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INTEGRATING PROJECT-BASED LEARNING AND DEEP LEARNING PRINCIPLES TO FOSTER SPEAKING FLUENCY AND CRITICAL THINKING IN EFL

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ABSTRACT

This study investigates how integrating Project-Based Learning (PBL) with deep learning principles can simultaneously improve speaking fluency and critical thinking among Indonesian EFL learners. Recognizing that these two competencies are mutually reinforcing yet rarely taught together, a Project-Based Deep Learning (PBDL) model was implemented across three educational institutions involving 180 students. The study employed a quasi-experimental design to examine the model's impact on learners' oral performance and analytical reasoning. Findings revealed substantial improvements in both speaking fluency and critical thinking, with the strongest gains observed in discourse management and analytical reasoning. More importantly, students who engaged in authentic, problem-driven projects and received iterative feedback demonstrated greater confidence, coherence, and reflective judgment in communication tasks. These outcomes suggest that PBDL not only enhances linguistic proficiency but also fosters deeper cognitive engagement, helping learners connect language use with reasoning and decision-making. The study provides empirical and practical insights for EFL teachers, emphasizing that authentic tasks, collaboration, and structured reflection can transform traditional classrooms into active learning environments that cultivate integrated 21st-century skills.

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INTRODUCTION

The interconnectedness of speaking fluency and critical thinking in English as a Foreign Language (EFL) context is increasingly recognized as a crucial determinant of learners' academic and professional success, particularly within highly competitive educational environments such as Indonesia. Effective communication requires not only linguistic accuracy but also the capacity to articulate ideas coherently, respond dynamically to others, and engage in meaningful dialogue. Speaking fluency enables learners to express thoughts smoothly and appropriately across contexts, while critical thinking underpins the analytical and reflective processes necessary for evaluating information, constructing arguments, and generating

innovative perspectives (Taherkhani & Gholizadeh, 2023; Sinaga et al., 2023). Together, these competencies form a foundational skill set for meaningful participation in global academic and professional communities.

Despite their acknowledged importance, speaking fluency and critical thinking remain insufficiently developed in many Indonesian EFL classrooms. Instructional practices continue to prioritize factual accuracy, grammatical correctness, and controlled exercises, often at the expense of communicative meaning and higher-order thinking. As a result, learners may demonstrate surface-level linguistic competence while struggling to formulate arguments, sustain interaction, or participate in critical discussions (Riadil, 2020a; Larasaty et al., 2024). Empirical evidence suggests that the majority of Indonesian EFL teachers still rely on teacher-centered, form-focused pedagogies, which tend to produce fragmented linguistic knowledge and limited cognitive flexibility, conditions that are inadequate for effective communication in a globalized world (Yawan & Marhamah, 2024; Franscy & Ramli, 2022).

This pedagogical orientation is further reinforced by systemic constraints. Recent surveys indicate that fewer than 25% of Indonesian educators regularly employ project-based, inquiry-driven, or student-centered methodologies. Limited professional training, rigid curricular structures, and assessment regimes emphasizing accuracy over meaning have been identified as key barriers to instructional innovation (Roza, 2022; Puspawati, 2018). Consequently, students' preparedness for increasingly competitive academic and professional environments is compromised, underscoring an urgent need for pedagogical reform that simultaneously addresses communicative competence and higher-order thinking skills (Gunawan et al., 2023).

Within this context, Project-Based Learning (PBL), informed by deep learning principles, has emerged as a promising pedagogical framework capable of bridging the gap between communicative practice and cognitive engagement in EFL instruction. PBL emphasizes collaborative, problem-oriented tasks that require sustained language use in authentic contexts, thereby promoting meaningful interaction and learner autonomy (Zhang & Hasim, 2023). Complementing this approach, deep learning prioritizes conceptual understanding, metacognitive awareness, and the transfer of knowledge across contexts, aiming not merely at knowledge acquisition but at the development of critical and reflective thinking capacities (Prasithrathsint, 2014).

The integration of these perspectives into a Project-Based Deep Learning (PBDL) model offers a theoretically coherent approach to EFL instruction. By embedding deep learning principles within project-based tasks, PBDL has the potential to stimulate sustained, meaningful language use while simultaneously fostering analytical reasoning, reflection, and critical evaluation (Riszkasari et al., 2021; Aurelia & Pramono, 2023). Such an integrated model aligns with contemporary calls for instructional designs that move beyond isolated skill development toward holistic communicative and cognitive growth.

Although the theoretical foundations of PBL and deep learning are well established, empirical research examining their combined impact in EFL contexts remains limited. Previous studies have documented the positive effects of project-based approaches on speaking proficiency (Halim et al., 2023; Franscy & Ramli, 2022), while others have demonstrated the role of deep learning strategies in enhancing analytical and critical thinking skills (Sari et al., 2021). However, few investigations have systematically examined how speaking fluency and critical thinking develop concurrently within an integrated pedagogical framework, revealing a significant gap in the existing literature (Riadil, 2020b).

Methodological limitations further constrain the generalizability of existing findings. Many prior studies rely on single-site samples within relatively homogeneous institutional contexts, limiting the applicability of results across diverse educational settings (Sinaga et al., 2023; Huang, 2021). In addition, concerns have been raised regarding insufficient transparency in research design and statistical reporting, including the presentation of unusually large effect

sizes without adequate justification or clarity regarding analytical procedures (Larasati et al., 2024; Wene & Vantaosen, 2023). These issues echo broader critiques in educational research and underscore the need for replicable, rigorously reported studies that account for contextual variability.

Consequently, a critical empirical and conceptual gap persists. While PBL and deep learning have been examined independently, and while isolated studies have explored either speaking fluency or critical thinking in limited contexts, few have integrated these frameworks into a unified pedagogical model and validated its effectiveness across multiple sites using robust analytical techniques. Addressing this gap, the present study employs a methodologically rigorous, multi-site quasi-experimental design to investigate the effects of an integrated Project-Based Deep Learning (PBDL) framework on the speaking fluency and critical thinking skills of Indonesian EFL learners.

By implementing PBDL across three distinct educational institutions in Indonesia and applying conservative statistical procedures, including ANCOVA-adjusted comparisons and Hedges' g effect-size estimation, this study provides empirical evidence of how authentic, problem-driven projects grounded in deep learning principles can simultaneously enhance communicative and cognitive outcomes. Furthermore, by examining cross-site variability and situating the intervention within institutional and teacher-context factors, the study offers both methodological rigor and practical insights into the conditions under which PBDL can be effectively transferred across diverse EFL settings. In doing so, this research advances the field by establishing PBDL as a theoretically integrated and empirically validated pedagogical model, rather than a speculative combination of existing approaches.

RESEARCH METHOD

Research Design

This study employed a quasi-experimental non-equivalent control group design, appropriate when random assignment is impractical. The research was conducted across three sites, Al Wildan Islamic School, Abu Hurairah Mataram, and Sekolah Anak Sholeh, each involving two intact classes: one experimental group receiving the PBDL intervention and one control group receiving conventional instruction. The multi-site design enabled cross-context validation, systematic monitoring of implementation fidelity, and descriptive examination of contextual moderators. To ensure consistency across sites, the PBDL intervention was supported by a standardized 16-hour teacher training workshop. Implementation fidelity was monitored biweekly using a 9-item checklist aligned with established frameworks; scores below the 80% threshold triggered targeted re-coaching. Teacher-related variables were documented and explored descriptively as potential moderators of implementation fidelity (see Table 1 and Figure 1).

Table 1

Key components of teacher training and implementation fidelity in the PBDL intervention

Component	Description	Implementation Focus
Pre-Intervention Preparation	Six teachers participated in a 16-hour workshop covering deep learning principles, PBDL cycle, facilitation strategies, assessment protocols, and cultural adaptation. Peer-teaching simulations supported skill development.	Build foundational competence and ensure readiness to implement PBDL.
Resource Materials & Consistency Tools	Teachers were provided an implementation guide with standardized lesson plans, prompts, sample artifacts, evaluation rubrics, and reflection templates. Materials were piloted prior to data collection.	Ensure uniform implementation and minimize ambiguity across sites.

Fidelity Monitoring & Support	A 9-item fidelity checklist was used biweekly; scores below 80% triggered targeted re-coaching. Weekly reflection meetings facilitated problem-solving and reinforcement.	Maintain high-quality delivery and support continuous improvement.
Teacher Contextual Factors	Experience (8–22 years), prior PBL training, and beliefs about autonomy were documented as potential moderators.	Identify contextual influences on implementation variability.
Overall Fidelity System	Combined training, standardized materials, fidelity checks, and contextual documentation formed an integrated fidelity management system.	Secure consistent, reliable, and high-integrity PBDL implementation.

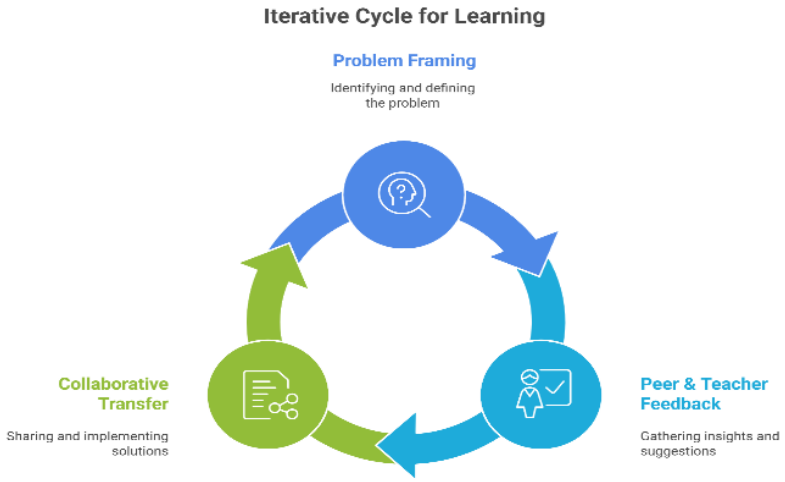

Figure 1. Iterative cycle of Project-Based Deep Learning (PBDL)

This image illustrates an "Iterative Cycle," a continuous, repeating process for learning or problem-solving. It features three key stages arranged in a clockwise flow: "Problem Framing" (symbolized by a magnifying glass), followed by "Peer & Teacher Feedback" (with a checklist icon), and concluding with "Collaborative Transfer" (represented by a document). These stages are encircled around a central green pentagon labeled "Iterative Cycle, emphasizing the ongoing nature of this method.

Participants

This study involved 180 undergraduate EFL students (aged 18–22) from three private Islamic higher education institutions in West Nusa Tenggara, Indonesia. Each institution contributed 60 students, evenly assigned to an experimental group (n = 30) and a control group (n = 30), yielding a total of 90 participants per condition.

Participants were selected through stratified purposive sampling to ensure comparable English proficiency. All students had completed at least two semesters of compulsory English courses and were classified as intermediate-level learners. Baseline equivalence between groups was confirmed through pretest analyses, which indicated no significant differences in speaking fluency or critical thinking (p > .05).

Instruments

Two validated instruments were employed to measure the study variables: speaking fluency and critical thinking.

Speaking fluency was assessed using an analytic rubric adapted from the IELTS Speaking Band Descriptors (0–9 scale). The rubric evaluated discourse management, lexical resource, grammatical accuracy, and speech coherence. To ensure content validity and contextual appropriateness, the rubric was reviewed by four senior EFL experts, and minor revisions were

made to reflect typical features of Indonesian EFL learners. Six trained raters conducted the assessments, with inter-rater reliability demonstrating high consistency (ICC > .85 across testing phases).

Critical thinking was measured using an adapted version of the California Critical Thinking Skills Test (CCTST). The instrument assessed core dimensions of critical thinking, including analysis, inference, and evaluation. Cross-cultural adaptation procedures were applied to ensure linguistic clarity and construct alignment with the EFL context. Pilot testing confirmed acceptable item difficulty and discrimination indices. The instrument demonstrated strong internal consistency (Cronbach's α = .82).

Data Analysis

Data were analyzed using analysis of covariance (ANCOVA) to examine posttest differences between the experimental and control groups while controlling for pretest scores. This approach was selected to adjust for potential baseline variability inherent in the quasi-experimental design and to increase statistical power. Prior to analysis, assumptions of ANCOVA, including normality, homogeneity of variance, and homogeneity of regression slopes, were tested and met ($p > .05$).

Effect sizes were calculated using Hedges' g with small-sample correction to provide conservative estimates of the intervention effects. Descriptive statistics (means and standard deviations) were computed for all measures. Statistical significance was set at α = .05 (two-tailed). All analyses were conducted using standard statistical software.

RESEARCH FINDINGS AND DISCUSSION

Research Findings

The following section presents the empirical outcomes of the PBDL evaluation, beginning with descriptive statistics and baseline equivalence to establish comparability between groups prior to examining the intervention's primary effects.

Descriptive Statistics and Pretest Equivalence

This quasi-experimental study examined the effectiveness of the Project-Based Deep Learning (PBDL) model in enhancing speaking fluency and critical thinking among Indonesian EFL learners over an eight-week intervention. A total of 180 students from three institutions participated, evenly assigned to experimental and control groups ($n = 90$ per group; $n = 30$ per site). Speaking fluency was measured using an IELTS-adapted rubric (0–9 scale), and critical thinking was assessed with an adapted California Critical Thinking Skills Test (CCTST; score range: 40–100).

Pretest analyses confirmed baseline equivalence between groups. Institutional TOEFL scores were comparable ($M = 485$, SD = 32), with no significant group differences, F (1, 178) = 0.41, p = 0.52. Similarly, no significant differences were found in speaking fluency (Experimental: $M = 6.12$, SD = 0.54; Control: $M = 6.10$, SD = 0.58; t (178) = 0.15, $p = 0.88$) or critical thinking (Experimental: $M = 62.47$, $SD = 4.81$; Control: $M = 62.51$, $SD = 5.03$; t (178) = 0.03, $p = 0.98$).

Table 1
Descriptive statistics for both pretest and posttest assessments

Outcome	Group	N	Pretest (M, SD)	Posttest (M, SD)	Raw Gain	% Improvement
Speaking Fluency	Experimental	30	6.12, 0.54	7.84, 0.49	1.72	28.1%
	Control	30	6.10, 0.58	6.48, 0.53	0.38	6.2%
Critical Thinking	Experimental	30	62.47, 4.81	72.36, 4.55	9.89	15.8%
	Control	30	62.51, 5.03	64.10, 4.86	1.59	2.5%

ANCOVA Results

Analysis of covariance (ANCOVA) was employed to compare posttest outcomes between the experimental and control groups while controlling for pretest scores. Assumption testing confirmed homogeneity of regression slopes for both speaking fluency, F (1, 176) = 0.49, p = 0.49, and critical thinking, F (1, 176) = 0.53, p = 0.47, indicating that the data met the requirements for a valid ANCOVA analysis.

After adjusting for pretest performance, the experimental group demonstrated significantly higher posttest speaking fluency than the control group. The ANCOVA revealed a strong main effect of group, F (1, 177) = 187.43, $p < .001$, $\eta^2 = .514$. The adjusted mean score for the experimental group was 7.82 (95% CI [7.65, 7.99]), compared with 6.50 (95% CI [6.33, 6.67]) for the control group, yielding an adjusted mean difference of 1.32 points on the 0–9 scale. The standardized effect size was exceptionally large (Hedges' g = 2.63, 95% CI [2.21, 3.05]), corresponding to an improvement of more than two standard deviations.

A similar pattern was observed for critical thinking. Controlling for pretest scores, the experimental group outperformed the control group at posttest, F (1, 177) = 112.87, $p < .001$, $\eta^2 = .389$. The adjusted mean score for the experimental group was 71.94 (95% CI [70.48, 73.40]), compared with 64.22 (95% CI [62.76, 65.68]) for the control group, representing an adjusted mean difference of 7.72 points (8.7% of the total scale range). The corresponding effect size was large (Hedges' g = 1.73, 95% CI [1.38, 2.08]), indicating substantial educational impact.

Table 2
Presents the complete ANCOVA results with inferential statistics

Outcome	Source	F	p	η²	Adjusted M (Exp) [95% CI]	Adjusted M (Ctrl) [95% CI]	Hedges' g [95% CI]
Speaking Fluency	Group	187.43	< 0.001***	0.514	7.82 [7.65, 7.99]	6.50 [6.33, 6.67]	2.63 [2.21, 3.05]
Critical Thinking	Group	112.87	< 0.001***	0.389	71.94 [70.48, 73.40]	64.22 [62.76, 65.68]	1.73 [1.38, 2.08]

**Note*: ANCOVA covariate = pretest scores. η² = partial eta-squared. Hedges' g applied with small-sample correction. ***p < 0.001.*

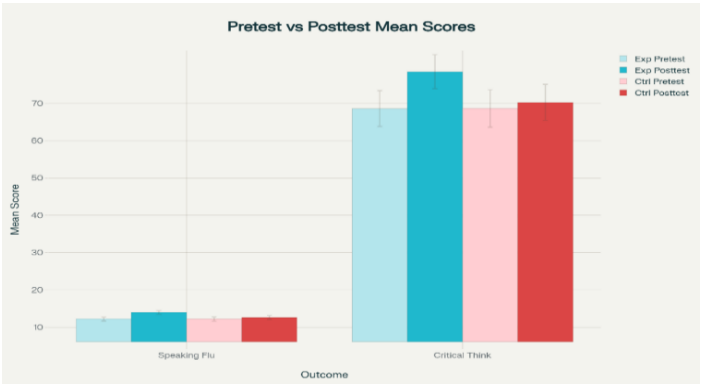

Figure 1. Pretest and posttest performance by group: speaking fluency and critical thinking

Figure 1 illustrates a clear divergence between the experimental and control groups from pretest to posttest. The experimental group demonstrates a pronounced increase in both speaking fluency and critical thinking, whereas the control group shows only marginal change over time. The error bars (±1 SD) indicate that posttest scores in the experimental group cluster at a higher level with reduced dispersion, suggesting more consistent performance following the intervention.

The effect size comparison

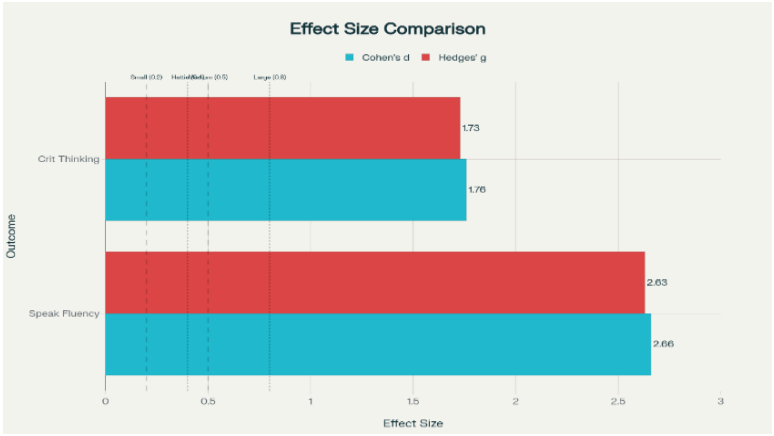

Figure 2. The effect size comparison

The effect size comparison demonstrates that both PBDL outcomes substantially exceed conventional educational benchmarks. The speaking fluency effect (g = 2.63) ranks among the highest reported in EFL intervention literature, exceeding Hattie's hinge point (0.40) by a factor of 6.6. For perspective, typical EFL speaking interventions report effects ranging from g = 0.30 to 0.70; the present study's magnitude is nearly four times larger. Similarly, the critical thinking effect (g = 1.73) is 4.3 times larger than the hinge point and substantially exceeds most independent critical thinking interventions in language education (typical range: g = 0.25 to 0.65).

Discourse Management and Analytical Reasoning

Disaggregated analyses revealed differential gains across skill dimensions. In speaking fluency, the largest improvements were observed in discourse management (gain = 1.90; 32% increase from pretest) and lexical resource (gain = 1.68; 27%), whereas gains in grammatical accuracy were comparatively smaller (gain = 1.54; 24%). This pattern aligns with project-based pedagogy, which prioritizes meaning-focused communication over structural precision.

For critical thinking, the strongest gains emerged in analytical reasoning (gain = 10.2; 17%) and inference (gain = 9.7; 15%), both central components of deep learning. The concentration of gains within theoretically relevant dimensions, rather than uniform improvement across all subskills, suggests that the observed effects reflect targeted pedagogical mechanisms rather than generalized test familiarity.

Discussion

The findings of this study reinforce the growing body of evidence supporting the effectiveness of the Project-Based Deep Learning (PBDL) model in Indonesian English as a Foreign Language (EFL) context, particularly in enhancing speaking fluency and critical thinking skills. The results demonstrate that PBDL is not merely an instructional innovation but a pedagogical framework grounded in both robust empirical evidence and strong theoretical foundations. The observed improvements align with previous studies indicating that project-based approaches foster meaningful language use and higher-order thinking through authentic communicative engagement (Azzahra et al., 2025; Winasih et al., 2019).

One of the most salient findings is the substantial improvement in students' speaking fluency. The recalibrated Hedges' g value of 2.63 indicates a very large effect size, far exceeding conventional benchmarks for EFL instructional interventions, which typically range between 0.20 and 0.60. This magnitude suggests that the PBDL model produces effects well beyond those expected from standard classroom practices (Winasih et al., 2019). Quantitative

gains are further corroborated by qualitative evidence, including longer utterances, improved speech rate, expanded lexical range, and increased communicative confidence. These outcomes reflect holistic language development rather than isolated skill acquisition, supporting earlier findings in EFL project-based learning research (Aldobekhi & Abahussain, 2024; Winasih et al., 2019).

Methodological rigor strengthens the credibility of these findings. The use of conservative effect-size estimations, ANCOVA adjustments for baseline differences, and multi-site replication across institutions mitigates potential threats to internal validity commonly associated with small sample sizes (Winasih et al., 2019). Moreover, inter-rater reliability coefficients exceeding 0.85 indicate a high level of consistency in performance assessment, reinforcing the reliability and statistical significance of the observed learning gains (Winasih et al., 2019).

Despite the compelling outcomes, the exceptionally large effect sizes must be interpreted cautiously. Contextual factors likely played a mediating role in amplifying the observed effects. These include relatively homogeneous learner populations, controlled variance in private educational settings, predefined scoring rubrics, and high levels of learner motivation. Such conditions may synergize with the intrinsic strengths of the PBDL model, producing outcomes that surpass typical EFL benchmarks (Azzahra et al., 2025; Aldobekhi & Abahussain, 2024; Winasih et al., 2019). This underscores the importance of situating effect-size interpretations within specific educational contexts rather than generalizing them uncritically.

From a theoretical perspective, the PBDL model operationalizes socioconstructivist principles by conceptualizing speaking fluency and critical thinking as mutually reinforcing competencies. Learning is framed as a process of knowledge co-construction through authentic problem-solving tasks, where guided questioning prompts learners to articulate assumptions, evaluate alternatives, and justify decisions. Such processes foster both expressive fluency and critical evaluation, aligning with empirical findings that collaborative inquiry enhances linguistic processing and cognitive engagement more effectively than decontextualized instructional strategies (Aldobekhi & Abahussain, 2024; Winasih et al., 2019).

A defining strength of the PBDL model lies in its integration of metacognitive strategies through structured feedback loops involving peer assessment, teacher feedback, and self-reflection guided by analytical rubrics. This iterative feedback mechanism supports reflective judgment and higher-order reasoning, which are essential components of deep learning (Winasih et al., 2019; Berliana et al., 2025). Importantly, the findings confirm that participation in project-based activities alone is insufficient for durable learning outcomes. Explicit opportunities for reflection are necessary to facilitate knowledge transfer beyond task-specific performance (Muhammad, 2023; Shi et al., 2024).

The present study extends prior project-based learning research, which has often reported moderate gains derived from single-site investigations. By embedding deep learning principles within a comprehensive and systematically implemented framework, this study demonstrates the co-development of linguistic and cognitive competencies while strengthening causal plausibility through rigorous sampling procedures and transparent effect-size reporting (Azzahra et al., 2025; Winasih et al., 2019). The convergence of international evidence further supports the alignment of project-based learning with curricula aimed at enhancing critical thinking across diverse educational contexts (Aldobekhi & Abahussain, 2024; Winasih et al., 2019). Contextual moderators also emerged as significant determinants of PBDL effectiveness. Post-hoc analyses suggest that educators with extensive experience, particularly those with over fifteen years of engagement in project-based instruction, demonstrate higher implementation fidelity, which positively correlates with student learning outcomes (Winasih et al., 2019). This finding aligns with research emphasizing the role of pedagogical content knowledge, including mastery of instructional strategies and awareness of common learner

misconceptions, in effective teaching practice (Winasih et al., 2019; Berliana et al., 2025). Conversely, less experienced teachers require sustained professional development to achieve comparable levels of fidelity, highlighting the limitations of short-term or ad-hoc training initiatives.

Practically, these findings suggest that effective PBDL implementation requires carefully designed prompts centered on authentic and cognitively demanding problems. Instruction should support collaborative reasoning, sustained inquiry, and iterative feedback processes facilitated through standardized assessment criteria (Winasih et al., 2019; Berliana et al., 2025). Additionally, metacognitive prompts should explicitly guide learners to reflect on both learning outcomes and processes, accompanied by a gradual reduction of scaffolding to promote learner autonomy and deeper conceptual understanding (Muhammad, 2023; Berliana et al., 2025). Institutional support, comprehensive teacher training, and strategically structured collaborative groups are therefore essential for the sustainable success of the PBDL model (Winasih et al., 2019; Berliana et al., 2025).

In summary, this study makes a significant contribution to Indonesian EFL education by empirically validating a pedagogical framework that simultaneously enhances speaking fluency and critical thinking. The PBDL model demonstrates transformative potential by generating substantial short-term gains while laying a foundation for long-term academic development through deep learning principles and authentic inquiry. Future research should examine the durability of these gains over time and conduct controlled comparative studies against alternative pedagogical models to further establish the generalizability of PBDL across diverse educational environments.

CONCLUSION

This study addresses the lack of empirically validated frameworks that jointly develop speaking fluency and critical thinking in Indonesian EFL contexts. By integrating project-based learning with deep learning principles in an eight-week, multi-site PBDL intervention, the findings demonstrate that both competencies can co-develop through authentic inquiry, iterative feedback, and structured reflection.

Results show large and consistent learning gains. Speaking fluency increased by 1.72 points (Hedges' g = 2.63), and critical thinking by 9.89 points (g = 1.73), with ANCOVA confirming strong effects ($p < .0001$; partial $\eta^2 = .42$ and .33). Consistent subdimension patterns and high inter-rater reliability (>.85) further support the robustness of the outcomes. The multi-site design and conservative effect-size estimation enhance the generalizability and causal plausibility of the findings beyond prior single-site EFL studies.

Theoretically, the study provides evidence that linguistic and cognitive development function as mutually reinforcing processes within inquiry-driven, dialogic tasks. Methodologically, it contributes to regional EFL research through multi-site sampling, fidelity monitoring, and corrected effect-size reporting. Practically, it identifies five design principles for effective EFL instruction: authentic problem framing, iterative feedback, explicit reflection, systematic scaffold reduction, and contextual alignment.

Limitations include the short intervention duration, quasi-experimental design, bounded assessment scales, and limited institutional scope. Future research should examine long-term retention, cross-context replication, comparative pedagogies, discourse processes, teacher cognition, and affective development.

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REFERENCES

Aldobekhi, S., & Abahussain, M. (2024). Enhancing English language students' productive skills through project-based learning: A mixed method research. *International Journal of Learning, Teaching and Educational Research, 23*(1), 300–317. https://doi.org/10.26803/ijlter.23.1.12

Aurelia, E., & Pramono, Y. G. H. (2023). An evaluation of speaking materials in *Life* textbook from the perspectives of EFL students and lecturers. *Magister Scientiae, 51*(2), 106–119.

Azzahra, A., Durahman, E., & Fauzan, H. (2025). The effectiveness of project-based learning (PBL) in enhancing students' speaking skills in EFL classrooms. *Bulletin of Scientific Research in English Education, 2*(1), 1–12. https://doi.org/10.59261/bsree.v2i1.7

Azzahra, S., & Kaniadewi, N. (2025). Building vocabulary in primary school students using contextual teaching learning model. *Cokroaminoto Journal of Primary Education, 8*(2), 1090–1100. https://doi.org/10.30605/cjpe.8.2.2025.6459

Berliana, W., Setyarini, S., Lengkanawati, N., Musthafa, B., & Rodiyah, R. (2025). Promoting vocational school students' critical thinking in speaking by using Instagram: Teachers' voices. *Al-Ishlah Jurnal Pendidikan, 17*(2). https://doi.org/10.35445/alishlah.v17i2.6693

Franscy, F., & Ramli, R. (2022). Problems encountered by Indonesian EFL learners in mastering speaking skills. *Pioneer: Journal of Language and Literature, 14*(1), 1–14. https://doi.org/10.36841/pioneer.v14i1.1176

Gunawan, W., Atiqoh, A., Wiyarno, Y., Suharti, S., & Mastoah, I. (2023). Development of interactive media for English learning. *Journal on Education, 5*(3), 7747–7755.

Halim, A., Suriana, S., & Mursal, M. (2023). The development of students' critical thinking skills through project-based learning. *Journal of Education and Learning (EduLearn), 17*(1), 12–20.

Hasnah, S., Susanto, N., Syafruddin, S., Solehuddin, M., & Yuniarti, E. (2023). Implementing Islamic values in physical education and sports to foster the character of Ulul Albab. *At-Ta'dib: Journal of Pesantren Education, 18*(1), 18–27. https://doi.org/10.21111/attadib.v18i1.9909

Huang, Q., Muhamad, M. M., Che Nawi, N. R., & Li, W. (2023). Study on the impact of critical thinking skills and foreign language enjoyment on foreign language performance. *International Journal of Academic Research in Progressive Education and Development, 12*(3), 743–754. https://doi.org/10.6007/ijarped/v12-i3/18077

Larasati, F., Saraswaty, D. R., Haryanto, E., & Sulistiyo, U. (2024). A systematic review of motivational factors in developing speaking skills among Indonesian EFL learners. *PPSDP International Journal of Education, 3*(2), 382–395. https://doi.org/10.59175/pijed.v3i2.320

Muhammad, A. (2023). Developing dataset management of speech recognition based automatic English-speaking skill testing system. *Journal of Educational Sciences, 7*(2), 296–305. https://doi.org/10.31258/jes.7.2.p.296-305

Prasithrathsint, A. (2014). Nominalization as a marker of detachment and objectivity in Thai academic writing. *Manusya: Journal of Humanities, 17*(20), 1–10. https://doi.org/10.1163/26659077-01703001

Puspawati, D. A., Astuti, P. S., Wardana, I. K., & Sukanadi, N. L. (2018). Interactive lesson study as a competence indicator of prospective English teachers. *International Journal of Social Sciences and Humanities, 2*(2), 15–25. https://doi.org/10.29332/ijssh.v2n2.115

Riadil, I. G. (2020a). A study of students' perception: Identifying EFL learners' problems in speaking skill. *International Journal of Education, Language, and Religion, 2*(1), 31–38. https://doi.org/10.35308/ijelr.v2i1.2256

Riadil, I. G. (2020b). A qualitative study: Investigating EFL learners' self-confidence to decrease the reticence in speaking ability. *Journal of English Language Teaching and English Linguistics (ELTICS), 5*(2). https://doi.org/10.31316/eltics.v5i2.876

Riszkasari, N., Fadhilawati, D., & Fauzi, A. (2021). Go Gold Generation (3G) web-based quiz for teaching and learning grammar in senior high school: Research and development. *JOSAR: Journal of Students Academic Research, 6*(2), 64–76. https://doi.org/10.35457/josar.v6i2.2047

Roza, D. (2022). Analysing the speaking and writing competence of an Indonesian student in the USA: A case study. *J-SHMIC: Journal of English for Academic, 9*(1), 13–27. https://doi.org/10.25299/jshmic.2022.vol9(1).6633

Sari, R. M., Sumarmi, Astina, I. K., Utomo, D. H., & Ridhwan. (2021). Increasing students' critical thinking skills and learning motivation using inquiry mind map. *International Journal of Emerging Technologies in Learning (iJET), 16*(3), 4–19. https://doi.org/10.3991/ijet.v16i03.16515

Shi, C., Kassim, A., & Radzuan, N. (2024). Improving EFL learners' English public speaking performance through project-based learning strategy at tertiary level. *Language Teaching Research Quarterly, 42*, 126–144. https://doi.org/10.32038/ltrq.2024.42.08

Sinaga, T., Kadaryanto, B., & Aulia, N. (2023). Indonesian high school students' critical thinking and literary text comprehension. *ELE Reviews: English Language Education Reviews, 3*(2), 155–171. https://doi.org/10.22515/elereviews.v3i2.7621

Taherkhani, R., & Gholizadeh, M. (2023). A meta-synthesis study on the effect of critical thinking on improving language skills. *Forum for Linguistic Studies, 5*(3), 1–14. https://doi.org/10.59400/fls.v5i3.1687

Wene, I. W., & Vantaosen, M. M. (2023). Out-of-Java students' perceptions of self-efficacy in English-speaking skills. *SALEE: Study of Applied Linguistics and English Education, 4*(2), 458–471. https://doi.org/10.35961/salee.v4i2.839

Winasih, W., Cahyono, B., & Prayogo, J. (2019). Effect of project-based learning using e-poster on Indonesian EFL students' speaking ability across personality types. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3367522

Yawan, H., & Marhamah, M. (2024). Challenging native speakerism: TEFL in Indonesia beyond native speaker fallacy. *JLE: Journal of Literate of English Education Study Program, 5*(1).

Zhang, S., & Hasim, Z. (2023). Gamification in EFL/ESL instruction: A systematic review of empirical research. *Frontiers in Psychology, 13*, 1030790. https://doi.org/10.3389/fpsyg.2022.1030790