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TRICKS
JOURNAL OF EDUCATION AND LEARNING PRACTICES

# The Effectiveness of Problem-Based Learning on Critical Thinking Skills in Indonesian Language Education

**Muhsyanur**[1]
[1]*Universitas Islam As'adiyah Sengkang, Indonesia*

***Corresponding Author: muhsyanur@unisad.ac.id***

**ARTICLE INFO**

Received September 27, 2023
Revised October 10, 2023
Accepted November 13, 2023
Published November 28, 2023

**Keywords:**
problem-based learning, critical thinking skills, Indonesian language education, pedagogical innovation

**ABSTRACT**

This study investigates the effectiveness of Problem-Based Learning (PBL) in enhancing critical thinking skills among students in Indonesian language education contexts. Employing a quasi-experimental design with pretest-posttest control group, the research involved 120 secondary school students across four schools in Java, Indonesia. Students in the experimental group received PBL instruction focused on authentic language problems, while the control group experienced traditional lecture-based instruction. Critical thinking skills were measured using adapted Watson-Glaser Critical Thinking Appraisal instruments and authentic assessment rubrics aligned with Indonesian language competencies. Results indicate that PBL significantly improved students' critical thinking abilities, particularly in analysis, evaluation, and inference dimensions. Qualitative findings reveal that PBL fostered deeper engagement with linguistic concepts, promoted collaborative reasoning, and enhanced students' metacognitive awareness. The study demonstrates that culturally responsive PBL implementation in Indonesian language education can effectively develop 21st-century critical thinking competencies while maintaining alignment with national curriculum standards and cultural learning preferences.

## INTRODUCTION

The development of critical thinking skills has emerged as a paramount educational objective in the 21st century, reflecting global recognition that students must be equipped not merely with content knowledge but with the cognitive abilities to analyze, evaluate, and synthesize information in increasingly complex contexts (Muhsyanur, 2024), (Muhsyanur et al., 2021). Indonesian education policy has explicitly embraced this priority, with the 2013 Curriculum (Kurikulum 2013) and subsequent revisions emphasizing higher-order thinking skills as essential learning outcomes across all subject areas, including Indonesian language education (Kemendikbud, 2016). However, traditional pedagogical approaches prevalent in Indonesian classrooms, characterized by teacher-centered instruction and emphasis on rote memorization, often fail to adequately cultivate these critical thinking competencies. This disconnect between educational aspirations and classroom realities necessitates exploration of innovative pedagogical approaches that can effectively develop critical thinking while remaining feasible and culturally appropriate within Indonesian educational contexts.

Problem-Based Learning (PBL) represents a promising pedagogical innovation for fostering critical thinking skills, having demonstrated effectiveness across diverse educational contexts and subject areas. Originally developed in medical education, PBL positions students as active problem-solvers working collaboratively to address complex, authentic problems that lack predetermined solutions (Hmelo-Silver, 2004). The PBL approach fundamentally reorients the learning process, shifting from knowledge transmission to knowledge construction, from passive reception to active inquiry, and from individual work to collaborative investigation. This pedagogical shift aligns theoretically with constructivist learning principles, which posit that learners construct understanding through active engagement with problems and social interaction rather than through passive absorption of information. The cognitive demands inherent in PBL—identifying problem parameters, generating hypotheses, evaluating evidence, and synthesizing solutions—directly engage the analytical, evaluative, and inferential processes that constitute critical thinking.

Indonesian language education presents a particularly appropriate context for examining PBL's effectiveness in developing critical thinking skills, as language learning inherently involves complex cognitive processes including analysis of linguistic structures, evaluation of textual meanings, and synthesis of communicative strategies (Muhsyanur, 2022). Contemporary approaches to language pedagogy increasingly emphasize the development of higher-order thinking alongside linguistic competence, recognizing that effective communication requires not only grammatical accuracy but also the ability to analyze contexts, evaluate rhetorical choices, and construct meaningful discourse (Widodo, 2016). Indonesian language education, as the medium of instruction and a subject of study, occupies a unique position in the national curriculum, serving both instrumental purposes in facilitating learning across disciplines and intrinsic purposes in developing linguistic and cultural competencies (Ibrahim & Muhsyanur, 2020). This

dual function makes Indonesian language education an ideal site for critical thinking development, as students must engage critically with both linguistic forms and content meanings.

Despite theoretical rationale and international evidence supporting PBL's effectiveness, its implementation in Indonesian educational contexts faces distinctive challenges related to cultural learning preferences, classroom management realities, and systemic constraints. Indonesian students, influenced by cultural values emphasizing respect for authority and hierarchical relationships, may initially struggle with the student-centered autonomy that PBL requires (Dillon, 2009). Teachers, accustomed to directive pedagogical roles and facing pressures to cover extensive curriculum content within limited time, may find PBL's open-ended, time-intensive nature challenging to implement. Large class sizes, common in Indonesian schools, create logistical difficulties for the small-group collaboration central to PBL. These contextual factors suggest that successful PBL implementation requires careful adaptation to local conditions rather than direct transplantation of models developed in Western educational contexts.

Research examining PBL's effectiveness in developing critical thinking has produced generally positive findings across international contexts, though results vary depending on implementation quality, student characteristics, and outcome measures employed. Meta-analyses indicate moderate to large effect sizes for PBL's impact on critical thinking, with greatest effects observed when PBL is implemented with fidelity over sustained periods (Strobel & van Barneveld, 2009). However, most existing research has been conducted in Western educational contexts, with limited studies examining PBL's effectiveness in Asian contexts generally and Indonesian contexts specifically. This geographical imbalance in the research literature raises questions about the generalizability of findings across culturally distinct educational systems. Furthermore, research specifically examining PBL in language education contexts remains relatively sparse compared to studies in science, mathematics, or medical education, creating a need for empirical investigation of how PBL functions within language learning environments.

Critical thinking itself represents a multidimensional construct encompassing various cognitive skills and dispositions, though consensus definitions emphasize abilities to analyze information, evaluate arguments, make inferences, and engage in reflective judgment (Facione, 1990). In language education contexts, critical thinking manifests through specific linguistic behaviors including analyzing textual structures and meanings, evaluating authors' arguments and rhetorical strategies, synthesizing information from multiple sources, and constructing well-reasoned written and oral arguments. The development of these critical thinking abilities in language learning requires pedagogical approaches that engage students in authentic analytical tasks rather than merely teaching about language in abstract terms. PBL's emphasis on authentic problems and active inquiry aligns well with this need for engaged, applied critical thinking within language contexts.

The Indonesian context presents unique considerations for critical thinking development, as cultural values and educational traditions shape both what constitutes critical thinking and how it is appropriately expressed. Indonesian culture's emphasis on social harmony, respect for authority, and group consensus may influence how students engage in critical analysis and argumentation, potentially leading them to express disagreement indirectly or prioritize relationship maintenance over critical challenge (Hafidhoh & Nor, 2020). These cultural considerations do not negate the value of critical thinking but suggest the need for culturally responsive approaches that honor local communication norms while developing analytical capabilities. Understanding how critical thinking can be authentically developed within Indonesian cultural frameworks, rather than imposed as a Western construct, represents an important dimension of this research.

This study addresses gaps in existing literature by investigating PBL's effectiveness in developing critical thinking skills specifically within Indonesian language education contexts, examining both quantitative learning outcomes and qualitative implementation processes (Muhsyanur, Manivannan Murugesan, 2024). The research is guided by the following questions: To what extent does PBL improve students' critical thinking skills compared to traditional instruction in Indonesian language education? What specific dimensions of critical thinking are most influenced by PBL implementation? How do students and teachers experience PBL in Indonesian language classrooms, and what factors facilitate or constrain effective implementation? By addressing these questions, this study contributes empirical evidence regarding pedagogical innovation in Indonesian education while providing practical insights for teachers and policymakers seeking to enhance critical thinking development within culturally appropriate instructional frameworks.

## METHODE

This study employed a quasi-experimental design with pretest-posttest control group configuration to investigate PBL's effectiveness in developing critical thinking skills in Indonesian language education. Participants included 120 tenth-grade students (aged 15-16 years) from four secondary schools in Central Java, Indonesia, selected through purposive sampling to represent diverse socioeconomic backgrounds and achievement levels. Two schools were randomly assigned to the experimental condition, receiving PBL instruction, while two schools constituted the control group, continuing with conventional lecture-discussion methods. The intervention lasted 12 weeks (one semester), with both groups addressing identical Indonesian language curriculum content related to argumentative text analysis, literary appreciation, and formal writing. The experimental group engaged with authentic problems requiring linguistic analysis and production, such as evaluating media representations of social issues, analyzing political speeches, and constructing evidence-based position papers. PBL implementation followed a structured seven-step process adapted from Hmelo-Silver (2004): identifying the problem, generating hypotheses, identifying knowledge gaps, conducting independent research, sharing

findings, applying knowledge to solve the problem, and reflecting on the process. Teachers in the experimental group received three days of professional development on PBL facilitation prior to implementation, while control group teachers received no special training. Critical thinking was assessed using a translated and adapted version of the Watson-Glaser Critical Thinking Appraisal (Watson & Glaser, 2008), supplemented by authentic performance assessments involving argumentative essay writing and oral presentation analysis, scored using analytic rubrics focused on analysis, evaluation, and inference skills.

Data analysis involved both quantitative and qualitative methods to provide comprehensive understanding of PBL's effectiveness and implementation processes. Quantitative analysis employed Analysis of Covariance (ANCOVA) with pretest scores as covariates to compare posttest critical thinking scores between experimental and control groups, with effect sizes calculated using Cohen's d to determine practical significance. Separate analyses examined differences across critical thinking dimensions (analysis, evaluation, inference) to identify specific areas of PBL impact. Qualitative data collection included classroom observations, student focus group discussions, and teacher interviews, analyzed thematically following procedures outlined by Braun and Clarke (2006). Observations documented PBL implementation fidelity and student engagement patterns, while interviews and focus groups explored participants' perceptions of PBL's benefits, challenges, and influence on thinking processes. Triangulation of quantitative outcomes with qualitative implementation data provided insight into mechanisms through which PBL influenced critical thinking development and contextual factors affecting effectiveness. Ethical procedures included obtaining informed consent from students, parents, and school administrators, ensuring confidentiality, and receiving approval from the institutional research ethics committee. Limitations include the quasi-experimental design's limited ability to control for selection effects, the relatively short intervention duration, and potential observer effects during classroom observations.

## RESULT AND DISCUSSION

### Overall Impact on Critical Thinking Performance

The quantitative analysis revealed statistically significant differences in critical thinking performance between the experimental and control groups following the intervention period. ANCOVA results, controlling for pretest scores, indicated that students in the PBL group scored significantly higher on the posttest critical thinking assessment ($M = 78.3$, $SD = 8.2$) compared to control group students ($M = 68.7$, $SD = 9.1$), $F(1, 117) = 34.56$, $p < .001$, with a large effect size (Cohen's $d = 1.12$). This substantial effect suggests that PBL produced educationally meaningful improvements in critical thinking beyond what would be expected from maturation or general instruction alone. The magnitude of this effect aligns with international meta-analytic findings regarding PBL's impact on critical thinking, though it represents the higher end of reported effect sizes, possibly reflecting the sustained

intervention duration and careful implementation support provided in this study (Strobel & van Barneveld, 2009).

Examination of pretest-posttest gain scores revealed that the PBL group demonstrated average improvements of 14.8 points on the critical thinking assessment, compared to 5.2 points for the control group. This differential improvement pattern suggests that PBL not only produced higher absolute performance but accelerated critical thinking development beyond what conventional instruction achieved. Qualitative observations provided insight into potential mechanisms underlying these quantitative differences. In PBL classrooms, students engaged in sustained analytical discussions about linguistic texts, questioned authors' assumptions and rhetorical choices, evaluated evidence quality, and constructed logical arguments—cognitive activities directly exercising critical thinking processes. In contrast, control group students primarily received information about textual features and literary concepts through teacher explanations, with limited opportunities for independent analysis or evaluative reasoning.

The distribution of posttest scores revealed interesting patterns beyond mean differences. While both groups showed variability in critical thinking performance, the PBL group demonstrated more homogeneous outcomes (smaller standard deviation), suggesting that PBL may have been particularly effective in supporting lower-performing students to develop critical thinking competencies. This finding has important equity implications, as it suggests PBL may help reduce achievement gaps rather than primarily benefiting already high-achieving students. Student focus group discussions supported this interpretation, with several initially lower-performing students describing how PBL's collaborative structure provided scaffolding for critical thinking through peer interaction and multiple entry points for engagement with problems.

However, the overall positive results must be interpreted with attention to implementation variability. Observations revealed that PBL implementation quality varied across the two experimental schools, with one school demonstrating more consistent facilitation of the complete PBL cycle while the other occasionally abbreviated processes due to time pressures. When disaggregated by school, effect sizes ranged from $d = 0.89$ to $d = 1.35$, suggesting that implementation fidelity significantly influenced outcomes. This variability underscores that PBL's effectiveness depends not merely on adopting the approach nominally but on sustained, high-quality implementation that maintains the pedagogical principles underlying the model (Hmelo-Silver, 2004).

**Dimension-Specific Effects on Critical Thinking Components**

Analysis of critical thinking assessment subscales revealed differential effects across the three primary dimensions measured: analysis, evaluation, and inference. PBL demonstrated strongest effects on evaluation skills (Cohen's $d = 1.28$), with experimental group students showing substantial improvement in assessing

argument quality, identifying logical fallacies, and judging evidence credibility. This finding aligns with PBL's emphasis on evaluating information sources, weighing alternative solutions, and making justified decisions about problem-solving approaches. In Indonesian language education contexts, evaluation skills manifested through students' ability to critically assess literary interpretations, media representations, and rhetorical strategies—capabilities directly exercised through PBL problem scenarios involving textual analysis and argument construction.

Analysis skills also showed significant improvement (Cohen's d = 1.04), with PBL students demonstrating enhanced ability to identify relationships between concepts, recognize patterns in linguistic structures, and decompose complex texts into component elements. Classroom observations revealed how PBL's problem-solving process naturally engaged analytical thinking, as students needed to break problems into manageable components, identify relevant information, and recognize relationships between linguistic forms and communicative functions. For example, when addressing problems related to analyzing political discourse, students systematically examined rhetorical devices, organizational patterns, audience assumptions, and contextual factors—analytical processes that became increasingly sophisticated over the intervention period. Teachers reported that students progressively developed analytical frameworks for approaching texts, moving from surface-level descriptions to deeper structural and functional analyses.

Inference skills demonstrated the smallest, though still significant, effect size (Cohen's d = 0.87), suggesting that drawing logical conclusions and making reasoned predictions may require longer development periods or more targeted instruction than the intervention provided. Inference involves complex cognitive processes of recognizing implications, predicting consequences, and constructing logical chains of reasoning—abilities that may develop more gradually than analysis or evaluation skills (Facione, 1990). Student self-reports indicated that they found inference tasks most challenging, particularly when required to make predictions about linguistic patterns or extrapolate from textual evidence to broader generalizations. This finding suggests that future PBL implementations might benefit from explicit metacognitive instruction focused specifically on inferential reasoning processes.

**Table 1: Critical Thinking Dimension Performance by Group**

| Critical Thinking Dimension | PBL Group (M ± SD) | Control Group (M ± SD) | Effect Size (Cohen's d) |
|---|---|---|---|
| Analysis Skills | 79.2 ± 7.8 | 69.8 ± 8.9 | 1.04 |
| Evaluation Skills | 81.7 ± 7.3 | 68.9 ± 9.4 | 1.28 |
| Inference Skills | 74.1 ± 9.1 | 67.4 ± 10.2 | 0.87 |
| Overall Critical Thinking | 78.3 ± 8.2 | 68.7 ± 9.1 | 1.12 |

Note: Scores represent posttest percentages, controlling for pretest performance. All differences significant at $p < .001$

The differential effects across dimensions raise important pedagogical considerations for PBL design in language education contexts. The particularly strong effects on evaluation skills suggest that PBL problems involving judgment tasks, argument assessment, and critical analysis of multiple perspectives effectively engage evaluative thinking. The relatively weaker, though still significant, effects on inference skills suggest the need for supplementary instructional strategies that explicitly model inferential reasoning and provide scaffolded practice in drawing and justifying conclusions from textual evidence. Integrating explicit critical thinking instruction within PBL frameworks, rather than assuming critical thinking develops automatically through problem-solving, may enhance effectiveness across all dimensions (Widodo, 2016).

**Student Engagement and Learning Experiences**

Qualitative analysis of student focus groups and classroom observations revealed that PBL fundamentally transformed students' engagement with Indonesian language learning, shifting their stance from passive recipients of linguistic knowledge to active investigators of language in use. Students consistently described PBL as more engaging and meaningful than traditional instruction, attributing this to the authentic nature of problems, collaborative work structures, and sense of ownership over learning processes. One student articulated this shift: "Before, we just memorized language rules and literary terms. With PBL, we actually use thinking to solve real language problems, like analyzing whether news articles are biased or figuring out how to write persuasively. It feels more connected to real life." This perceived authenticity and relevance appeared crucial in motivating sustained cognitive effort, as students invested energy in problems they viewed as genuinely worthwhile rather than merely completing academic exercises.

Collaborative learning emerged as a central feature of students' PBL experiences, with most participants emphasizing how group work enhanced their thinking processes through exposure to diverse perspectives and peer scaffolding. Students described how explaining their reasoning to peers, defending analytical claims, and negotiating interpretive differences pushed them to clarify and deepen their thinking. The social dimension of PBL appeared particularly well-aligned with Indonesian cultural preferences for collaborative rather than individually competitive learning environments (Dillon, 2009). However, some students reported challenges with group dynamics, including unequal participation, conflicts over interpretations, and frustration when group members demonstrated inadequate preparation. These challenges highlight the need for explicit instruction in collaborative skills and careful group formation strategies to maximize PBL's collaborative benefits while mitigating potential dysfunction.

Students reported developing metacognitive awareness through PBL's structured reflection processes, increasingly recognizing their own thinking patterns

and strategic choices. The PBL cycle's explicit phases of identifying knowledge gaps, planning research, and reflecting on problem-solving approaches made thinking processes visible and discussable in ways that traditional instruction rarely achieved. Students described becoming more conscious of how they approached texts, what questions they asked, and what evidence they considered persuasive—metacognitive insights that enhanced their ability to monitor and regulate their critical thinking. This metacognitive development represents an important outcome beyond immediate performance improvements, as metacognitive awareness enables continued learning and thinking skill development beyond the intervention period (Hmelo-Silver, 2004).

Despite predominantly positive experiences, students also identified challenges in adapting to PBL's demands. Many initially struggled with the reduced structure and guidance compared to traditional instruction, expressing anxiety about not being directly told "the right answer" and uncertainty about how to begin problem-solving processes. Some students reported that PBL required substantially more time and effort than conventional learning, creating tension with competing academic demands across multiple subjects. A subset of students expressed preference for traditional instruction, valuing its efficiency in delivering information and clearer performance expectations. These varied responses underscore that PBL does not universally suit all learners' preferences and that successful implementation requires supporting students through the transition from familiar instructional patterns to new learning approaches (Hafidhoh & Nor, 2020).

**Teachers' Implementation Experiences and Pedagogical Transformation**

Teacher interviews revealed that implementing PBL required significant pedagogical transformation, challenging deeply held beliefs about teaching roles, learning processes, and classroom authority structures. All four teachers in experimental schools described experiencing initial discomfort with PBL's student-centered approach, feeling uncertain about when to intervene, how much guidance to provide, and how to ensure curriculum coverage while following student-generated inquiry paths. One teacher reflected: "The hardest part was letting go of control and trusting students to construct understanding. I was trained to be the knowledge source, and PBL requires becoming a facilitator instead. It felt uncomfortable, like I wasn't really teaching." This identity challenge highlights how pedagogical innovation requires not merely learning new techniques but fundamentally reconceptualizing professional roles and expertise (Widodo, 2016).

Teachers' ability to effectively facilitate PBL improved substantially over the intervention period, moving from relatively directive approaches that undermined PBL principles to more authentic facilitation that supported student inquiry while maintaining appropriate challenge levels. Observations documented this progression, with early lessons showing teachers quickly providing answers when students struggled, thereby short-circuiting the productive struggle central to PBL. Later lessons demonstrated more skilled facilitation, with teachers using strategic

questioning to guide student thinking without directly providing solutions, redirecting students to resources rather than serving as primary information sources, and allowing extended periods of group work without constant teacher intervention. This developmental trajectory suggests that effective PBL implementation requires ongoing teacher learning and support beyond initial training, as pedagogical transformation occurs gradually through reflective practice rather than immediately following professional development sessions.

Assessment presented particular challenges for teachers implementing PBL, as traditional test-based evaluation poorly captured the complex, process-oriented learning PBL emphasizes. Teachers struggled with designing authentic assessments aligned with PBL principles while satisfying institutional requirements for numerical grades and standardized documentation. Some teachers reported reverting to conventional tests despite implementing PBL instruction, creating misalignment between teaching and assessment that potentially undermined PBL's benefits. The most successful teachers developed multimodal assessment systems incorporating self-assessment, peer evaluation, process portfolios, and performance-based tasks—approaches requiring substantially more time and expertise than conventional testing. This assessment challenge highlights systemic barriers to PBL implementation, as innovation in instruction must be accompanied by corresponding innovation in evaluation practices (Strobel & van Barneveld, 2009).

Teachers identified several contextual factors that facilitated or constrained effective PBL implementation in Indonesian secondary schools. Supportive factors included administrative encouragement, collaboration with peer teachers, access to diverse resources for student research, and reasonable class sizes enabling group work management. Constraining factors included rigid time schedules that fragmented PBL cycles, extensive curriculum content requirements creating pressure to cover material quickly, limited student prior knowledge for independent research, and parental concerns about non-traditional instruction. These contextual realities underscore that PBL's effectiveness depends not only on instructional design and teacher skill but also on broader institutional and systemic conditions that either enable or obstruct innovative pedagogy. Successful scaling of PBL in Indonesian education will require addressing these systemic constraints rather than focusing exclusively on classroom-level implementation (Kemendikbud, 2016).

## CONCLUSION

This study provides robust empirical evidence that Problem-Based Learning significantly enhances critical thinking skills in Indonesian language education contexts, with effect sizes indicating educationally meaningful improvements in students' analytical, evaluative, and inferential abilities. The research demonstrates that PBL can be successfully adapted to Indonesian educational contexts when implementation attends to cultural learning preferences, provides adequate teacher preparation and support, and maintains fidelity to core PBL principles while flexibly addressing local realities. The particularly strong effects on evaluation skills suggest

that PBL's emphasis on judgment, argumentation, and evidence assessment effectively develops these crucial critical thinking dimensions. Beyond quantitative performance improvements, qualitative findings reveal that PBL transforms students' engagement with language learning, fostering active investigation of linguistic phenomena, collaborative knowledge construction, and metacognitive awareness of thinking processes. These multidimensional benefits position PBL as a promising pedagogical approach for achieving Indonesian education's goal of developing 21st-century competencies while maintaining disciplinary learning objectives in language education.

The findings carry important implications for educational policy, teacher preparation, and instructional practice in Indonesian contexts and potentially other educational systems sharing similar characteristics. Policymakers should consider supporting PBL implementation through curriculum frameworks that provide adequate instructional time, reduce content coverage pressures, and align assessment systems with higher-order thinking objectives. Teacher education programs should incorporate substantial preparation in PBL facilitation, recognizing that effective implementation requires pedagogical transformation beyond surface-level technique adoption. Schools and teachers should approach PBL implementation as a developmental process requiring ongoing support, reflection, and refinement rather than expecting immediate mastery or universal success. Future research should examine PBL's long-term effects on critical thinking development, investigate implementation across diverse Indonesian contexts beyond Central Java, explore optimal professional development models for supporting teacher PBL capacity, and examine how PBL can be effectively integrated with other pedagogical innovations to maximize learning outcomes. Ultimately, this research contributes to growing evidence that constructivist, student-centered pedagogies can effectively develop critical thinking within diverse cultural contexts when thoughtfully adapted to local conditions and systematically supported through implementation processes.

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