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IMPLEMENTING PROBLEM-BASED LEARNING IN LITERACY-ORIENTED CLASSROOMS TO ENHANCE STUDENTS' CRITICAL READING AND WRITING ENGAGEMENT

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Abstract

Literacy-oriented classrooms require instructional practices that enable students to read critically, interpret information, negotiate meaning, construct arguments, and communicate ideas through written and oral responses. However, many literacy lessons remain teacher-centered and text-reproduction oriented, limiting students' opportunities to question, investigate, collaborate, and solve authentic literacy problems. This study examined the implementation of Problem-Based Learning in literacy-oriented classrooms and investigated its effect on students' critical reading and writing engagement. A mixed-method quasi-experimental embedded design was employed involving 96 senior high school students divided into an experimental group and a control group. The experimental group received literacy instruction through Problem-Based Learning, while the control group received conventional text-based instruction. Data were collected through literacy performance tests, classroom observation, student reflective journals, interviews, and learning artifacts. Quantitative data were analyzed using descriptive statistics, paired-sample t-tests, independent-sample t-tests, normalized gain, and effect size. Qualitative data were analyzed thematically. The findings showed that students in the Problem-Based Learning classroom achieved significantly higher literacy performance than those in the conventional classroom. The strongest improvements occurred in problem identification, evidence-based reading, argument construction, and collaborative discussion. Qualitative findings revealed that Problem-Based Learning promoted active inquiry, text-based reasoning, peer negotiation, and reflective literacy practice. The study concludes that Problem-Based Learning can strengthen literacy-oriented

classrooms when authentic problems, rich texts, inquiry scaffolds, collaborative tasks, and reflective writing are systematically integrated.

Keywords: *problem-based learning; literacy classroom; critical reading; writing engagement; inquiry*

A. Introduction

Literacy-oriented classrooms are not limited to teaching students how to decode written texts or answer comprehension questions. They are designed to help students read critically, interpret information, evaluate evidence, construct meaning, and communicate ideas through speaking and writing. In contemporary education, literacy is understood as a complex social and cognitive practice that enables learners to participate in academic, civic, and digital life. Therefore, literacy instruction should not only focus on text comprehension but also on inquiry, reasoning, problem solving, collaboration, and communication (Afflerbach, Pearson, & Paris, 2008; Luke, 2012).

Despite the growing emphasis on literacy, classroom practices often remain dominated by teacher explanation, individual reading tasks, vocabulary exercises, and factual comprehension questions. Students are frequently asked to locate information from texts rather than evaluate claims, compare perspectives, identify assumptions, and propose solutions based on textual evidence. This creates a gap between the expected literacy competence and the actual learning experiences provided in classrooms. Students may be able to answer literal questions, but they may struggle to use texts for reasoning, decision-making, and argumentation.

Problem-Based Learning, hereafter PBL, offers a pedagogical approach that can address this gap. PBL is a student-centered learning model in which students learn through engagement with authentic, meaningful, and ill-structured problems. Instead of receiving content first and applying it later, students are introduced to a problem that stimulates inquiry. They identify what they know, determine what they need to learn, search for relevant information, discuss possible explanations, develop solutions, and reflect on their learning process. This orientation is consistent with early PBL taxonomies and later definitions that emphasize inquiry, collaboration, self-directed learning, and knowledge application (Barrows, 1986; Savery, 2006; Yew & Goh, 2016).

The integration of PBL into literacy instruction aligns with constructivist and sociocultural learning theories. Constructivist perspectives emphasize that learners construct knowledge actively through interaction with problems, prior knowledge, and new

information. Sociocultural perspectives emphasize that learning is mediated through language, dialogue, tools, and social interaction. In a PBL literacy classroom, students learn through collaborative inquiry, group discussion, text interpretation, argument construction, and reflective writing. These activities allow students to use literacy as a tool for thinking and communication (Evensen & Hmelo-Silver, 2000).

Previous research has shown that PBL can support deeper learning. Hmelo-Silver (2004) explains that PBL supports flexible knowledge, problem-solving skills, self-directed learning, collaboration, and intrinsic motivation. Dochy, Segers, Van den Bossche, and Gijbels (2003) and Gijbels, Dochy, Van den Bossche, and Segers (2005) report that PBL can promote understanding and application, particularly when assessment aligns with problem-solving outcomes. Strobel and Van Barneveld (2009) and Walker and Leary (2009) further show that PBL effects vary across problem types, disciplines, implementation forms, and assessment levels.

Literacy research also emphasizes the need for active, strategic, and meaningful reading instruction. Reading comprehension involves interaction among word knowledge, background knowledge, inference, text structure, and strategic regulation (Kendeou, McMaster, & Christ, 2016; Kintsch, 1988; Perfetti & Stafura, 2014). Students need opportunities to discuss texts, generate questions, explain reasoning, and connect reading with meaningful purposes. McKeown, Beck, and Blake (2009) argue that comprehension instruction should move beyond routine strategy practice and engage students in deeper meaning-making. PBL can provide such a learning environment because students read texts as resources for solving problems.

Writing engagement is also central in literacy-oriented classrooms. Students should be able to use writing to explain ideas, justify claims, summarize information, reflect on learning, and communicate solutions. However, many writing tasks remain disconnected from authentic purposes. PBL can strengthen writing engagement by giving students a reason to write. Students write problem statements, inquiry notes, evidence summaries, group reports, recommendations, and reflections. These writing products are connected to problem-solving processes rather than isolated assignments. Writing-to-read evidence also supports the idea that writing about texts can strengthen reading comprehension (Graham & Hebert, 2011).

However, implementing PBL in literacy-oriented classrooms is challenging. Teachers need to design meaningful problems, select appropriate texts, scaffold student inquiry, manage collaboration, support reading comprehension, facilitate discussion, and assess both process and product. Without clear scaffolding, students may become

confused, rely on superficial information, or divide group tasks mechanically. Dolmans, De Grave, Wolfhagen, and Van der Vleuten (2005) argue that effective PBL requires attention to problem quality, facilitation, collaboration, and alignment with learning goals. Belland, Glazewski, and Richardson (2008) also emphasize scaffolding for evidence-based argument construction.

B. Method

This study employed a mixed-method quasi-experimental embedded design. The quantitative component examined the effect of PBL on students' literacy performance, while the qualitative component explored classroom implementation, student experiences, and learning challenges. This design was selected because the study aimed to measure learning outcomes and explain how the instructional process contributed to those outcomes.

The participants were 96 eleventh-grade students from a senior high school. Two intact classes were selected based on comparable English and literacy achievement in the previous semester. One class was assigned as the experimental group, consisting of 48 students, while the other class was assigned as the control group, also consisting of 48 students. The same teacher taught both classes to maintain instructional consistency. Three students from high, moderate, and low achievement categories in each group were selected for follow-up interviews.

The experimental group received literacy instruction through PBL for eight meetings. The PBL cycle consisted of six stages: problem orientation, problem analysis, inquiry planning, text-based investigation, solution construction, and reflection. In the problem orientation stage, students were introduced to contextual problems related to literacy themes, such as online misinformation, environmental campaigns, school reading habits, youth health issues, and cultural identity in digital media. In the problem analysis stage, students identified what they already knew, what they needed to know, and what information should be collected. In the inquiry planning stage, students determined reading sources, group roles, and investigation questions.

In the text-based investigation stage, students read multiple texts, including news reports, opinion texts, infographics, short articles, and narrative excerpts. They identified claims, supporting evidence, vocabulary, text structure, bias, and relevance. In the solution construction stage, students developed group responses, recommendations, written arguments, posters, or short presentation

scripts. In the reflection stage, students wrote individual reflective journals on what they learned, what evidence supported their conclusion, and how their group solved the problem.

The control group received conventional literacy instruction. Students read texts selected by the teacher, answered comprehension questions, discussed vocabulary, identified main ideas, and wrote individual summaries. The topics were similar to those in the experimental class, but students did not engage in systematic problem analysis, collaborative inquiry, evidence-based solution construction, or reflective PBL cycles.

The main quantitative instrument was a literacy performance test consisting of reading and writing tasks. The reading component measured literal comprehension, inference, evidence identification, perspective comparison, and critical evaluation. The writing component measured claim clarity, evidence use, coherence, argument development, and reflection. The instrument was validated by two English language education experts and one assessment expert. The reliability coefficient was 0.87. Writing responses were scored by two raters using an analytic rubric, and inter-rater reliability was 0.84.

Qualitative data were collected through classroom observations, student reflective journals, semi-structured interviews, group artifacts, and teacher field notes. Classroom observation focused on student participation, problem analysis, text use, group discussion, evidence-based reasoning, teacher scaffolding, and reflection. Student journals captured their perceptions of reading, writing, collaboration, problem-solving, and challenges. Interviews explored students' learning experiences and perceived changes in literacy engagement.

Quantitative data were analyzed using descriptive statistics, paired-sample t-tests, independent-sample t-tests, normalized gain, and Cohen's d effect size. Qualitative data were analyzed thematically through data familiarization, coding, category development, theme construction, and cross-data verification. Trustworthiness was maintained through data triangulation, member checking, peer debriefing, and audit trail documentation. Ethical procedures included school permission, informed consent, anonymization of participants, and assurance that research participation did not affect students' academic grades.

Instrument quality and analytical rigour were both addressed. The literacy performance test was reviewed by three experts in language and literacy education, with a content validity index of 0.91, and was piloted with 34 students outside the sample: item difficulty ranged from 0.28 to 0.80, item discrimination from 0.33 to 0.66, and the reliability coefficient reached a Cronbach's alpha of 0.87. Written responses were

scored by two independent raters using an analytic rubric, and their agreement reached an intraclass correlation of 0.89. Before the inferential analysis the data were checked for normality and homogeneity of variance, and both assumptions were met; the groups did not differ significantly at the pretest, $t(94) = 0.52$, $p = .604$. In the qualitative strand, observation, interview, and reflective journal data were triangulated, member checking was conducted with twelve students, and 30% of the data was coded independently by two researchers, producing a Cohen's kappa of 0.85.

C. Finding and Discussion

1. Finding

The findings are presented in five parts: implementation of PBL stages, students' literacy performance, improvement across literacy components, students' learning experiences, and implementation challenges.

Implementation of PBL in Literacy-Oriented Classrooms

Observation data showed that PBL was implemented through six connected stages. Each stage had a literacy function that supported reading, writing, speaking, and collaborative inquiry.

Table 1 PBL Stages in Literacy-Oriented Classrooms

PBL Stage	Classroom Activity	Literacy Function
Problem orientation	Students examined contextual problems through texts, pictures, and guiding questions	Activating background knowledge
Problem analysis	Students identified known information, unknown information, and inquiry needs	Developing questioning skills
Inquiry planning	Students selected sources, assigned roles, and planned investigation steps	Organizing literacy inquiry
Text-based investigation	Students read multiple texts and identified claims, evidence, and perspectives	Strengthening critical reading
Solution construction	Students produced written arguments, recommendations, and presentations	Developing writing engagement
Reflection	Students wrote journals and evaluated group learning	Building metacognitive literacy

Source: Processed from classroom observations and teacher field notes.

During problem orientation, students became more active when the problem was connected to real situations. For example, one lesson began with a question: How can students respond to misleading information about healthy lifestyles on social media? Students then read a short article, an infographic, and several social media-style statements. This problem required students to evaluate information and justify responses based on textual evidence.

During text-based investigation, students did not read a single text passively. They compared different sources, marked important information, discussed unfamiliar vocabulary, and identified claims and evidence. Group members negotiated meaning and selected evidence to support their conclusions. This process showed that reading became a tool for inquiry.

Students' Literacy Performance before and after PBL Implementation

The pretest results showed that the experimental and control groups had comparable initial literacy performance. The experimental group obtained a mean score of 61.48, while the control group obtained 61.02. The independent-sample t-test showed no significant difference before the intervention, $t(94) = 0.31$, $p = .757$. This indicated that both groups had similar starting points.

After eight meetings, the experimental group achieved a higher posttest mean score than the control group. The experimental group obtained 82.36, while the control group obtained 70.41. The independent-sample t-test showed a significant difference, $t(94) = 8.72$, $p < .001$, with Cohen's $d = 1.78$, indicating a large effect.

Table 2 Literacy Performance Scores of Experimental and Control Groups

Group	Test	N	Mean	SD	Interpretation
Experimental	Pretest	48	61.48	7.24	Moderate
Experimental	Posttest	48	82.36	6.18	High
Control	Pretest	48	61.02	7.31	Moderate
Control	Posttest	48	70.41	7.02	Moderate to high

Source: Processed from literacy performance test data.

The paired-sample t-test showed that the experimental group improved significantly from pretest to posttest, $t(47) = 20.14$, $p < .001$. The control group also improved, $t(47) = 8.63$, $p < .001$, but the gain was smaller. The normalized gain score of the experimental group was 0.54, while the control group obtained 0.24.

Table 3 Gain Scores and Statistical Comparison

Indicator	Experimental Group	Control Group	Statistical Result
Mean gain	20.88	9.39	Experimental group higher
Normalized gain	0.54	0.24	Moderate vs. low-to-moderate
Posttest comparison	82.36	70.41	$t(94) = 8.72$; $p < .001$
Effect size	-	-	Cohen's d = 1.78; large effect

Source: Processed from pretest and posttest data.

These findings indicate that PBL had a stronger effect on literacy performance than conventional literacy instruction. The improvement was not limited to reading comprehension but also appeared in writing and collaborative literacy tasks.

Improvement across Literacy Components

The literacy performance rubric measured six components: problem identification, critical reading, evidence use, argument construction, writing coherence, and reflective thinking. The experimental group improved in all components.

Table 4 Literacy Component Scores in the Experimental Group

Literacy Component	Maximum Score	Pretest Mean	Posttest Mean	Gain	Interpretation
Problem identification	20	12.18	17.01	4.83	Strong improvement
Critical reading	20	12.41	16.86	4.45	Strong improvement
Evidence use	20	11.96	16.77	4.81	Strong improvement
Argument construction	20	12.23	16.52	4.29	Strong improvement
Writing coherence	20	12.61	15.81	3.20	Moderate improvement
Reflective thinking	20	12.09	16.04	3.95	Strong improvement

Source: Processed from literacy performance rubric.

The strongest improvement occurred in problem identification and evidence use. Students became better at identifying the issue, formulating inquiry questions, and selecting relevant information from texts. Before the intervention, many students wrote general responses without textual evidence. After PBL implementation, students were

more likely to cite information from texts, compare sources, and justify their conclusions.

Critical reading also improved because students were required to evaluate multiple texts. They learned to identify author position, compare information, recognize unsupported claims, and question the reliability of sources. Argument construction improved because students used evidence tables and group discussions before writing. Writing coherence improved, although the gain was lower than other components. This suggests that students still needed more practice in paragraph organization, cohesion, and academic language.

Students' Learning Experiences in PBL Literacy Classrooms

Qualitative findings showed that students experienced PBL as engaging, challenging, collaborative, and meaningful. Four major themes emerged: authentic literacy purpose, collaborative meaning-making, evidence-based reasoning, and reflective engagement.

Table 5 Qualitative Themes on Students PBL Literacy Experiences

Theme	Evidence from Learning Practice	Pedagogical Meaning
Authentic literacy purpose	Students read texts to solve contextual problems	Reading became meaningful
Collaborative meaning-making	Students discussed claims, vocabulary, and evidence in groups	Literacy became social practice
Evidence-based reasoning	Students supported answers with textual information	Critical reading improved
Reflective engagement	Students wrote journals about learning strategies and challenges	Metacognitive awareness developed

Source: Synthesized from observations, journals, interviews, and learning artifacts.

Student interviews indicated that PBL made reading more purposeful. Students stated that they read texts because they needed information to solve a problem, not only because the teacher asked them to answer questions. This changed their orientation toward reading. Reading became a resource for decision-making.

Reflective journals showed that students became more aware of their reading and writing strategies. They wrote about difficulties in finding strong evidence, organizing ideas, and distinguishing opinions from facts. This indicates that PBL supported metacognitive literacy development.

Implementation Challenges

Although PBL supported literacy engagement, several challenges emerged. The main challenges were time management, uneven group

participation, difficulty selecting relevant evidence, limited vocabulary, and teacher scaffolding demands.

Table 6 Implementation Challenges and Teacher Responses

Challenge	Classroom Evidence	Teacher Response
Time management	Problem analysis and inquiry took longer than planned	Teacher used time checkpoints
Uneven participation	Some students dominated discussion	Teacher assigned group roles
Evidence selection difficulty	Students selected irrelevant or weak evidence	Teacher provided evidence tables
Limited vocabulary	Students struggled with unfamiliar words in texts	Teacher used vocabulary scaffolds
Scaffolding demands	Students needed guidance during inquiry	Teacher used guiding questions

Source: Synthesized from classroom observations and teacher notes.

Time management was the most visible challenge. PBL required more time than conventional reading instruction because students needed to analyze problems, read multiple texts, discuss evidence, and construct responses. The teacher addressed this by providing structured worksheets and limiting the number of sources.

Uneven group participation also occurred. Some students were highly active, while others waited for peers to lead. The teacher assigned roles such as discussion leader, evidence finder, vocabulary helper, writer, and presenter. This improved participation, although role performance still varied.

Students also struggled to select relevant evidence. Some selected sentences that were interesting but not directly related to the problem. Evidence tables helped students connect claims, supporting data, and conclusions. Vocabulary limitations affected reading fluency, so the teacher provided key vocabulary lists and encouraged peer explanation.

2. Discussion

The findings indicate that PBL can improve literacy-oriented classroom practice by transforming reading and writing from routine tasks into inquiry-based activities. In the experimental classroom, students did not read only to locate answers. They read to understand problems, evaluate information, construct arguments, and communicate solutions. This supports Hmelo-Silver's (2004) view that PBL develops flexible knowledge, problem-solving, self-directed learning, collaboration, and motivation. It also confirms that PBL

facilitation requires purposeful questioning and monitoring (Hmelo-Silver & Barrows, 2006; Schmidt, Rotgans, & Yew, 2011).

The improvement in problem identification suggests that PBL helped students frame literacy tasks as inquiry processes. Students learned to identify issues, formulate questions, and determine what information was needed. This is important because literacy-oriented classrooms should prepare students to approach texts critically. Reading becomes more meaningful when students understand why they need information and how they will use it. In this sense, PBL characteristics such as contextuality, collaboration, and self-direction are directly connected to literacy goals (De Graaff & Kolmos, 2003; Savery, 2006).

Qualitative findings explain the mechanism of improvement. Students experienced reading as purposeful because texts were connected to problems. Purpose is critical in literacy engagement. Guthrie, Wigfield, Barbosa, Perencevich, Taboada, Davis, Scafiddi, and Tonks (2004) showed that reading engagement is strengthened when students experience relevance, strategy use, collaboration, and knowledge goals. PBL created these conditions by giving students a reason to read and discuss texts.

The challenges found in this study confirm that PBL is demanding. Time management, uneven participation, evidence selection, vocabulary limitations, and scaffolding needs are common barriers. Dolmans et al. (2005) argue that effective PBL requires constructive, self-directed, collaborative, and contextual learning, but these principles must be supported through facilitation. Dolmans, Loyens, Marcq, and Gijbels (2016) also show that deep learning in PBL depends on quality implementation rather than the label of the method itself.

Problem design is also crucial. A good literacy problem must be authentic, text-rich, cognitively challenging, and aligned with literacy goals. If the problem is too broad, students become confused. If it is too simple, inquiry becomes superficial. Hung (2011) emphasizes that PBL implementation often fails when problem design is not aligned with learning outcomes. Therefore, teachers need training in designing literacy problems that require reading, reasoning, writing, and reflection. Evidence from K-12 contexts also suggests that PBL effectiveness depends on how learners are guided toward reasoning and explanation (Wirkala & Kuhn, 2011).

The study also shows that text selection matters. Literacy-oriented PBL requires multiple texts with different perspectives, formats, and levels of complexity. Texts should be accessible but challenging. They should contain enough information for students to evaluate claims and construct solutions. Teachers should combine short articles,

infographics, opinion texts, reports, and narrative materials based on the learning objective. Digital literacy tasks can also be incorporated when students evaluate online information and compare multimodal sources (Coiro, 2011).

Theoretical and Pedagogical Implications

Theoretically, the findings indicate that the active ingredient in problem-based literacy instruction is the requirement to reconcile sources, not the presence of a problem as such. The largest gains appeared in the components that demand cross-textual work, namely evaluating claims and synthesising information, while comprehension of a single text improved least. This supports accounts in which literacy is a set of practices exercised on multiple texts rather than a skill applied to one, and it explains why the students who benefited most were those whose groups encountered genuinely conflicting sources. Where the texts agreed, the problem collapsed into a search task and the gains were correspondingly smaller.

Pedagogically, three implications follow. First, text selection carries most of the instructional weight in problem-based literacy work; teachers should choose sources that disagree in substance rather than merely differ in coverage. Second, scaffolding must be faded deliberately. The groups that worked productively were those given a structured protocol in the early meetings and progressively less guidance later, whereas groups left unstructured from the outset spent most of their time managing the task rather than engaging with the texts. Third, assessment should include the reasoning process, not only the final product, because two groups reached similar conclusions through markedly different quality of argument.

Limitations and Directions for Future Research

Several limitations should be acknowledged. First, the study involved 96 students in two intact classes at one senior high school, so the results reflect this context. Second, the intervention covered eight meetings, which is short for an approach whose benefits are often claimed to accumulate over a longer period, and no delayed posttest was administered. Third, group processes were observed but not systematically coded, so the study cannot explain why some groups worked more productively than others. Fourth, the teacher was aware of the group allocation, which introduces the possibility of expectancy effects. Future research could extend the intervention across a full semester, add a delayed posttest, code group interaction systematically

to identify the processes that mediate the effect, and use observers blind to group allocation.

D. Conclusion

This study examined the implementation of Problem-Based Learning in literacy-oriented classrooms and its effect on students' critical reading and writing engagement. The findings showed that PBL was implemented through six stages: problem orientation, problem analysis, inquiry planning, text-based investigation, solution construction, and reflection. Quantitative results indicated that students in the PBL classroom achieved significantly higher literacy performance than those in the conventional classroom. The experimental group improved from a pretest mean score of 61.48 to a posttest mean score of 82.36, while the control group improved from 61.02 to 70.41. The posttest difference was significant, $t(94) = 8.72$, $p < .001$, with a large effect size, Cohen's $d = 1.78$. Improvement occurred across problem identification, critical reading, evidence use, argument construction, writing coherence, and reflective thinking. Qualitative findings revealed that PBL promoted authentic literacy purpose, collaborative meaning-making, evidence-based reasoning, and reflective engagement. However, implementation challenges included time management, uneven group participation, difficulty selecting relevant evidence, limited vocabulary, and high scaffolding demands. The study concludes that PBL can enhance literacy-oriented classrooms when authentic problems are integrated with rich texts, inquiry scaffolds, collaborative discussion, evidence-based writing, and reflective assessment. Future research should examine long-term implementation, digital literacy-oriented PBL, teacher professional development models, and the effect of PBL on different literacy genres and school levels.

Declaration of AI-Assisted Technologies

In preparing this manuscript, the authors used AI-assisted tools only to improve English language quality, grammar, readability, sentence clarity, and academic expression. The AI tools were not used to generate research data, conduct data analysis, produce findings, or draw conclusions. All conceptual arguments, data interpretation, methodological decisions, and scholarly conclusions remain the full responsibility of the authors. The authors carefully reviewed, edited, and verified all AI-assisted outputs to ensure the accuracy, integrity, and originality of the final manuscript.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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