Nusantara: Jurnal Pendidikan Indonesia
P-ISSN: 2774-3829|E-ISSN: 2774-7689
Vol. 5, No. 3, July 2025
https://journal.rumahindonesia.org/index.php/njpi/index

The Effectiveness of the Problem-Based Learning Model on the Critical Thinking Skills of Buddhist Education Students

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ABSTRACT
Purpose – This study examines the impact of Problem-Based Learning (PBL) on students' critical thinking skills in Buddhist religious education at SMA Bhakti Karya Kaloran, addressing the significance of critical thinking as a core 21st-century competency and the scarcity of research applying PBL in spiritually and contemplatively oriented religious contexts like Buddhism.
Method – This study employed a quantitative approach with a correlational design. The research sample consisted of 25 Buddhist students, selected using a saturated sampling technique. Data was collected through a Likert-scale questionnaire that had been tested for validity and reliability and were analyzed using simple linear regression with the assistance of SPSS version 21.
Findings – The research findings indicate that the Problem-Based Learning (PBL) model has a significant influence on students' critical thinking skills, with a coefficient of determination (R^2) of 0,535. This suggests that 53,5% of the variation in critical thinking ability can be explained by the implementation of the PBL model. The most prominent aspects of the PBL model were social engagement and psychomotor involvement, while the highest dimension of critical thinking was in the interpretative aspect. The significance value (0.000 < 0.05) and the t-value (5.141 > t-table) confirm a significant relationship between the two variables.
Research Implications – This study makes an important contribution to enriching the literature on Buddhist education through a participatory and contextual learning approach. However, its limitations lie in the small sample size and the restricted scope to a single school, which prevents the results from being widely generalized. Further research is recommended to employ a larger sample and a more robust experimental design to explore causal relationships and other mediating factors such as learning motivation and the internalization of religious values.

OPEN ACCESS

ARTICLE HISTORY
Received: 03-05-2025
Revised: 19-06-2025
Accepted: 23-06-2025

KEYWORDS
problem-based learning, critical thinking, buddhist education, quantitative study

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Introduction

The development of the times, marked by the complexity of global challenges, demands that students possess critical thinking skills as a key 21st-century competency (Mujiyanto, 2022:2). Education is no longer merely a means of knowledge transfer, but a platform for developing character, as well as logical, analytical, and systematic thinking skills in evaluating and responding to information (Paul & Elder, 2008:8). In the context of Indonesia, strengthening critical thinking has become a central focus of national education policy (Zahranisa et al., 2023:2). This becomes increasingly important in the face of the rapid flow of information in the digital era, where students must be able to carefully and reflectively filter information to avoid falling into superficial or manipulative understandings (Lie et al., 2024:1).

One of the pedagogical approaches that is relevant and proven effective in developing critical thinking skills is Problem-Based Learning (PBL) (Nyanasuryanadi, 2020:2). This model positions students as active participants in the learning process through the exploration and resolution of real-world, contextual problems (Heliso et al., 2025:2). In addition to fostering critical thinking, PBL also cultivates collaboration, communication, and decision-making skills, making it a comprehensive strategy to meet the challenges of 21st-century education (Mas et al., 2023:3). This approach aligns with the goals of national education, which aim to develop students who are reflective and solution-oriented in addressing life's challenges (Ge et al., 2022:3).

In the context of Buddhist education, Problem-Based Learning (PBL) provides space for students to connect Buddhist teachings with social realities (Hamilton et al., 2023:1). Its implementation at SMA Bhakti Karya Kaloran, for instance, demonstrates that students not only understand the doctrines theoretically, but are also able to reflect on Buddhist values in solving real-life problems (Fonna & Nufus, 2024:1). Learning becomes more meaningful when students engage in discussions, analyze cases, and reflect on the teachings in their daily lives (Zahranisa et al., 2023:2). These activities have proven to foster critical thinking skills, as evidenced by the increased student engagement in dialogue, question-and-answer sessions, and reflective argumentation (Hollis, 2023:1).

Although the effectiveness of Problem-Based Learning (PBL) has been widely studied across various disciplines, its application within the context of religious education—particularly Buddhist education—has received limited attention (Vidya & Utami, 2024:3). Most PBL studies have focused on the fields of science and technology, while pedagogical contexts grounded in spiritual values, such as Buddhist education, remain underexplored (Suputra & Sudewa 2024:2). His lack of research reveals a theoretical and empirical gap that needs to be addressed, so that proven pedagogical strategies like PBL can be appropriately adapted for teaching Buddhist doctrines, which are rich in moral, ethical, and contemplative values (Du & Zhang, 2022:10).

Therefore, it is important to conduct research that thoroughly examines the impact of the Problem-Based Learning (PBL) model on the development of critical thinking in Buddhist education (Aston, 2024:1). This research will not only enrich the academic literature in the field of Buddhist education, but also provide practical contributions to the development of more relevant, participatory, and transformative learning models (Utami, 2025:8). Through the PBL approach, students are encouraged to become active learners who are capable of internalizing the values of Buddhism while sharpening their critical thinking skills in a contextual and applicable manner (Roccia et al., 2024:2).

Methods

This study employs a quantitative approach with a correlational design aimed at determining the effect of the Problem-Based Learning (PBL) model on students' critical thinking skills (Causirhom et al., 2024:9). The population of this study consists of all Buddhist students at SMA Bhakti Karya Kaloran, totaling 25 students. Given the relatively small population size, the sampling technique used is total sampling, meaning all members of the population were included as research participants. The instrument used was a questionnaire with a Likert scale designed to measure the level of PBL implementation and students' critical thinking ability. The instrument underwent validity and reliability testing to ensure its appropriateness as a measurement tool. The data analysis technique employed was simple linear regression, assisted by SPSS version 21 software, to examine the extent to which the PBL model influences students' critical thinking skills (Budiyanto et al., 2024:2).

Result

The data in this study were obtained through the distribution of questionnaires to 25 respondents and subsequently analyzed to test the validity and reliability of the instrument. After the testing process, the data were then compiled based on each variable examined. One of the main focuses of this study is the Problem-Based Learning (PBL) variable, which is analyzed through four sub-variables: affective, cognitive, psychomotor, and social aspects. These four aspects represent important dimensions of the application of the PBL model in the learning context, particularly in strengthening students' critical thinking skills (Oktaviana & Haryadi, 2020:1).

Table 1. Recapitulation Results of the Problem-Based Learning Variable

Sub Variable X	Average Score	Percentage
Affective Aspect	32.76	65.52%
Cognitive Aspect	33.08	66.16%
Psychomotor Aspect	35.28	70.56%
Social Aspect	36.32	72.64%
Average	34.36	68.72%

Based on Table 1 above, the recapitulation results of the Problem-Based Learning variable indicate that the affective aspect reached a percentage of 65.52%, the cognitive aspect an average percentage of 66.16%, the psychomotor aspect 70.56%, and the social aspect 72.64%. These findings are in line with the research conducted by Nurtanto and Sofyan (2015:1), which showed that 97.40% of students successfully achieved the minimum competency in the affective aspect, 92.31% in the cognitive aspect, and 92.31% in the psychomotor aspect. These results are also supported by studies conducted by Setiawan et al. (2023:1) and Mistry et al. (2019:1), which found that students' average social skills increased from 26% to 78% after implementing the Problem-Based Learning model. Therefore, the overall average obtained is 68.72%, which falls into the moderate category.

Table 2 below presents the results of data collection on critical thinking, which comprises the sub-variables of the interpretative dimension, analytic dimension, evaluative dimension, and exploratory dimension.

Table 2. Recapitulation Results of Critical Thinking Variables

Sub Variable X	Average Score	Percentage
Interpretative Dimension	34.36	68.72%
Analytical Dimension	33.2	66.40%
Evaluative Dimension	33.2	66.40%
Exploratory Dimension	31.72	63.44%
Average	33.12	66.24%

Based on Table 2 above, the recapitulation results of the critical thinking variable in the interpretative dimension show a percentage of 68.72%. Furthermore, the analytical dimension indicates a percentage of 66.40%, which is consistent with the findings of Yulianti (2018:1), where the implementation of the Problem-Based Learning (PBL) model resulted in a 75.6% improvement in analytical skills. For the evaluative dimension, a percentage of 66.40% was obtained, supported by Aeni (2020:1), which found that the application of PBL yielded an evaluation result of 68.75%. The exploratory dimension recorded a percentage of 63.44%, aligning with the findings of Windaria and Yanti (2021:1), who reported that PBL enhanced critical thinking skills by up to 75.55%. These results are further reinforced by the research of Helmi et al. (2023:1), which stated that the implementation of the Problem-Based Learning model contributed 74.8% to the improvement of students' critical thinking abilities. Therefore, the overall average percentage obtained is 66.24%, which falls into the moderate category.

Before conducting hypothesis testing, an important initial step in quantitative data analysis is to ensure that the obtained data meet the basic statistical assumptions, one of which is normal distribution. Therefore, the researcher first performs a normality test on

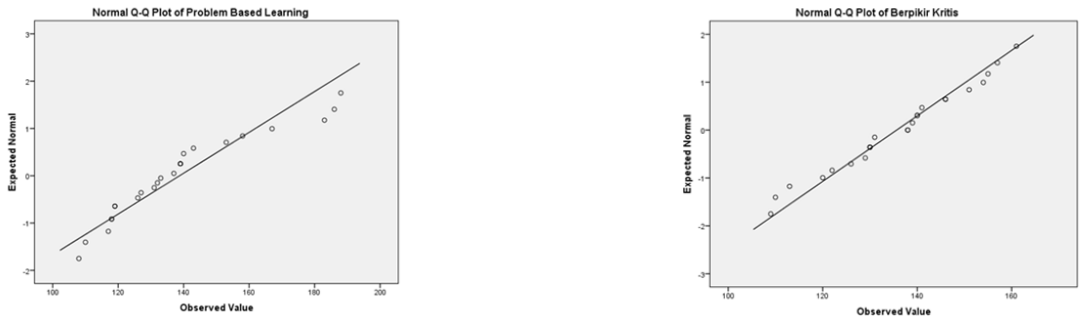
the data. In this study, the Shapiro-Wilk test is used, which is known for its high sensitivity to data with a small sample size, particularly fewer than 50 respondents (Ambarwati & Kurniasih, 2021:9). This test aims to determine whether the obtained data are normally distributed so that a simple linear regression analysis can be conducted validly and accurately.

Table 3. Normality Test Results

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Problem Based Learning	.143	25	.198	.939	25	.138
Critical Thinking	.119	25	.200*	.966	25	.544

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

The normality test of the data in this study was analyzed using the significance value from the Shapiro-Wilk test (Jauhari et al., 2024:5). The testing criteria state that if the Sig value > 0.05, then the data is normally distributed. Conversely, if the Sig value < 0.05, the data is not normally distributed. The results of the normality test showed that the data for the Problem Based Learning variable (X) had a significance value of 0.138. This value indicates that the data for the Problem Based Learning variable (X) is normally distributed (Sig > 0.05). Meanwhile, the Critical Thinking variable (Y) had a significance value of 0.544. This value indicates that the data for the Critical Thinking variable (Y) is normally distributed (Sig > 0.05).



(a) (b)

Figure 1. Normality Q-Q Plots of Data. Schemes follow the same formatting. There are multiple panels: (a) Normality Q-Q Plot for Problem Based Learning variable; (b) Normality Q-Q Plot for Critical Thinking variable

The image above shows the data distribution of the Problem-Based Learning variable (X), which lies between the test lines trending towards the upper right. Although most of the data follow the line pattern, there are several data points located somewhat far from the line, indicating that the data distribution is not normal (Sig < 0.05). A similar

pattern is observed in the data distribution of the Critical Thinking variable (Y), where the data points are around the test line but some deviate, which also indicates that the data are not normally distributed (Sig < 0.05).

Table 4. Results of Correlation Test

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.731[a]	.535	.514	8.21159

a. Predictors: (Constant), Problem Based Learning

Based on the correlation test in Table 4, the correlation coefficient (R) has a value of 0,731, indicating a strong relationship between Problem-Based Learning and critical thinking.

Table 5. Interval Scale for Coefficient Values

Interpretation of Coeffcient	Level of Relationship
0,00v- 0,199	Very Weak
0,20v- 0,399	Weak
0,40v- 0,599	Moderate
0.60v- 0,799	Strong
0,8- 0,1000	Very Strong

The correlation coefficient (R) between the Problem Based Learning variable (X) and Critical Thinking (Y) is 0,731. This value can be interpreted as indicating a strong relationship between the two variables tested. The coefficient of determination in the table above, R Square, is 0,535, which means that Problem Based Learning (X) contributes 53,5% of the influence on Critical Thinking (Y). The remaining 46,5% is influenced by other variables not examined in this study.

Tabel 6. Results ANOVA

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1782.219	1	1782.219	26.431	.000[b]
	Residual	1550.894	23	67.430		
	Total	3333.113	24			

a. Dependent Variable: Critical Thinking

b. Predictors: (Constant), Problem Based Learning

The analysis results using SPSS Statistics 21 yielded an F calculated value of 26.431, which is greater than the F table value of 4.28, with a significance level of 0.000 < 0.005. Therefore, the null hypothesis (H_0) is rejected. Problem Based Learning has a significant influence on Critical Thinking among Buddhist students at SMA Bhakti Kharya Kaloran.

Tabel 7. Results of Simple Linear Regression Test

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	82.293	9.899		8.313	.000
	Problem Based Learning	.365	.071	.731	5.141	.000

a. Dependent Variable: Critical Thinking

The t-test was conducted to examine the significance of the constant and the independent variable, Problem-Based Learning. Based on the results shown in the table above, the calculated t-value is 5.141 with a significance level (Sig) of 0.000, which is less than 0.05. Therefore, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted, indicating that the Problem-Based Learning variable has a sufficiently significant effect on Critical Thinking ability. These results demonstrate that the research data is statistically significant, thus the obtained regression model can be used to analyze the relationship between the variables. This calculation produced the regression equation between variable X (Problem-Based Learning) and variable Y (Critical Thinking). The constant value of 82.293 indicates that when Problem-Based Learning (X) is zero, the Critical Thinking score (Y) remains positive at 82.293. Meanwhile, the regression coefficient of 0.365 for variable X shows that every one-unit increase in Problem-Based Learning is followed by an increase of 0.365 in the students' Critical Thinking ability.

Discussion

The findings of this study reinforce and extend the empirical evidence that the Problem-Based Learning (PBL) model consistently has a positive impact on students' critical thinking skills. Critically speaking, this result aligns with the study by Aldilah and Sari (2024:4), which demonstrated that PBL had a regression coefficient of 1.048 with a t-value of 11.654, indicating a strong and significant effect on the improvement of critical thinking. Similar findings were reported by Zalukhu et al. (2024:1), who found a t-value of 6.828—greater than the t-table value of 1.670—in the context of students at SMA Negeri I Lotu. These studies collectively support the current study's position within the body of literature that statistically affirms the substantial intervention strength of PBL in shaping students' critical thinking skills.

Beyond quantitative validation, evidence from Su'udah and Salama (2023:1) also demonstrated a substantial increase in students' average critical thinking ability—from 57% before the implementation of PBL to 87% afterward. This highlights that the effectiveness of PBL is not only statistically proven but also practically enhances learning outcomes. Further support comes from Guo et al. (2020:1), who, in the context of higher education, reported that 73.7% of students showed a high interest in PBL, and 83% felt they received essential training in problem-solving. This suggests that PBL influences not only cognitive dimensions but also learning motivation and broader problem-solving competencies (Nosair et al., 2015:1).

In line with this, Li et al. (2024:1) found that the experimental group employing a PBL combination showed superior outcomes in theoretical understanding, case analysis, practical assessment, and learning satisfaction compared to the control group. This suggests that PBL has a comprehensive effect on academic quality and student satisfaction. Ge et al. (2022:1) further reported significant improvements in students' social competence and communication skills following PBL intervention, along with notable differences in academic achievement when controlling for pretest covariates. In this context, the present study further confirms that PBL is a strategically effective approach not only for developing critical thinking but also for enhancing students' socio-emotional competencies (Peng et al., 2021:1).

The practical implication of this study lies in the relevance of applying PBL to Buddhist Religious Education. Educators can utilize this approach to encourage students to explore Buddhist values more critically and reflectively, for example, by presenting real-life problems that require contextual interpretation of religious teachings (Guo et al., 2020:4). This supports the strengthening of character education and 21st-century competencies as promoted by the Merdeka Curriculum (Roccia et al., 2024:1). PBL also provides an effective strategy to foster collaboration, empathy, and value-based decision-making skills among students.

Nevertheless, this study has several limitations. Its focus on a single location and exclusive use of a quantitative approach limits the depth of understanding regarding students' internal processes in developing critical thinking skills (Lunt et al., 2024:1). The generalizability of the findings must be approached cautiously, considering the potential differences in school context, culture, and student backgrounds. Future studies are recommended to adopt mixed-methods approaches and expand research settings to provide a more holistic and in-depth understanding of the effectiveness of PBL in religious education, particularly in developing cognitive, affective, and spiritual domains in an integrated manner.

Conclusion

Based on the research findings, it can be concluded that the implementation of the Problem-Based Learning (PBL) model has a significant influence on enhancing students' critical thinking skills in Buddhist education at SMA Bhakti Karya Kaloran. The analysis shows that PBL effectively encourages students to actively participate in the learning process, connect Buddhist teachings to real-life situations, and develop reflective and solution-oriented thinking skills. Nevertheless, this study has limitations, such as a small sample size and a research context limited to a single school, which calls for caution in generalizing the results. For future research, it is recommended to expand the sample and explore potential mediating or moderating variables, such as learning motivation and religious values, that may affect the effectiveness of PBL. Experimental or quasi-experimental designs could also be employed to examine more deeply the causal relationship between this instructional model and students' critical thinking development.

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