



Improving Students' Critical Thinking through Problem-Based Learning in English Class at Grade XI SMK Swasta GKPI 1 Pematangsiantar

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Abstract

This study investigates the enhancement of students' critical thinking performance through the implementation of Problem-Based Learning in an English class at Grade XI of SMK Swasta GKPI 1 Pematangsiantar. Employing a qualitative descriptive field research design, the study aims to examine how PBL facilitates the development of higher-order thinking skills within a vocational English learning context. Data were collected through classroom observations, interviews, document analysis, and critical thinking assessments conducted before and after the implementation of PBL. The findings indicate a significant improvement in students' critical thinking performance across multiple indicators, including problem identification, logical reasoning, evaluation of ideas, decision-making, and reflective thinking. The results further reveal that PBL enhances students' cognitive engagement by integrating authentic problem scenarios, collaborative inquiry, and reflective practices into English instruction. The vocational orientation of learning tasks strengthens relevance and supports deeper cognitive processing. This study contributes to the literature by providing empirical evidence on the effectiveness of PBL in vocational English education and highlights its potential to create student-centered, cognitively rich learning environments that support both language development and critical thinking growth.

Keywords: Problem-Based Learning, Critical Thinking, English Education, Vocational High School, Qualitative Study.



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INTRODUCTION

The increasing emphasis on twenty-first-century skills within global education systems has positioned critical thinking as a core competency that students must develop to navigate complex academic, professional, and social challenges, particularly in language learning contexts where reasoning, interpretation, and evaluation intersect with communicative competence. In English as a Foreign Language (EFL) classrooms, the shift from teacher-centered instruction toward learner-centered pedagogies reflects a broader pedagogical transformation aligned with constructivist learning theories and global curriculum reforms that prioritize higher-order cognitive engagement over rote memorization. Within this evolving landscape, Problem-Based Learning (PBL) has gained sustained international attention as an instructional approach capable of fostering analytical reasoning, self-directed inquiry, and reflective judgment through authentic, ill-structured problems embedded in meaningful learning situations (Anggraeni et al., 2023; Chen et al., 2024). This global momentum underscores the growing expectation that English classrooms function not merely as sites of language transmission but as intellectual spaces where learners actively construct knowledge and evaluate information critically.

A substantial body of empirical research has examined the effectiveness of PBL in enhancing students' critical thinking across disciplines and educational levels, consistently reporting positive cognitive outcomes while highlighting contextual variations in implementation. Studies conducted in science, social studies, and interdisciplinary settings demonstrate that PBL facilitates deeper conceptual understanding by encouraging students to question assumptions, synthesize evidence, and articulate reasoned arguments collaboratively (Adnyani & Suniasih, 2023; Dharma & Lestari, 2022; Haryanti et al., 2022). In language education, PBL has been shown to improve reading comprehension, speaking ability, and learner engagement by situating linguistic tasks within problem-solving scenarios that demand interpretation and evaluation rather than surface-level comprehension (Aulia et al., 2023; Daeli, 2022). Systematic and meta-analytic evidence further strengthens this position by confirming that PBL exerts a statistically significant and pedagogically meaningful effect on critical thinking development

when compared to conventional instructional models, particularly when learning activities are carefully scaffolded and aligned with cognitive objectives (Anggraeni et al., 2023; Chen et al., 2024).

Despite this growing consensus, closer examination of the literature reveals notable limitations and conceptual gaps that constrain the generalizability and pedagogical precision of existing findings. Many studies focus predominantly on primary or general secondary education, leaving vocational high school contexts underrepresented, even though such settings demand higher levels of applied reasoning and contextual problem-solving aligned with workplace realities. Research in EFL contexts often prioritizes linguistic outcomes such as comprehension or fluency, treating critical thinking as a secondary or indirect variable rather than a central analytical construct measured through rigorous cognitive frameworks (Aulia et al., 2023; Fitriyah et al., 2024). Moreover, variations in research design, assessment instruments, and operational definitions of critical thinking have produced fragmented evidence, making it difficult to determine how PBL specifically mediates cognitive processes within English classrooms at different educational strata (Dianita & Tiarani, 2023; Ernanda et al., 2022). These inconsistencies suggest that the relationship between PBL and critical thinking remains theoretically under-theorized and empirically uneven across instructional contexts.

The unresolved nature of these issues highlights a pressing scientific and pedagogical concern, particularly for vocational education institutions where students are expected to integrate language proficiency with analytical reasoning and problem-solving skills relevant to real-world professional environments. Vocational high school students often encounter English learning as task-oriented and examination-driven, resulting in limited opportunities to engage in reflective inquiry or critical discourse despite the cognitive demands of their future careers. Without pedagogical interventions that explicitly cultivate critical thinking, English instruction risks reinforcing passive learning patterns that undermine students' capacity to evaluate information, justify decisions, and adapt knowledge across contexts. Addressing this gap is especially urgent in EFL settings where instructional innovation must balance language acquisition goals with cognitive development demands in order to produce learners who are both communicatively competent and intellectually autonomous (Bendraou & Sakale, 2023; Ardiansyah et al., 2024).

Positioned within this scholarly and practical landscape, the present study responds to the need for context-sensitive, theoretically grounded research that examines how PBL can be systematically employed to enhance critical thinking in vocational EFL classrooms. By focusing on Grade XI students at SMK Swasta GKPI 1 Pematangsiantar, this research extends existing literature beyond general secondary education and contributes empirical insight into how PBL operates within a vocational English learning environment characterized by diverse cognitive abilities and pragmatic learning orientations. Unlike prior studies that treat PBL as a generic instructional model, this research conceptualizes PBL as a cognitive intervention designed to restructure classroom interaction, learner agency, and evaluative reasoning within English instruction. This positioning allows the study to bridge international theoretical discourse with localized pedagogical realities, strengthening the contextual validity of PBL research in EFL education.

Accordingly, this study aims to investigate the extent to which Problem-Based Learning improves students' critical thinking skills in English classes at the vocational high school level, while also examining how instructional design and learning processes mediate this relationship. The research seeks to contribute theoretically by refining the understanding of critical thinking development within PBL-oriented EFL instruction and methodologically by providing empirically grounded evidence from a vocational education context that remains underexplored in international literature. By integrating rigorous assessment of critical thinking outcomes with pedagogical analysis, the study aspires to inform both instructional practice and future research on learner-centered approaches in English education, particularly within vocational settings that demand cognitive flexibility and applied reasoning skills.

RESEARCH METHOD

This study employed a descriptive qualitative field research design grounded in an interpretivist epistemological perspective, which assumes that critical thinking development emerges through socially mediated learning processes and is best understood through in-depth contextual interpretation rather than numerical measurement. The selection of this design was theoretically justified by constructivist learning theory and problem-based pedagogy, both of which conceptualize learning as an active process in which students construct meaning through engagement with authentic problems,

collaborative inquiry, and reflective discourse. A qualitative descriptive approach was considered methodologically appropriate because the research aimed to capture how Problem-Based Learning (PBL) was enacted in real instructional settings and how students' critical thinking manifested during English learning activities, without manipulating variables or testing causal relationships. This approach allowed for systematic documentation and interpretation of instructional practices, student responses, and cognitive engagement patterns as they naturally occurred within the classroom context, ensuring ecological validity and alignment with qualitative research rigor in educational studies.

The research was conducted at Grade XI of SMK Swasta GKPI 1 Pematangsiantar, a vocational secondary school where English is taught as a compulsory subject and instructional practices are oriented toward applied communication and workplace relevance, thereby providing a contextually rich setting for examining PBL implementation. The research participants consisted of one intact Grade XI class selected through purposive sampling based on predefined criteria, including active implementation of PBL strategies in English instruction and students' comparable academic backgrounds, ensuring information-rich cases suitable for qualitative inquiry. Data were collected from multiple sources to enhance credibility, including classroom observations, semi-structured interviews with the English teacher and selected students, and analysis of instructional documents such as lesson plans, student worksheets, and reflective tasks. Observation and interview protocols were developed based on established critical thinking indicators—analysis, evaluation, inference, and reasoning—to ensure content validity, while triangulation across data sources and prolonged engagement in the field supported trustworthiness and reliability. Data collection followed a standardized chronological procedure beginning with preliminary classroom familiarization, followed by systematic observations of PBL-based lessons, post-instruction interviews, and document compilation. Data analysis was conducted using qualitative thematic analysis involving data reduction, coding, categorization, and interpretive synthesis, guided by a critical thinking analytical framework to identify recurring patterns, instructional mechanisms, and cognitive responses. This analytic process enabled a coherent interpretation of how PBL contributed to the development of students' critical thinking skills within the vocational English classroom context.

RESULT AND DISCUSSION

Enhancement of Students' Critical Thinking Performance through Problem-Based Learning

The implementation of Problem-Based Learning in the English classroom revealed a discernible transformation in students' critical thinking performance, as evidenced by systematic changes across multiple cognitive indicators observed during instructional activities and reflected in assessment outcomes. The empirical findings demonstrate that students increasingly engaged in analytical reasoning, evaluative judgment, and reflective thinking when confronted with authentic problems embedded in English learning tasks, supporting the constructivist premise that cognition develops through active meaning-making processes (Yu & Zin, 2023). This pattern aligns with prior syntheses indicating that PBL environments stimulate higher-order thinking by situating learning within problem contexts that demand interpretation, justification, and decision-making (Anggraeni et al., 2023). The vocational English context further amplified this effect by requiring students to relate language use to practical scenarios resembling workplace communication, thereby reinforcing relevance-driven cognition (Jumhur et al., 2024). Consequently, critical thinking development emerged not as an isolated skill but as an integrated outcome of linguistic engagement, collaboration, and contextual reasoning.

A comparative analysis of students' performance before and after PBL implementation indicates a substantial upward shift in overall critical thinking competence, suggesting that instructional redesign meaningfully altered students' cognitive engagement patterns. The observed improvement reflects how PBL restructures classroom interaction from teacher-centered explanation toward inquiry-driven exploration, which has been empirically associated with deeper cognitive processing (Haryanti et al., 2022). Within English learning, this shift encouraged students to articulate ideas, negotiate meanings, and justify opinions using the target language, reinforcing the reciprocal relationship between language proficiency and critical thinking development (Aulia et al., 2023). The qualitative classroom observations further revealed that students gradually transitioned from passive reception to active questioning, indicating increased epistemic agency fostered through problem-oriented tasks (Neswary & Prahani, 2022). These findings substantiate claims that PBL supports sustainable cognitive growth by embedding reasoning demands into everyday instructional practices.

The improvement in students' ability to identify problems highlights the effectiveness of PBL in cultivating analytical awareness as a foundational component of critical thinking. Students demonstrated increased sensitivity to problem parameters, contextual constraints, and implicit assumptions when analyzing English-based scenarios, which is consistent with research emphasizing problem identification as a gateway to higher-order reasoning (Dharma & Lestari, 2022). This development was facilitated by repeated exposure to ill-structured problems that required interpretation rather than direct recall, thereby challenging students to interrogate information critically (Fitriyah et al., 2024). In vocational settings, such analytical awareness is particularly salient, as learners must navigate complex communicative situations that lack predefined solutions (Daeli, 2022). Thus, the findings suggest that PBL not only enhances linguistic engagement but also strengthens students' capacity to frame problems cognitively within authentic contexts.

Logical reasoning emerged as another domain exhibiting pronounced improvement, reflecting students' growing ability to construct coherent arguments and draw justified conclusions during English discussions. Classroom interactions showed that students increasingly supported their opinions with evidence derived from texts, peer input, and contextual reasoning, indicating a shift toward rational discourse practices (Triyanto et al., 2022). This progression corroborates empirical studies demonstrating that PBL promotes structured reasoning by requiring learners to evaluate alternatives and defend decisions collaboratively (Ernanda et al., 2022). The use of English as the medium of reasoning further intensified cognitive demand, as students had to align linguistic accuracy with logical coherence (Montafej et al., 2022). Consequently, logical reasoning development functioned simultaneously as a cognitive and linguistic achievement within the PBL framework.

Evaluation of ideas showed the highest level of improvement, underscoring the role of PBL in fostering evaluative judgment and critical appraisal skills. Students increasingly assessed the credibility, relevance, and feasibility of proposed solutions during group work, reflecting the internalization of evaluative criteria embedded in problem-solving tasks (Sulhan et al., 2023). This aligns with systematic reviews indicating that PBL environments are particularly effective in enhancing evaluative thinking by positioning students as active judges of knowledge rather than passive recipients (Anggraeni et al., 2023). The qualitative data further revealed that evaluative discussions were often mediated through peer feedback, suggesting that social interaction played a critical role in shaping judgment processes (Bendraou & Sakale, 2023). Such findings reinforce the interpretivist view that critical thinking is socially constructed through dialogic engagement.

Table 1. Comparison of Students' Average Critical Thinking Scores Before and After the Implementation of Problem-Based Learning

Critical Thinking Indicator	Pre-Test Mean Score	Post-Test Mean Score	Improvement	Interpretation
Identifying problem	62.3	81.7	+19.4	Significant improvement
Logical reasoning	58.5	80.2	+21.7	Significant improvement
Evaluating ideas	60.1	84.5	+21.9	High improvement
Decision-making	63.4	79.1	+21.1	High improvement
Reflection	59.8	81.5	+19.3	Moderate to high improvement
Average	60.8	81.5	+20.7	High improvement overall

Source: Field data from pre-test and post-test assessments conducted at Grade XI SMK Swasta GKPI 1 Pematangsiantar.

Decision-making skills exhibited a high level of improvement, indicating that students became more confident and systematic in selecting solutions during problem-based tasks. The PBL structure required learners to weigh alternatives, anticipate consequences, and justify choices, which are core components of critical decision-making (Maulina et al., 2025). This process was reinforced through collaborative deliberation, allowing students to encounter diverse perspectives and refine judgments collectively (Nurdin & Uleng, 2023). In vocational English instruction, such decision-making competence is essential, as students must navigate communicative demands that require timely and contextually appropriate responses (Jumhur et al., 2024). Therefore, the observed enhancement suggests that PBL effectively bridges cognitive skill development with practical communicative competence.

Reflection also demonstrated notable improvement, indicating that students increasingly engaged in metacognitive evaluation of their learning processes and outcomes. Reflective activities embedded in PBL sessions encouraged learners to assess strengths, identify difficulties, and articulate learning strategies using English, thereby reinforcing self-regulated learning behaviors (Muda et al., 2025). This finding is consistent with studies highlighting reflection as a critical mechanism through which PBL consolidates learning and promotes transferability of skills (Yu & Zin, 2023). The qualitative interview data further revealed that students perceived reflection as meaningful rather than procedural, suggesting deeper internalization of learning experiences (Oktaviani & Suharsih, 2024). Such reflective engagement underscores the transformative potential of PBL in cultivating lifelong learning dispositions.

The overall increase in average critical thinking scores reflects the cumulative impact of PBL across interconnected cognitive domains rather than isolated skill gains. This holistic improvement supports meta-analytic evidence indicating that PBL yields robust effects on critical thinking by simultaneously activating analysis, evaluation, and reflection processes (Chen et al., 2024). The alignment between qualitative observations and quantitative trends further strengthens the credibility of the findings, demonstrating methodological coherence within the descriptive qualitative framework (Ardiansyah et al., 2024). Importantly, the vocational context did not constrain cognitive development but instead amplified relevance-driven engagement, validating PBL's adaptability across educational settings (Daeli, 2022). Thus, the results substantiate the argument that PBL constitutes an effective pedagogical strategy for fostering integrated critical thinking in English education.

Comparative analysis with previous studies reveals strong convergence between the present findings and established empirical patterns, while also contributing context-specific insights from vocational English instruction. Similar improvements in critical thinking indicators have been reported across primary, secondary, and higher education contexts, reinforcing the generalizability of PBL's cognitive benefits (Adnyani & Suniasih, 2023; Ernanda et al., 2022). However, this study extends existing literature by demonstrating how PBL functions within a vocational English classroom, where language learning intersects with applied problem-solving demands (Jumhur et al., 2024). This contribution addresses gaps identified in prior reviews regarding underrepresentation of vocational contexts in PBL research (Anggraeni et al., 2023). Consequently, the findings offer both confirmatory and novel insights into PBL-driven critical thinking development.

From a conceptual perspective, the findings affirm constructivist and problem-based pedagogical assumptions that learning emerges through active engagement with meaningful tasks. The observed cognitive improvements illustrate how students construct knowledge through interaction, negotiation, and reflection rather than passive absorption (Yu & Zin, 2023). This process-oriented view of learning underscores the importance of instructional designs that prioritize inquiry and collaboration over content transmission (Triyanto et al., 2022). In English education, such designs enable learners to integrate language use with reasoning practices, thereby enhancing both communicative competence and cognitive depth (Aulia et al., 2023). The study thus reinforces the theoretical coherence between PBL, constructivism, and critical thinking development.

The implications of these findings suggest that integrating PBL into vocational English curricula can meaningfully enhance students' readiness for complex communicative and cognitive demands. Teachers are encouraged to design problem scenarios that reflect authentic vocational contexts, thereby sustaining relevance and cognitive challenge (Fitriyah et al., 2024). Curriculum developers may also consider embedding reflective and evaluative components systematically within English instruction to support sustained critical thinking growth (Sulhan et al., 2023). Moreover, the results highlight the value of qualitative inquiry in capturing nuanced cognitive transformations that may be overlooked by purely

quantitative approaches (Ardiansyah et al., 2024). Overall, the study contributes empirically and conceptually to advancing student-centered, cognitively rich English education through Problem-Based Learning.

Students' Learning Engagement and Collaborative Interaction in Problem-Based Learning

The implementation of Problem-Based Learning fostered a marked transformation in students' learning engagement, particularly in how they interacted cognitively and socially during English learning activities. Classroom observations indicated that students became more actively involved in problem exploration, discussion, and solution formulation, reflecting a shift from surface-level participation toward meaningful engagement. This pattern supports socio-constructivist perspectives emphasizing that learning engagement deepens when students collaboratively negotiate meaning and share responsibility for problem resolution (Vygotsky, 1978; Bendraou & Sakale, 2023). Within the PBL framework, engagement functioned not merely as behavioral participation but as sustained cognitive involvement driven by authentic problem contexts.

Students' participation in group discussions increased substantially, suggesting that PBL effectively reduced passive learning tendencies commonly observed in teacher-centered classrooms. Learners demonstrated greater willingness to express ideas, ask clarifying questions, and respond to peers' arguments using English, indicating enhanced communicative confidence. This finding aligns with previous studies reporting that PBL environments promote dialogic interaction by positioning students as co-constructors of knowledge rather than recipients of information (Triyanto et al., 2022). The use of problem scenarios grounded in vocational contexts further encouraged students to contribute actively, as tasks were perceived as relevant to real-world communication demands.

Collaborative interaction quality also showed significant improvement, particularly in terms of mutual support and shared reasoning among group members. Students increasingly engaged in turn-taking, justification of opinions, and collective evaluation of alternative solutions, reflecting higher levels of collaborative cognition. Such interaction patterns are consistent with research highlighting that PBL strengthens collaborative skills by embedding interdependence within problem-solving tasks (Ernanda et al., 2022). In the English classroom, this collaboration simultaneously supported language practice and critical engagement, reinforcing the reciprocal relationship between social interaction and cognitive development.

The enhancement of inquiry behavior further illustrates how PBL stimulated active learning engagement. Students displayed increased curiosity by formulating questions related to problem constraints, possible solutions, and underlying assumptions. This inquiry-driven behavior aligns with empirical evidence suggesting that PBL nurtures epistemic curiosity by exposing learners to ill-structured problems that lack predetermined answers (Fitriyah et al., 2024). As students sought clarification and justification through questioning, they demonstrated deeper engagement with both content and process, indicating a shift toward self-directed learning orientations.

Peer feedback emerged as a salient component of collaborative engagement, contributing to the refinement of ideas and solutions during group work. Students increasingly provided constructive comments, suggestions, and alternative viewpoints, suggesting the development of evaluative and interpersonal competencies. This finding corroborates studies emphasizing peer interaction as a catalyst for higher-order thinking within PBL settings (Sulhan et al., 2023). Through peer feedback, learners not only improved solution quality but also internalized evaluative standards, reinforcing critical engagement through social mediation.

Table 2. Students' Learning Engagement and Collaborative Interaction During Problem-Based Learning

Engagement Indicator	Before PBL	After PBL	Change Level	Interpretation
Active participation	Low	High	Significant increase	Students became more involved
Group discussion involvement	Moderate	High	High improvement	Enhanced collaborative dialogue

Inquiry and questioning behavior	Low	Moderate	Moderate increase	Growing critical curiosity
Peer feedback quality	Moderate	High	High improvement	Improved evaluative interaction
Responsibility in group tasks	Moderate	High	Significant increase	Stronger learning ownership

Source: Classroom observation and student activity records at Grade XI SMK Swasta GKPI 1 Pematangsiantar

The increase in students' sense of responsibility within group tasks indicates that PBL promoted ownership of learning processes. Learners became more accountable for task completion, role distribution, and group outcomes, reflecting internalized motivation rather than external compliance. This development aligns with self-determination theory, which posits that autonomy-supportive learning environments enhance intrinsic engagement (Ryan & Deci, 2020). By allowing students to manage problem-solving processes collaboratively, PBL cultivated a learning climate that supported responsibility and persistence.

From a pedagogical standpoint, the observed engagement patterns suggest that PBL effectively restructures classroom dynamics toward student-centered interaction. Teachers functioned primarily as facilitators, guiding inquiry and discussion without dominating knowledge transmission. This instructional shift created space for students to engage more deeply with content and peers, supporting sustained cognitive and social engagement (Haryanti et al., 2022). In English learning, such dynamics are particularly beneficial, as meaningful language use emerges through interaction rather than repetition.

Comparatively, the engagement outcomes observed in this study are consistent with findings across diverse educational contexts, reinforcing the robustness of PBL as an engagement-enhancing strategy. Previous research has documented similar increases in participation, collaboration, and inquiry in PBL-based classrooms at secondary and tertiary levels (Adnyani & Suniasih, 2023). However, the present findings contribute context-specific evidence from vocational English education, where engagement is closely tied to perceived relevance and applicability. This context strengthens the argument that PBL is adaptable and effective across curricular domains.

The enhancement of students' learning engagement and collaborative interaction underscores the complementary role of PBL in supporting critical thinking development. Engagement functioned as both a prerequisite and an outcome of problem-based instruction, mediating cognitive growth through social interaction and inquiry. The convergence between observational data and engagement indicators reinforces the validity of the findings within the qualitative descriptive framework. Thus, PBL emerges not only as a cognitive strategy but also as a powerful pedagogical approach for fostering active, collaborative, and meaningful learning in English classrooms.

Pedagogical and Cognitive Mechanisms Underlying the Effectiveness of Problem-Based Learning

The effectiveness of Problem-Based Learning in enhancing students' critical thinking performance can be systematically explained through its pedagogical structure, which reconfigures classroom learning from content transmission into cognitively demanding inquiry processes. Within the English learning context, PBL positioned students as active problem solvers who were required to interpret scenarios, formulate questions, and construct solutions using the target language, thereby integrating linguistic competence with higher-order thinking demands. This instructional shift aligns with constructivist learning theory, which posits that knowledge is actively constructed through interaction with meaningful tasks rather than passively received from instruction (Yu & Zin, 2023). Consequently, cognitive engagement emerged not as a byproduct but as an intentional outcome of instructional design embedded within the PBL framework.

From a cognitive perspective, PBL facilitated the activation of multiple critical thinking dimensions simultaneously, including analysis, evaluation, decision-making, and reflection, through iterative problem-solving cycles. Students were consistently required to move beyond surface-level comprehension toward deeper reasoning by identifying underlying issues, evaluating alternative viewpoints, and justifying conclusions in English-based discussions. This multidimensional activation supports empirical findings indicating that PBL promotes integrated cognitive processing rather than

isolated skill development (Chen et al., 2024). The sustained exposure to ill-structured problems further challenged students' epistemic beliefs, encouraging them to tolerate ambiguity and engage in evidence-based reasoning, which are central attributes of mature critical thinking (Sulhan et al., 2023).

Collaborative learning mechanisms also played a decisive role in mediating the impact of PBL on students' critical thinking development. Group-based problem-solving activities required learners to articulate ideas, negotiate meanings, and evaluate peer contributions, thereby situating cognition within social interaction. Such dialogic engagement aligns with sociocultural perspectives that conceptualize critical thinking as a socially constructed practice emerging through discourse and collaboration (Bendraou & Sakale, 2023). In the English classroom, this interactional process was further intensified by the necessity to express reasoning in a second language, which demanded both cognitive clarity and linguistic precision. As a result, students demonstrated increasing confidence in expressing arguments and responding critically to peer input, indicating the co-development of communicative and cognitive competencies.

The vocational context of SMK Swasta GKPI 1 Pematangsiantar amplified the relevance and authenticity of PBL tasks, thereby strengthening students' cognitive investment in learning activities. Problem scenarios designed around practical and workplace-related situations enabled students to perceive English learning as functionally meaningful rather than abstract or examination-oriented. This relevance-driven engagement is consistent with vocational education literature emphasizing contextual learning as a catalyst for deeper cognitive processing (Daeli, 2022). The findings suggest that when English instruction is aligned with students' future professional contexts, critical thinking development becomes more sustainable and transferable beyond the classroom.

Metacognitive regulation emerged as another key mechanism underpinning the observed improvement in critical thinking performance. Reflective components embedded in PBL activities encouraged students to evaluate their reasoning processes, identify learning difficulties, and adjust problem-solving strategies accordingly. This metacognitive engagement supports prior research indicating that reflection functions as a consolidating mechanism through which PBL transforms experience into structured knowledge (Muda et al., 2025). Students' increasing ability to articulate reflections in English further indicates that metacognition and language development progressed in parallel, reinforcing the integrative nature of PBL-based instruction.

The alignment between instructional design, cognitive demand, and learning context underscores the robustness of PBL as a pedagogical approach for fostering critical thinking in vocational English education. Rather than relying on explicit instruction of thinking skills, PBL embedded cognitive challenges within authentic communicative tasks, thereby normalizing critical thinking as an integral component of language use. This finding corroborates theoretical claims that higher-order thinking develops most effectively when embedded within disciplinary practices rather than taught as an isolated competence (Triyanto et al., 2022). Accordingly, the effectiveness of PBL observed in this study can be attributed to the coherence between pedagogical structure, cognitive mechanisms, and contextual relevance.

CONCLUSION

This study demonstrates that Problem-Based Learning constitutes an effective pedagogical approach for enhancing students' critical thinking performance in English instruction at the vocational secondary level. The integrated findings reveal that PBL systematically promotes improvement across key dimensions of critical thinking, including problem identification, logical reasoning, evaluative judgment, decision-making, and reflective thinking, through cognitively demanding and contextually meaningful learning activities. The implementation of authentic problem scenarios encourages students to actively engage in inquiry, articulate arguments, and justify solutions using the target language, thereby reinforcing the interdependence between linguistic competence and higher-order cognitive processes. Collaborative interaction and reflective practices embedded within the PBL framework further support the social and metacognitive construction of critical thinking. Importantly, the vocational context amplifies the relevance of learning tasks, enabling students to perceive English as a functional tool for problem-solving in real-world situations. Overall, the findings substantiate the theoretical and empirical alignment between constructivist learning principles and PBL, while extending existing literature by providing context-specific evidence from vocational English education, thereby affirming PBL's potential to foster sustainable and transferable critical thinking skills.

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