tailed):

1. If the score of Sig.> 0.025, then H0 which states there is no difference in average between the two groups is accepted.
2. If the score of Sig .<0.025, then H0 which states there is no difference in average between the two groups is rejected.

Given that the value of Asymp. Sig. (2-tailed) was 0.381, which indicates that it is more than 0.025, it is possible to reach the conclusion that H0 should be accepted. There is a difference in mean rank between the experimental group and the control group, however this difference was not statistically significant. Therefore, it is possible to draw the conclusion that the PBL learning model that was utilized in the classroom experiments was not successful enough to improve the learning outcomes of students enrolled in "Belajar dan Pembelajaran" classes.

Results obtained from research beyond expectations. Researchers hoped and likely tend to believe in the influence of using the PBL learning model in the classroom experiments on learning outcomes in "Belajar dan Pembelajaran" courses. There is the possibility that the PBL learning model used in the experimental class and the Discussion Model used in the control class has the same characteristic that is student-centered learning. Both learning models make the students active in the learning-teaching process. The result might be different if the other learning models applied in the control class.

4. Conclusions

PBL learning model used in the experimental class is not effective enough to improve student learning outcomes in Belajar dan Pembelajaran courses. There are many possible causes why it happened. One of them is the concept of PBL Model for experimental class and Discussion Model for the control class has the same characteristics in general that is both of them are the students-centered learning Model. To support the assumption, it is needed the follow up research about this. Furthermore, it is recommended to researchers who are interested in the same study to continue to conduct the related research in order to obtain many findings about the conditions experienced by students so that they can determine steps to improve the teaching and learning process which is better in the future and can improve quality of learning.

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