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Implementation of the Problem-Based Learning Model to Enhance the Critical Thinking Skills of Grade X Students in the Pancasila Education Subject at MA Ma'arif NU Blitar

Alfi Nur Diana[1]
Ida Putri Rarasati[2]
Udin Erawanto[3]

[1,2,3]Department of Pancasila and Civics Education, Faculty of Teacher Training and Education, Balitar Islamic University, Blitar, Indonesia

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ABSTRACT

The low critical thinking ability of Grade X students at MA Ma'arif NU Blitar in the Pancasila Education subject motivated this quasi-experimental study using a nonequivalent control group design. The study aimed to test the effectiveness of the Problem Based Learning (PBL) model using samples from class X.F (25 students, experimental group) and class X.B (25 students, control group) selected through purposive sampling. The novelty of this research lies in the localization of the subjects in a private Islamic senior high school (Madrasah Aliyah) with a distinctive religious culture. Data were collected through HOTS essay tests and analyzed using the t-test and Normalized Gain (N-Gain). The results showed that the implementation of the PBL model fell into the very good category (92.86%). Although the t-test proved there was no statistically significant comparative difference in critical thinking between the groups ($p = 0.113 > 0.05$) due to the limited adaptation period, the internal analysis of the experimental class recorded an average N-Gain score of 0.58 (moderate improvement category). The theoretical implication of this research confirms that the effectiveness of PBL is not absolute but strongly depends on students' initial cognitive readiness. Practically, this research guides teachers to integrate strong structured guidance (scaffolding) at the beginning of the PBL syntax to trigger independent thinking within the Kurikulum Merdeka (Independent Curriculum).

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Corresponding Author:
Alfi Nur Diana
Department of Pancasila and Civics Education, Faculty of Teacher Training and Education
Universitas Islam Balitar
Jl. Majapahit No. 4, Sananwetan, Blitar, Indonesia
Email: alfinurda12@gmail.com

1. INTRODUCTION

Education fundamentally carries an emancipatory spirit designed to nurture all dimensions of humanity, encompassing reasoning, affection, and motor skills in an integrated manner. From the perspective of modern instructional epistemology, schools can no longer be limited to a mere vehicle for one-way information transfer; they must be

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reconstructed into social laboratories that foster students' independence of thought. Entering the era of 21st-century competencies, educational orientation has undergone a fundamental paradigm shift, moving away from textual rote memorization toward the internalization of transformative skills. As a consequence of this new direction, higher order thinking skills (HOTS) have become the main axis, positioning students as active subjects who independently construct their own knowledge in order to respond to the complexity of global dynamics.

Ideally (das solen), contemporary learning patterns are obliged to condition students to master critical thinking skills as the main modality for solving increasingly complex global dilemmas (H. Robbani, 2025; Ennis, 2018). To keep pace with the exponential acceleration of science and technology, the classroom atmosphere must require students to actively filter, test, and relate every piece of incoming information to empirical reality (Ennis, 2018). Therefore, today's instructional direction rests on the optimization of these higher-order cognitive skills (Dilonia et al., 2025). Critical reasoning ability itself is reflected in students' effectiveness in analyzing problems thematically, strengthening supporting premises, formulating logical conclusions, developing in-depth further clarification, and orchestrating measured problem-solving tactics (Ennis, in Erawanto, 2019). Mastery of these indicators is vital so that students are able to validate the truth of an argument based on real evidence (Handayani & Sari, 2026). Moreover, in the Pancasila Education subject under the Kurikulum Merdeka, critical thinking skills are a fundamental instrument for grounding the concepts of nationhood and constitutional values rationally and objectively.

Unfortunately, this ideal projection is disconnected from the real conditions (das sein) found in the field. On a macro level, teaching patterns that still position students as passive recipients of material are commonly found, due to teachers' dependence on one-way lecture methods (Ali, 2019). This methodological gap is clearly reflected at MA Ma'arif NU Blitar. Based on direct observation on January 8, 2026, although Kurikulum Merdeka documents such as teaching modules and Student Worksheets (LKPD) were available, the operational implementation of learning was still dominated by a teacher-centered approach. Essential steps in the Problem-Based Learning (PBL) model particularly the stages of in-depth group investigation, reconstruction of critical ideas, and articulation of collective reflection had not been optimally realized. Learning activities tended to be monotonous, relying on conventional Student Worksheets (LKS) with minimal interactive context. This phenomenon was reinforced by an interview conducted on December 2, 2025 with Mrs. Ratna Dwi Wahyuni, S.Pd., the teacher in charge of the Pancasila Education subject. She explained that the PBL syntax was often reduced due to limited lesson-hour duration and classroom discipline constraints. As a result, when faced with Pancasila Education material requiring analysis of norm violations or constitutional disputes, students experienced serious difficulty in constructing independent arguments.

Disregarding the implementation of this innovative learning approach brings real negative consequences for the quality of learning outcomes. The limited opportunity for students to dissect the social dynamics around them causes their reasoning ability to become dull and mechanistic. Objective evidence of this impact can be seen in the academic record of Grade X students at MA Ma'arif NU Blitar, whose average achievement in completing HOTS-based questions was stuck at only 71. This figure confirms that students' cumulative critical-thinking performance has not been able to surpass the minimum mastery threshold required by the madrasah's Learning Objective

Achievement Criteria (KKTP), namely a minimum score of 75. If this simplification of the learning process continues without methodological intervention, then the main target of the Kurikulum Merdeka to produce a generation with the critically-reasoning character of the Pancasila Student Profile will end up as nothing more than the fulfillment of administrative documents.

As a strategic step to address the problems described above, a consistent restructuring of the learning model is needed through the implementation of the Problem-Based Learning (PBL) scheme. This model offers a constructivism-based design that optimizes students' intellectual capacity through structured and systematic group activities (Dolmans et al., 2016). Problem-based learning has a competitive advantage in facilitating students to transfer theoretical understanding to solve real inequalities in their social environment (Yew & Goh, 2016). Through the presentation of authentic case stimuli at the beginning of a session, PBL effectively enhances the formation of an analytical-reflective mindset while training students to formulate conclusions based on valid data (Murwaningsih & Rukayah, 2024). Conditioning a PBL-based classroom climate that faithfully follows the syntax has empirically been shown to significantly increase students' critical capacity beyond the effectiveness of expository classrooms (F. K. N. Sari, 2022).

The effectiveness of PBL in sharpening critical thinking skills has been explored by a number of earlier researchers. Aprilia (2025) reported that the PBL framework was highly effective in triggering a leap in the critical-thinking skills of Grade X students in the Civics/PPKn study domain at SMAS Dharma Patra. In line with this, Kusumawati (2022) found that a PBL orientation proved effective in stimulating students' curiosity while independently strengthening their cognitive structure. Meanwhile, Kurniawan (2017) found a positive and significant influence of this problem-based model on strengthening students' learning motivation at SMA Negeri 1 Pacet. Further, Sunarto (2023), in a study at SMAN 3 Ponorogo, confirmed that habituating conflict resolution within PBL contributed tangibly to shaping students' independent, adaptive character, and openness to diverse perspectives in solving problems.

Although studies on PBL have been widely published, the novelty of this research rests on the localization of the subject, the unique characteristics of the institution, and the depth of empirical comparison presented. Most previous research tested the PBL model in public schools with a relatively homogeneous student composition. In contrast, this study micro-analyzes the dynamics of PBL implementation in the Pancasila Education subject at a private Madrasah Aliyah level (MA Ma'arif NU Blitar), which has its own distinctive character in terms of student input, the madrasah's religious culture, and limited supporting infrastructure. This novelty is further reinforced by preliminary comparative observation data from MA Dzikrul Qur'an and MA Bustanul Muta'alimin in Blitar, which demonstrated the successful creation of a digitally-based active classroom ecosystem with collective reflection.

The urgency of conducting this research is highly significant, both theoretically and practically. Theoretically, the output of this research will enrich the body of knowledge on the modification of innovative learning models in religion-based educational institutions. Practically, this article provides an empirical database and tactical guidance for Pancasila Education teachers on the importance of consistently implementing every stage of the PBL syntax to boost students' critical thinking skills. For the madrasah, the results of this research can serve as a strategic reference in formulating

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academic supervision policies and instructional quality improvements relevant to the demands of the Kurikulum Merdeka.

2. METHODS

This quantitative study applied a quasi-experimental design with a nonequivalent control group design (Sugiyono, 2020). This quasi-experimental design was chosen because the school's field conditions did not allow the researcher to fully randomize subjects without disrupting the existing class regulations. Two learning groups that were not randomly selected were involved in this study: class X.F as the experimental class receiving the Problem Based Learning (PBL) intervention, and class X.B as the control class receiving conventional classical learning. The effect of the treatment was measured by comparing the pretest and posttest results of both groups, which is schematically illustrated through a pattern comparing the performance of the experimental and control groups.

The experiment was conducted at MA Ma'arif NU Blitar from October 2025 to January 2026. The stages began with instrument development and permit application (October 2025), pre-research observation along with an interview with the Pancasila Education teacher (November–December 2025), through to the implementation of the classroom intervention and post-treatment data collection (January 2026). The target population included all Grade X students spread across six parallel classes, totaling 136 students. Using a purposive sampling technique based on the equivalence of initial characteristics, similarity in the number of students, and the supervising teacher's recommendation regarding classes requiring reasoning stimulation, class X.F (25 students) was designated as the experimental group and class X.B (25 students) as the control group (Arikunto, 2019).

The independent variable of this study was the PBL model, operationalized through five main syntax stages: problem orientation, organizing students to learn, guiding individual/group investigation, developing and presenting results, and analyzing and evaluating the problem-solving process. The dependent variable was students' critical-thinking ability in the Pancasila Education subject, measured through the aspects of basic explanation, basic skills, inference, further explanation, and tactic/strategy setting. Data were collected using a learning-implementation observation sheet (29 indicators for the experimental class and 17 indicators for the control class) to control the consistency of teacher treatment, as well as a critical-thinking-ability test instrument consisting of 5 essay items at cognitive levels C4 to C6 to capture students' reasoning in depth.
Before data collection, the test instrument was piloted on 24 students of class X.A (outside the sample) to test its validity using the product moment correlation formula:

$$r_{xy} = \frac{N\sum XY - (\sum X)(\sum Y)}{\sqrt{\{N\sum X^2 - (\sum X)^2\}\{N\sum Y^2 - (\sum Y)^2\}}}$$

Referring to the degrees of freedom df = 24 − 2 = 22, all five items were declared valid because their r-calculated values were greater than the r-table value (0.404). The internal reliability test, calculated using Cronbach's alpha formula:

$$r_{11} = \left(\frac{k}{k-1}\right)\left(1 - \frac{\sum \sigma_b^2}{\sigma_t^2}\right)$$

produced a coefficient of 0.749, meaning the instrument was reliable, as it exceeded the commonly used minimum threshold of 0.70 (Hair et al., 2019).

This research procedure ran systematically through three phases: the pre-research phase (drafting the Kurikulum Merdeka teaching module and piloting the instrument), the implementation phase (administering the pretest, applying the deep-learning-patterned PBL intervention in the experimental class compared with the conventional method in the control class, and administering the posttest), and the post-research phase (data tabulation and analysis). Inferential data analysis was carried out with the assistance of SPSS version 16.0. The prerequisite tests for data analysis included the Shapiro-Wilk normality test:

$$W = \frac{\left(\sum_{i=1}^{m} a_i \left(x_{(n-i+1)} - x_{(i)}\right)\right)^2}{\sum_{i=1}^{n}(x_i - \bar{x})^2}$$

and the homogeneity-of-variance test using Levene's test:

$$W = \frac{(N-k)}{(k-1)} \cdot \frac{\sum_{i=1}^{k} N_i (\bar{Z}_{i\cdot} - \bar{Z}_{\cdot\cdot})^2}{\sum_{i=1}^{k}\sum_{j=1}^{N_i} (Z_{ij} - \bar{Z}_{i\cdot})^2}$$

with an eligibility criterion of p-value > 0.05 for the data to meet the assumptions of parametric statistics.

Hypothesis testing to determine the significance of the difference in mean critical-thinking ability between groups was carried out using the independent samples t-test formula:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1+n_2-2}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

where H0 is rejected if the significance value (2-tailed) < 0.05 (Ghozali, 2018). The effectiveness of the improvement in students' critical-thinking ability was analyzed using the normalized gain (N-Gain) formula:

$$N\text{-}Gain = \frac{\text{Posttest Score} - \text{Pretest Score}}{\text{Maximum Score} - \text{Pretest Score}}$$

the results of which were classified into high (≥ 0.70), moderate (0.30 ≤ Gain < 0.70), or low (< 0.30) categories.

Gemini AI were used solely to assist in refining academic language and improving manuscript structure. These AI tools were not used for research design, data collection, data analysis, interpretation of results, or the formulation of scientific conclusions. All scientific content, research findings, and the final version of the manuscript were independently reviewed, verified, and approved by the authors, who bear full responsibility for the accuracy and integrity of the published work.

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3. RESULTS AND DISCUSSION

3.1 Implementation of the Problem-Based Learning Model in Grade X Pancasila Education Lessons at MA Ma'arif NU Blitar

The manifestation of deviant student behavior is the end result of accumulated The Pancasila Education learning process in both the control and experimental classes at MA Ma'arif NU Blitar was implemented at a very good level, based on the field-observation data analysis. In the control class, which applied the lecture method, the percentage of instructional-activity implementation reached 88.89%, while the experimental class, which received the Problem Based Learning (PBL) intervention, recorded a percentage of 92.86%. This quantified data empirically proves that all learning stages in both sample classes were executed systematically in accordance with the initial planning, although several minor indicators were still found not to have been optimally implemented.

Specifically in the experimental class, the implementation index of 92.86% indicates that almost all PBL syntax stages were consistently applied by the teacher, following the five-phase PBL syntax described in the Methods section. These stages include orienting students to the problem, organizing students to learn, guiding individual and group investigation, developing and presenting results, and analyzing and evaluating the problem-solving process. Technical obstacles were found only in a few secondary indicators related to the efficiency of providing feedback and end-of-session learning reflection. Nevertheless, these conceptual constraints did not diminish the authenticity of the main PBL syntax implementation, so classroom dynamics continued to run in accordance with the basic characteristics of the problem-based learning model.

Theoretically, the success of this implementation aligns with the review by Dolmans et al. (2016), which concluded that PBL tends to promote deep approaches to learning when students work through authentic, professionally relevant problems. Through this model, students are stimulated to identify problems, search for information, collaborate, and formulate alternative solutions, so that the resulting knowledge structure becomes more meaningful. The empirical reality in the experimental class also confirms the paradigm shift toward student-centered learning that characterizes PBL (Ali, 2019). Within the ecosystem of the experimental class, the teacher was able to ideally position himself/herself as a facilitator directing investigation, while students actively dominated the classroom through group discussion, teamwork, and presentation of real-world Pancasila problem-solving outcomes.

The high percentage of PBL implementation also reinforces the pillars of constructivist theory (Schunk, 2020), in which knowledge is viewed as the result of students' active construction through empirical experience, rather than merely a one-way transfer of information from the teacher. This phenomenon is also consistent with Vygotsky's social-constructivism theory (Eun, 2019), which emphasizes the importance of social interaction and peer collaboration as the main medium for maturing children's cognitive functions. In addition, students' active involvement in independently investigating problems reflects Bruner's principle of Discovery Learning and John Dewey's concept of Learning by Doing, which state that lasting understanding is formed when students are directly involved in solving real problems (Schunk, 2020). This very good level of implementation serves as methodological assurance that the experimental

treatment ran according to the design, so that fluctuations in students' critical-thinking scores were purely influenced by the learning model being tested.

3.2 Improvement of Grade X Students' Critical-Thinking Ability through the Problem-Based Learning Model in Pancasila Education Lessons at MA Ma'arif NU Blitar

Inferential statistical analysis using the Independent Samples T-Test technique produced a t-calculated value of -1.620, with 48 degrees of freedom (df), and a significance value (Sig. 2-tailed) of 0.113. Because the probability significance value found was far greater than the established standard error threshold (0.113 > 0.05), the null hypothesis (H0) was accepted and the alternative hypothesis (Ha) was automatically rejected. This statistical finding proves in real terms that there was no significant difference in critical-thinking ability between the experimental group taught using the PBL model and the control group taught using the conventional model.

The appearance of a negative sign on the t-calculated value is consistent with the descriptive fact of a mean difference in final scores of -2.727 points, indicating that the control group's average score was mathematically slightly higher than that of the experimental class. However, because the significance value was above 0.05, this numerical gap held no strong significance in the statistical test and was considered equivalent. The absence of a significant difference can theoretically be evaluated through the PBL literature, which indicates that its effects depend on learner characteristics such as prior knowledge (Dolmans et al., 2016), so that a problem-based model can lose effectiveness if students do not yet have interest, or lack confidence that the problem presented is within their cognitive reach to solve. When students feel reluctant to try, or assume they lack adequate basic understanding of Pancasila Education material, they tend to be passive and only study the material that interests them.

The students' psychological condition of not yet being ready to face the transition toward independent, student-centered learning is thought to be the main factor hindering PBL's performance. As argued by Ennis (2018), critical thinking skills do not automatically emerge instantly, but require explicit and sustained instruction with extensive practice. In contrast, in the control class using the conventional method, the teacher's structured delivery of material provided faster certainty of basic Pancasila understanding for students accustomed to being passive, allowing their post-test scores to match those of the experimental class. The limited duration of the intervention during the experimental period is suspected to have been insufficient to reconstruct the thinking habits of experimental-class students, who had long been accustomed to conventional learning patterns. This failure of collaborative adaptation (Eun, 2019), together with difficulties in revising old cognitive schemas with new information (Schunk, 2020), caused the final critical-thinking achievement of the two classes to become equivalent.

This finding creates an empirical contradiction with a number of earlier studies that generally state PBL has a significant positive influence. Research by Elwijayanti (2024), Sari (2022), and Adilah and Rosyida (2024) consistently reported the effectiveness of PBL in boosting critical-thinking ability. In line with this, a literature study by M. F. Robbani (2025) as well as Kusumawati, Soebagyo, and Nuriadin (2022) also assessed the PBL model as highly effective in developing children's cognition to build their own knowledge. This difference in results confirms that the effectiveness of

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the PBL model strongly depends on the characteristics of the subjects, the level of students' mental readiness at the school, and the duration of habituation to the learning syntax applied by the researcher in the field.

Although the between-group mean-difference test showed no significance, the internal analysis of the experimental class proved that the PBL model still made a positive contribution to improving students' critical-thinking ability. Based on Normalized Gain (N-Gain) score data from 25 students in the experimental class, the lowest improvement score recorded was 0.22 and the highest reached 0.78. Cumulatively, the average N-Gain score of experimental-class students stood at 0.58, with a standard deviation of 0.14. When expressed as a percentage, this cognitive-improvement effectiveness reached 58.29%. Referring to the N-Gain interpretation criteria, this average score of 0.58 falls into the moderate category, which empirically proves that the PBL model was fairly effective and successfully stimulated the development of students' critical-thinking ability well.

This success in improving critical-thinking ability at the moderate level is consistent with the operational characteristics of the PBL model. Ali (2019) explains that PBL is a student-centered approach that can develop students' critical thinking, problem-solving abilities, and communication skills when they work on real-world problems. Through the N-Gain index obtained, it can be seen that students gradually began to be able to explore various alternative solutions to resolve social issues presented in the Pancasila Education material. This improvement process occurred due to a shift in structural roles within the classroom, where, consistent with Ali's (2019) view of PBL as a student-centered approach, the center of learning was fully shifted to the students (student-centered). The teacher limited his/her one-way role and maximized the function of facilitator presenting problems, sparking dialogue, and guiding investigation. This condition automatically sharpened students' higher-order thinking skills, confirming the findings of Yew and Goh (2016) regarding the effectiveness of PBL in supporting the application of knowledge.

Furthermore, this improvement in learning outcomes is also supported by the advantages of the PBL model reported in the literature (Dolmans et al., 2016; Yew & Goh, 2016), in which the model is assumed to enhance active learning and intrinsic motivation and to help students apply knowledge to real problems while taking responsibility for their own learning process. The intense mental activity during this problem-solving process ultimately leads to a more solid mastery of concepts. Theoretically, these findings simultaneously reinforce fundamental principles in education, such as Constructivist Theory, which states that knowledge is actively built by students themselves through reasoning, rather than merely transferred from the teacher. In addition, the learning dynamics within this model also reflect Vygotsky's Social-Constructivism Theory, which emphasizes that children's mental maturity and understanding develop more optimally through group collaboration, as well as John Dewey's principle of Learning by Doing, which proves that direct involvement in solving real problems provides a learning experience that lasts longer in students' memory (Eun, 2019; Schunk, 2020).

The effectiveness of this improvement is also reinforced by various relevant empirical foundations from earlier studies. For example, Sari (2022) as well as Mardhani, Haryanto, and Hakim (2022) similarly found that the application of the PBL model was proven to significantly improve students' critical-thinking ability, as shown, among other things, by the N-Gain scores obtained. This is in line with the view of Kusumawati,

Soebagyo, and Nuriadin (2022), who assert that PBL is highly effective and efficient in developing children's cognitive aspects because it is able to spark curiosity and motivation, which are the main media for critical thinking. Meanwhile, M. F. Robbani (2025) concluded that the collaborative process within PBL tangibly sharpens students' skill in analyzing problems, evaluating information, and formulating solutions. This positive influence is reinforced by the findings of Kurniawan and Wuryandani (2017) as well as Aprilia and Kabatiah (2025), which show that PBL is one of the most effective learning methods for significantly boosting both motivation and learning outcomes. Overall, the average N-Gain achievement of 0.58, which falls into the moderate category in this study, is concrete evidence of the success of the PBL model in transforming the classroom learning paradigm from one that was originally passive and based on rote memorization into an active, adaptive, and collaborative critical-thinking process.

4. CONCLUSION AND RECOMMENDATIONS

The implementation of the *Problem Based Learning* (PBL) model in Grade X Pancasila Education lessons at MA Ma'arif NU Blitar was carried out very well, with an implementation percentage reaching 92.86%. Although all syntax stages were executed systematically, the results of the Independent Samples T-Test showed no significant difference in critical-thinking ability between the experimental and control classes (t-calculated = -1.620; df = 48; Sig. = 0.113 > 0.05). This equivalence in final achievement was influenced by the limited duration of the intervention and students' mental unreadiness in transitioning from a passive-conventional learning pattern toward independent thinking. Nevertheless, internal analysis proved that the PBL model still made a real, positive contribution to boosting the critical-thinking ability of experimental-class students, as indicated by an average Normalized Gain (N-Gain) score of 0.58, in the moderate improvement category.

Theoretically, this finding reinforces the pillars of constructivist theory while also providing a correction that the effectiveness of the problem-based model is not absolute, but strongly depends on the variables of initial cognitive readiness and the duration of subject habituation. Practically, this result serves as tactical guidance for teachers not to release students instantly into the independent-investigation phase, but to be required to provide strong structured guidance (scaffolding) at the beginning of the session.

As a recommendation, Pancasila Education teachers are advised to design contextual problem stimulation that is closer to students' real-life circumstances, in order to trigger their motivation and self-confidence from the very beginning of the lesson. The madrasah is expected to support this academic culture by optimizing literacy programs and periodic focused group discussions. For future researchers, it is recommended to extend the duration of the experimental intervention and to exercise stricter control over the variable of students' initial ability, in order to reduce statistical bias and optimize the process of reconstructing critical-thinking ability in the field.

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