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## **The Influence of Project-Based Learning Methods (PjBL) and Critical Thinking in Improving Student Learning Outcomes**

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### **ABSTRACT**

*The study aims to analyze the influence of the effect of project-based learning (PjBL) together with the skills of critical thinking toward student learning achievement. This type of research is a survey, using the sample of 35 respondents from UNJ students majoring in Economic and Administration. The technique uses the Proportional Stratified Random Sampling. Data were collected by using a questionnaire with a Likert scale model and tests and will be analyzed using descriptive and inferential statistics. The results of the analysis of the data show that PjBL significantly influences student learning achievement in the form of more active and applicative learning processes, and CT affects the learning outcome by allowing students to think analytically and critically in problem-solving. Combined application of PjBL and critical thinking skills gives better effect on the student achievement compared to the individual application of PjBL and critical thinking skills. This implies that the two can be used simultaneously for enhancing performance, an indicative benefit that they can be used together for improving learning..*

**Keywords:** *Project-based Learning ; Critical Thinking; Student Learning Outcomes.*

## INTRODUCTION

Education at all levels plays an important role in preparing students to become competent professionals in their fields. Learning management is the ability of every educator to create an environment that is conducive to quality learning. The positive influence of learning management must be felt by both students and educators. Learning activities are designed to create learning experiences that combine mental and physical processes through active participant interaction between students and educators, the environment and other learning resources to achieve learning goals.

One of the creative teaching methods that encourages critical thinking and provides students with the opportunity to choose a topic, make observations, and complete a particular project is project-based learning. This learning paradigm is useful for those who want to make learning more dynamic and student-centered so that students can learn more effectively and produce work that is based on real-world (contextual) events. To achieve learning objectives, lecturers play an important role as facilitators in the learning process. In order for student learning outcomes to be maximized, lecturers must be able to create a pleasant and appropriate learning environment. The actual changes that occur in students after exposure to learning related to thinking skills, attitudes and abilities are known as learning outcomes. (Amir & Solida, 2022)

The literature review highlights the key principles of PjBL, including the centrality of the project, guided inquiry, autonomy, and realism. It also emphasizes the benefits of PjBL, such as increased student motivation, improved problem-solving skills, and enhanced collaboration. However, it also notes the limitations and challenges associated with PjBL, such as the need for teacher training and the potential for variability in implementation. The latest literature on PjBL emphasizes the importance of critical thinking skills in the modern workforce and society. Critical thinking is seen as a key component of problem-solving and decision-making, and its development is essential for students to succeed in their future careers. The literature also highlights the need for teachers to adopt innovative and effective strategies to enhance critical thinking skills among students. For instance, Thomas in Wena (2011) emphasizes the importance of centrality, inquiry, autonomy, realism, and collaboration in PjBL. Similarly, Zhang & Ma (2023) highlight the need for teachers to develop strategies that promote critical thinking, such as encouraging students to question assumptions and evaluate evidence.

The strengths of previous publications on PjBL include their emphasis on the importance of student autonomy, collaboration, and problem-solving. However, the limitations include the lack of consistency in the implementation of PjBL and the need for more research on its effectiveness in enhancing critical thinking skills. For example, PjBL can be challenging to implement due to the need for significant preparation and ongoing support from teachers, as noted by Zhang & Ma (2023). Additionally, the variability in implementation can lead to inconsistent results, as highlighted by the study of Ibnu Mahtumi et al. (2023).

This is not to mention that the benefits of PjBL and critical thinking have already been specified. However, there are still a number of weaknesses. First of all, the fact is that many studies on the application of these models have been conducted within the context of elementary and secondary education and not the higher education paradigm. Second, more often than not, their methodological design is not quite valid and reliable, and generalizations about the consequences are not perfectly formal. Third, the advantages of these

studies are also solid results since the positive results of active strategies on the engagement and performance of students are usually the same.

This empirical study is carried out to offer evidence of the effectiveness of PjBL and critical thinking in producing better learning outcomes among university students. The novelties of this study are in the fact that this research is focused on only one academic program at UNJ and used a comprehensive survey method with a Proportional Stratified Random Sampling. From this research, it can be concluded that it gives a great contribution to innovation for the practical application of innovative learning methods in higher education and can be the framework for integration of PjBL and Critical Thinking in student performance optimization. This research intended to fulfill the gap in the existing literature by giving detailed analysis and actionable recommendations for educators and policymakers. This study, by clearly linking the state of the art and research objectives, aspires to demonstrate the potential for PjBL and critical thinking in transforming educational practices and improving student outcomes.

The introduction section contains: background, a brief literature review of previous research on the topic (there must be a reference to a journal published within the last 10 years), differences from previous research, problem formulation and hypotheses (if any), and research objectives.

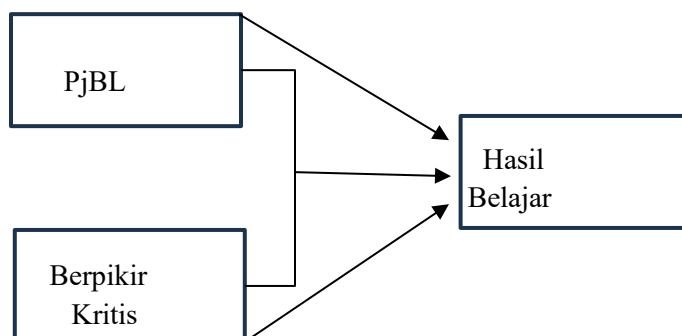
The article manuscript must meet the requirements as stated in the Author Guidelines available on the official Journal of MISTER website. The manuscript should be typed on A4 paper, consisting of 4,000-8,000 words, including references, tables, and figures. The manuscript should be typed in Times New Roman font, size 11 pt, 1,15 spaced, in MS Word format.

## **METHODS OF RESEARCH**

This study was conducted using quantitative research methods with explanatory research types. The population of Economic and Administration of the Faculty of Economics, State University of Jakarta class of. The number of samples in this study amounted to 150 students with a sampel retrieval technique, namely proportionate stratified random sampling. This study uses SPSS (Statistical Package for the Social Sciences) for data analysis, focusing on descriptive and inferential statistical techniques. Descriptive statistics are used to summarize data, including measures of central tendency and variability. Key techniques include means, standard deviations, and frequency distributions. Inferential statistics are used to test research hypotheses and examine relationships between variables. Key techniques include regression analysis, simple linear regression, multiple regression, analysis of variance, one-way ANOVA, two-way ANOVA, and correlation analysis. Data collection involves questionnaires distributed via Google Forms. Researchers use a Likert scale as a measurement scale on a scale which are entered into SPSS for analysis. Data entry involves correct coded responses, descriptive analysis, reliability testing, hypothesis testing, and interpretation of results. SPSS is used for its comprehensive suite of statistical analysis tools, providing an intuitive interface and robust output for thorough data analysis and interpretation.

### **Constellation of Relationships Between Variables**

The relationship between variables can be described in the constellation as follows:



(Source: Data processed by Researchers, 2024)

## RESULT AND DISCUSSION

The results and discussion section can be divided into several subtopics. The presentation of results and discussions should provide a clear and precise description of the research findings, the author's interpretation of these findings, and the conclusions that can be drawn.

### 1) Validity and Reability Test

There are 10 items in the PjBL usage variable with a calculated value of  $r$  greater than  $r$  of the table 0.361 so it can be stated that all items are valid. Cronbach's Alpha PjBL usage variable is  $0.790 > 0.6$  so it can be declared reliable. The Critical Thinking variable has a 10-item statement with a calculated  $r$  value greater than the table  $r$  of 0.361 so it says that all items are valid. Cronbach's Alpha innovation variable is  $0.784 > 0.6$  so it can be declared reliable. There are 10 items of the Learning Outcomes variable with a calculated value of  $r$  is greater than  $r$  of the table 0.361 so it can be stated that all items are valid. The value of Cronbach's Alpha is an entrepreneurial motivation variable of  $0.786 > 0.76$  so that it can be declared reliable.

### 2) Normality Test

Based on the Kolmogrov-Smirnov normality test, the significance value of 0.054 is greater than 0.05, so it can be concluded that the data is normally distributed.

**Table 1. Normality Test result**

| One-Sample Kolmogorov-Smirnov Test       |                |                         |
|------------------------------------------|----------------|-------------------------|
|                                          |                | Unstandardized Residual |
| N                                        |                | 35                      |
| Normal Parameters <sup>a,b</sup>         | Mean           | .0000000                |
|                                          | Std. Deviation | 1.33473010              |
| Most Extreme Differences                 | Absolute       | .147                    |
|                                          | Positive       | .109                    |
|                                          | Negative       | -.147                   |
| Test Statistic                           |                | .147                    |
| Asymp. Sig. (2-tailed) <sup>c</sup>      |                | .052                    |
| Monte Carlo Sig. (2-tailed) <sup>d</sup> | Sig.           | .054                    |

a. Test distribution is Normal.

b. Calculated from data.

(Source: Data processed by Researcher, 2024)

### 3) Multicholnearity Test

If the tolerance value is below 0.10 or the VIF is above 10, multicollinearity occurs. Based on the coefficients table above,  $0,969 > 0,1$  and  $VIF\ 1.032 < 10$  it can be concluded that there is no multicollinearity in the data. Based on the Kolmogrov-Smirnov normality test, the significance value of 0.054 is greater than 0.05, so it can be concluded that the data is normally distributed

**Table 2. Multicholnearity Test result**

| Coefficients <sup>a</sup> |            |                             |            |                           |        |       |                         |       |
|---------------------------|------------|-----------------------------|------------|---------------------------|--------|-------|-------------------------|-------|
| Model                     |            | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig.  | Collinearity Statistics |       |
|                           |            | B                           | Std. Error | Beta                      |        |       | Tolerance               | VIF   |
| 1                         | (Constant) | 16.522                      | 2.312      |                           | 7.145  | <,001 |                         |       |
|                           | X1         | .507                        | .029       | .930                      | 17.251 | <,001 | .969                    | 1.032 |
|                           | X2         | .113                        | .059       | .103                      | 1.911  | .065  | .969                    | 1.032 |

a. Dependent Variable: Y

(Source: Data processed by Researcher, 2024)

### 4) Heteroskedasticity Test Result

Inner Model is an evaluation carried out to predict the relationship between latent variables based on substantive theory through the bootstrapping resampling method procedure so that stability and data estimation are obtained. In the Inner Model test, there are several items that must be analyzed, namely by using R-Square for dependent constructs, f-Square, Q2 predictive relevance and Variance Inflation Factor (VIF).

**Table 3. Normality Test result**

| Coefficients <sup>a</sup> |            |                             |            |                           |        |      |                         |       |
|---------------------------|------------|-----------------------------|------------|---------------------------|--------|------|-------------------------|-------|
| Model                     |            | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig. | Collinearity Statistics |       |
|                           |            | B                           | Std. Error | Beta                      |        |      | Tolerance               | VIF   |
| 1                         | (Constant) | -1.348                      | 1.036      |                           | -1.301 | .203 |                         |       |
|                           | X1         | .030                        | .013       | .362                      | 2.260  | .031 | .969                    | 1.032 |
|                           | X2         | -.036                       | .027       | -.217                     | 1.358  | .184 | .969                    | 1.032 |

a. Dependent Variable: ABSRES

(Source: Data processed by Researcher, 2024)

If the sig value is greater than 0.05 then heteroscedasticity does not occur. From the data above (X1)  $0.031 > 0.05$  and (X2)  $0.184 > 0.05$  it can be concluded that there is no heteroscedasticity in the data.

## 5) F Test

Based on a Sig value of  $0.00 < 0.05$ , each independent variable together has a significant effect on Learning Outcomes (Y)

**Table 4. F Test Result**

| ANOVA <sup>a</sup> |                |    |             |         |                    |  |
|--------------------|----------------|----|-------------|---------|--------------------|--|
| Model              | Sum Of Squares | df | Mean Square | F       | Sig.               |  |
| Regression         | 610.796        | 2  | 305.398     | 161.343 | <.001 <sup>b</sup> |  |
| Residual           | 60.571         | 32 | 1.893       |         |                    |  |
| Total              | 671.367        | 34 |             |         |                    |  |

a. Dependent Variable: Y

b. Predictors: (Constant), X2, X1

(Source: Data processed by Researcher, 2024)

## 6) T Test

From the table, it is known that the t-count value is  $17.251 >$  the t-table value is 2,036933. Then it can be variable These of PjBL (X1) has a significant positive effect on the Learning Outcomes (Y). As for the Critical Thinking Skill, the t-count value is  $1.911 >$  the t-table value is 1.97928, it can be concluded that the Motivation variable (X2) has not a significant positive effect on the Learning Outcomes (Y).

**Table 5. T Test Result**

| Coefficients <sup>a</sup> |                             |            |                           |        |       |                         |       |
|---------------------------|-----------------------------|------------|---------------------------|--------|-------|-------------------------|-------|
| Model                     | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig.  | Collinearity Statistics |       |
|                           | B                           | Std. Error | Beta                      |        |       | Tolerance               | VIF   |
| (Constant)                | 16.522                      | 2.312      |                           | 7.145  | <,001 |                         |       |
| X1                        | .507                        | .029       | .930                      | 17.251 | <,001 | .969                    | 1.032 |
| X2                        | .113                        | .059       | .103                      | 1.911  | .065  | .969                    | 1.032 |

a. Dependent Variable: Y

(Source: Data processed by Researcher, 2024)

## 7) Coefficient of Determination Test

The R Square value shows 0.90, meaning that variables x1 and x2 have a 90% influence on the variable Learning Outcomes (Y).

**Table 6. Coefficient of Determination Test Result**

| Model Summary <sup>b</sup> |                   |          |                   |                            |
|----------------------------|-------------------|----------|-------------------|----------------------------|
| Model                      | R                 | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1                          | .954 <sup>a</sup> | .910     | .904              | 1.376                      |

a. Predictors: (Constant), X2, X1

b. Dependent Variable: Y

(Source: Data processed by Researcher, 2024)

## 8) Multiple Linear Regression Test

Based on the table below, a multiple regression equation is obtained, namely  $Y = 16.552 + 0,507 X1 + 0,113 X2$

**Table 7. Multiple Linear Regression Test Result**

| Coefficients <sup>a</sup> |                             |            |                           |        |       |                         |       |
|---------------------------|-----------------------------|------------|---------------------------|--------|-------|-------------------------|-------|
| Model                     | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig.  | Collinearity Statistics |       |
|                           | B                           | Std. Error | Beta                      |        |       | Tolerance               | VIF   |
| (Constant)                | 16.522                      | 2.312      |                           | 7.145  | <,001 |                         |       |
| X1                        | .507                        | .029       | .930                      | 17.251 | <,001 | .969                    | 1.032 |
| X2                        | .113                        | .059       | .103                      | 1.911  | .065  | .969                    | 1.032 |

a. Dependent Variable: Y

## CONCLUSION

The results of this study show that critical thinking abilities and project-based learning (PjBL) have a big impact on students' learning outcomes. By incorporating these pedagogical approaches, learning environments become more dynamic and productive, which in turn improves student performance.

## Suggestion

In order to increase student engagement and accomplishment, it is advised that educators and institutions integrate project-based learning and critical thinking activities into their curricula. Subsequent studies ought to investigate the enduring impacts of these approaches on diverse scholarly fields and incorporate more extensive sample sizes to ensure wider relevance. To ensure the generalizability and efficacy of these teaching practices, future studies should take into account potential limitations such as the different degrees of student motivation and resource accessibility.

## Consequences and Restrictions

The study's conclusions highlight the necessity of implementing changes in education that prioritize critical thinking and active learning. However, the study's concentration on a single academic topic and the sample size are drawbacks that imply additional research is required to validate these findings in a variety of educational settings.

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