The Effect of the Project-based Learning (PjBL) Model to Students' Learning Interests and Learning Outcomes in the Advanced Reinforced Concrete Structure Subject, Civil Engineering Department, Universitas Negeri Semarang

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ABSTRACT

The learning process has several aims, one of them is to develop the students' ability to think critically, creatively, and innovatively so they are capable for solving problems that exist around them. To achieve that aim, an appropriate learning method is needed, one of the learning methods that can be applied is the learning method by using the Project Based Learning (PjBL) model. This study aims to determine the effect of The Project Based Learning (PjBL) model to students' learning interest and learning outcomes in the Advanced Reinforced Concrete Structure Subject at the Civil Engineering Department, Universitas Negeri Semarang. The methods that used in this study are descriptive statistical analysis methods and inferential statistical analysis methods. The population in this study were 49 students who took the Advanced Reinforced Concrete Structure subject. The results of the normality test, homogeneity test, and linearity test concluded that the data obtained passed the statistical prerequisite test. Based on the results of the Pearson Product Moment Correlation Hypothesis Test, the r-count value is 0.584 > r-table value (0.281) and the r-count value is in the range of 0.40 - 0.59 (the correlation between variables is moderately strong). Based on the comparison of the average score between students who take part in learning with the Project Based Learning (PjBL) model compared to the average score of student learning outcomes who take part in learning without the Project Based Learning (PjBL) model, there is a considerable increase, which is 112.24%. So it can be concluded that there is a moderately strong influence between the Project Based Learning (PjBL) model to students' learning interest and learning outcomes in the Advanced Reinforced Concrete Structure Subject at the Civil Engineering Department, Universitas Negeri Semarang.

Keywords: *Project Based Learning, Learning Interest, Learning Outcomes, Civil Engineering*

1. INTRODUCTION

The learning process is an activity that provides education and training to students aimed at achieving a good level of understanding of the material and good learning outcomes. Good learning outcomes are closely related to good learning interests of the students as well. Interest is a consistent tendency to observe and remember an activity. When someone has an interest in a topic, they tend to be more focused and enthusiastic about learning it. Learning interest can enhance the quality and quantity of a student's learning process, as activities that are observed and paid attention to continuously tend to make a person feel happy and motivated to learn more about them. With high learning interest, it can directly improve students' learning outcomes [1][2][3][4].

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In addition to aiming for students to achieve a good understanding of the material and learning outcomes, the learning process also aims to develop students' critical, creative, and innovative thinking skills so that they are able to solve problems in their surroundings. These skills are very important for students to master in order to face the challenges in an increasingly complex and dynamic work environment. Innovation in learning is necessary to achieve these goals, and one of the innovations that can be used is the Project Based Learning (PjBL) model in the learning process.

The Project Based Learning (PjBL) model is a learning model that is based on activities that emphasize understanding and student-centered learning, with the teacher serving as a facilitator [5][6][7]. The PjBL learning model emphasizes active student involvement in solving complex and open-ended problems, and encourages them to work collaboratively in groups to produce unique and innovative products that focus on solving the problems being studied [8][9][10][11].

The goal of the Project Based Learning (PjBL) model is to enhance students' critical, creative, and collaborative thinking skills. The steps involved in project-based learning include gathering and integrating new knowledge from real-life experiences, conducting investigations or research, solving problems, making decisions, and providing opportunities for students to work independently or in groups. Through such a learning process, it is expected that students can improve their learning outcomes [12][13][14][15].

Based on this, the researcher wants to examine how much influence of the application of the Project Based Learning (PjBL) model has on student interest and learning outcomes in the Advanced Reinforced Concrete Structure Subject in the Civil Engineering Education Study Program, Civil Engineering Department, Universitas Negeri Semarang. The Advanced Reinforced Concrete Structure Subject is a course that contains material about the theory and analysis of the design of reinforced concrete column and slab structures. Based on the actual conditions that occur, the implementation of Advanced Reinforced Concrete Structure still uses conventional methods with structured assignments in each material. This causes students to have difficulty in understanding the material of Advanced Reinforced Concrete Structure as a whole so that student learning outcomes are not optimal. To overcome this, an effective learning model is needed to increase students' learning interest and learning outcomes in the Advanced Reinforced Concrete Structures subject. The learning model that can be applied is the Project Based Learning (PjBL) model.

The results of this study are expected to provide the right solution regarding the learning model used to have a positive influence on students' interest and learning outcomes. Specifically, this research is expected to be used as one of the solutions for the implementation of learning in the Advanced Reinforced Concrete Structure Subject in the Civil Engineering Education Study Program, Civil Engineering Department, Universitas Negeri Semarang.

2. METHODOLOGY

The method used in this study is ex-post facto research. Ex-post facto research is a type of research in which the independent variable has already occurred before the study begins, and the researcher only observes the dependent variable using a quantitative approach [16][17].

The variables in this study consist of independent and dependent variables. The independent variable is the learning with the Project Based Learning model (X) and the dependent variable is the students' learning interest in in the Advanced Reinforced Concrete Structures subject in the Civil Engineering Education Program, Department of Civil Engineering, Universitas Negeri Semarang (Y). Meanwhile, to determine the effect of learning with the Project Based Learning model on students' learning outcomes, it was done by making comparison with the learning outcomes of students who take learning activities in class.

This study was conducted at the Universitas Negeri Semarang in the Civil Engineering Education Program, Civil Engineering Department. The population used in this study were 55 students who took the Advanced Reinforced Concrete Structures subject.

This study uses two statistical analysis methods, namely descriptive analysis and correlation inferential analysis. Descriptive analysis is used to describe data without making further conclusions [18]. The data described in this study are learning with the project based learning model and students' learning interest in the Advanced Reinforced Concrete Structure subject. Correlation inferential statistical analysis is a statistical analysis used to obtain conclusions and make decisions based on the analysis that has been carried out to connect two variables, namely the independent variable (X) and the dependent variable (Y) [18].

Before conducting correlational analysis, the research data that has been obtained must go through statistical prerequisite tests including the normality test, the homogeneity test and the linearity test.

The normality test aims to determine the data used in the study has a normal distribution or not. The normality test used in this study is the Kolmogorov-Smirnov Normality Test. The data has a normal distribution if it has a significance value > 0.05.

The homogeneity test aims to determine the data used in the study has the same variance (homogeneous) or not. The homogeneity test used in this study is Levene's test. The data has the same variance (homogeneous) if it has a significance value > 0.05.

The linearity test aims to determine the two variables used in this study (the independent variable and the dependent variable) have a significant linear relationship or not. If the significance value of Deviation from Linearity > 0.05 then there is a linear relationship between the independent variable and the dependent variable.

After the research data passes the statistical prerequisite test, then the hypothesis test can be done. The hypothesis test used in this study is the Pearson Product Moment Correlation Test. If the significance value < 0.05, it can be concluded that the hypothesis H1 is accepted. To find out the relationship between the independent variables and the dependent variable, it can be seen from the r-count value of the Pearson Product Moment Correlation Test. If the r-count value gets a result that is greater than the r-table value, it can be concluded that there is a relationship between the independent variable and the dependent variable. To find out how strong the relationship between the independent variable and the dependent variable is, the r-count value can be interpreted according to Table 1 below.

Table 1. Interpretation of correlation coefficient value (r-count value).

r-count Value	Interpretation
0.00 – 0.19	The relationship between variables is very weak
0.20 – 0.39	The relationship between variables is weak
0.40 – 0.59	The relationship between variables is moderately strong
0.60 – 0.79	The relationship between variables is strong
0.80 – 1.00	The relationship between variables is very strong

The hypotheses in this study are : H1 = there is an effect of learning with the project based learning model to students' learning interest in the Advanced Reinforced Concrete Structure Subject, Civil Engineering Education Program, Civil Engineering Department, Universitas Negeri Semarang, and H0 = there is no effect of learning with the project based learning model to students' learning interest in the Advanced Reinforced Concrete Structure Subject, Civil Engineering Education Program, Civil Engineering Department, Universitas Negeri Semarang.

3. RESULTS AND DISCUSSION

3.1. Students' Learning Outcomes Analysis

The method used to analyse students' learning outcomes is a comparative analysis between the average score of students who follow the learning process with the project based learning model in the Advanced Reinforced Concrete Structures subject and the average score of students who follow the learning process with the conventional model which can be seen in the Table 2 below.

Table 2. The comparison of students' learning outcomes.

Learning Model	Mean Score
With project based learning model	80.52
Without project based learning model (conventional)	71.74

Based on table 2 above, it can be concluded that there is an increase in the mean score of students' learning outcomes who follow the learning process with the project based learning model compared to the average score of students' learning outcomes who who still follow the learning process with the conventional model, with an increment of 112.24%.

3.2. Descriptive Statistical Analysis

The results of a questionnaire about learning with the project based learning model in the Advanced Reinforced Concrete Structure Subject, Civil Engineering Education Program, Civil Engineering Department, Universitas Negeri Semarang can be seen in Figure 1 below.

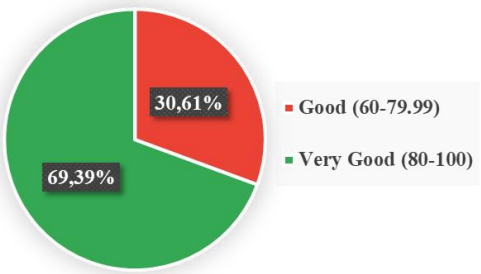

Figure 1 Data distribution of learning with project based learning model questionnaire.

Based on Figure 1 above, it shows that the questionnaire about the process of implementing learning with project based learning model that have been given to 49 respondents gave a result of 69.39% or 34 respondents stated that the implementation of learning with project based learning model was in "very good" condition. And 30.61% or 15 respondents stated that the implementation of learning with project based learning model was in "good" condition.

Then, the results of a questionnaire about students' learning interest in the Advanced Reinforced Concrete Structure Subject, Civil Engineering Education Program, Civil Engineering Department, Universitas Negeri Semarang can be seen in Figure 2 below.

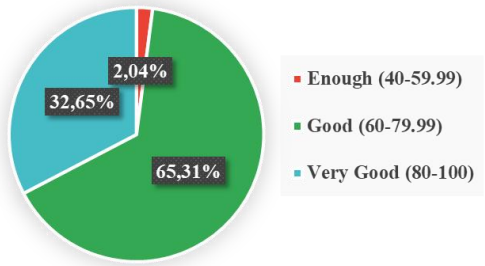

Figure 2 Data distribution of students' learning interest questionnaire.

Based on Figure 2 above, it shows that the questionnaire about about students' learning interest that have been given to 49 respondents gave a result of 65.31% or 32 respondents stated that their interest in learning during the learning process of Advanced Reinforced Concrete Structure subject was in "good" condition. 32.65% or 16 respondents stated that their interest in learning during the learning process of Advanced Reinforced Concrete Structure subject was in "very good" condition. And 2.04% or 1 respondent stated that her interest in learning during the learning process of Advanced Reinforced Concrete Structure subject was in "enough" condition.

3.3. Inferential Statistical Analysis - Statistical Prerequisite Test

The results of the statistical prerequisite test for the questionnaire data obtained the following results:

3.3.1. Normality Test

Based on the Kolmogorov-Smirnov Normality Test, the significance value obtained is 0.200. This siginificance value is more than 0.05, so it can be concluded that the data is normally distributed. The results of Kolgomorov-Smirnov Normality Test can be seen in Table 3 below.

Table 3. Kolgomorov-smirnov normality test result.

		Unstandardized Residual
N		49
Normal Parameters	Mean	0.0000000
	Std. Deviation	6.30880271
Most Extreme Differences	Absolute	0.104
	Positive	0.088
	Negative	-0.104
Test Statistic		0.104
Asymp. Sig. (2-tailed)		0.200

3.3.2. Homogeneity Test

The homogeneity test used in this study is the Levene Test. From the results of the Levene test, the significance value obtained is 0.934. This significance value is more than 0.05, so it can be concluded that the data has the same variance (homogeneous). The results of Homogeneity Test (Levene Test) can be seen in Table 4 below.

Table 4. Homogeneity test (levene test) result.

Levene Statistic	df1	df2	Sig.
0.007	1	96	0.934

3.3.3. Linierity Test

Based on Linearity test, the significance value obtained is 0.555. This significance value is more than 0.05, so it can be concluded that there is a linear relationship between the independent variable and the dependent variable. The results of Linierity Test (Levene Test) can be seen in Table 5 below.

Table 5. Linierity test result.

			Sum of Squares	df	Mean Square	F	Sig.
Students' Learning Interest * Implementation of Project Based Learning Model	Between Groups	(Combined)	1318.30	10	131.83	3.17	0.005
		Linearity	990.09	1	990.09	23.78	0.000
		Deviation from Linearity	328.21	9	36.47	0.88	0.555
	Within Groups		1582.24	38	41.64		
	Total		2900.54	48			

3.4. Inferential Statistical Analysis - Hypothesis Test (Pearson Product Moment Correlation Test)

Based on the Pearson Product Moment Correlation Test, the significance value obtained is 0.000. This significance value is less than 0.05, so it can be concluded that hypothesis H1 is accepted and hypothesis H0 is rejected. From the results of the Pearson Product Moment Correlation Test also obtained r-count value is 0.584. This r-count value obtained is more than the r-table value (0.281, r-table value for N = 49 with a significance level of 5%), so it can be concluded that there is a relationship between independent variable (learning with project-based learning model) and the dependent variable (students' learning interest). The value of r-count is 0.584, this value is in the range 0.40 – 0.59 (the correlation between variables is moderately enough), so it can be concluded that there is a strong enough relationship between the independent variable (learning with project-based learning model) and the dependent variable

(students' learning interest). The completely results of hypothesis test can be seen in Table 6 below.

Table 6. Pearson product moment correlation hypothesis test result.

		Implementation of Project Based Learning Model	Students' Learning Interest
Implementation of Project Based Learning Model	Pearson Correlation	1	0.584
	Sig. (2-tailed)		0.000
	N	49	49
Students' Learning Interest	Pearson Correlation	0.584	1
	Sig. (2-tailed)	0.000	
	N	49	49

4. CONCLUSION

The conclusion obtained from the results of this study is that there is a moderately strong correlation between the implementation of learning with project based learning model to the students' learning interests and learning outcomes in the Advanced Reinforced Concrete Structure subject at the Civil Engineering Education Program, Civil Engineering Department, Universitas Negeri Semarang. This is indicated by the comparison of the average score between students who follow the learning process with the project based learning model in the Advanced Reinforced Concrete Structures subject compared to the average score of student learning outcomes who follow the learning process with the conventional model, with an increment of 112.24%. And based on the results of hypothesis test which gives a r-count value of 0.584, this value indicates that the correlation between the independent variable (learning with project based learning model) and the dependent variable (students' learning interest) is moderately strong.

AUTHORS' CONTRIBUTIONS

LB carried out the analysis design, participated in data collection, data analysis, and wrote the manuscript. AW participated the analysis design and data analysis. ENJ participated in the analysis design and statistical analysis. VAK participated in statistical analysis and helped to draft the manucript. RM participated in data analysis and helped to draft the manucript. NY participated in data collection and statistical analysis. All authors read and approved the final manuscript.

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