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Implementation of the Problem-Based Learning Model to Enhance Students' Critical Thinking Skills and Its Impact on Language Learning

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ABSTRACT

This study aims to enhance students' critical thinking skills through the implementation of the Problem-Based Learning (PBL) model in the learning process. The primary objective is to determine the effectiveness of the PBL model in improving students' critical thinking skills during learning activities. The study is motivated by students' limited ability to analyze problems quickly and accurately, articulate opinions, and solve problems systematically during the learning process. It employs the Classroom Action Research (CAR) method, conducted over two cycles comprising the stages of planning, action implementation, observation, and reflection. The subjects of the study were students from a class within the Teacher Professional Education (PPG) program at Universitas Widya Dharma Klaten. Data collection techniques included observation, critical thinking skills tests, documentation, and interviews. The results indicate that the implementation of the PBL model successfully improved students' critical thinking skills. Success can be demonstrated by the average test score in Cycle I, which was 6.37. Meanwhile, in Cycle II, the average test score was 7.72, representing an increase of 12.11%. Thus, the PBL model is effective for enhancing students' critical thinking skills within the learning process. While this study measures language skills, it focuses exclusively on examining speaking proficiency. Success is gauged by the participants' adeptness at verbally articulating the reasoning behind their problem-solving approaches.

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1. Introduction

Education is a crucial aspect of enhancing the quality of human resources. In the learning process, students are expected not only to master the subject matter but also to think critically and creatively, as well as to solve problems encountered in daily life. Critical thinking is a vital 21st-century skill needed to navigate the rapid advancement of science and technology. However, in reality, students' critical thinking skills remain low. This is evident in their limited ability to analyze problems, express opinions, provide logical reasoning, and draw conclusions during lessons. Most students are accustomed to passively receiving information from teachers rather than actively engaging in the discovery of learning concepts. Furthermore, teacher-centered instruction limits opportunities for students to develop higher-order thinking skills.

One strategy to improve students' critical thinking skills is to implement innovative, student-centered learning models. Problem-Based Learning (PBL) is a model that emphasizes solving real-world problems as the context for learning. Through this model, students are encouraged to actively seek information, engage in discussions, collaborate, and find solutions to problems. Consequently, students not only understand the learning material but also develop critical thinking skills (Yew & Goh, 2016; Hmelo-Silver, 2004; Sari & Prasetyo, 2021).

Problem-Based Learning (PBL) is significant because it positions students as active problem solvers. Rather than merely memorizing theories, students develop critical thinking skills, collaborative abilities, and independent learning habits. PBL is one of the most frequently recommended responses to this challenge. In PBL, an ill-structured, authentic problem precedes instruction; learners work in small groups to define what they need to know, pursue self-directed inquiry, and justify a solution, while the teacher acts as a facilitator (Barrows, 1986; Hmelo-Silver, 2004; Savery, 2006). Consequently, the implementation of the PBL model is expected to improve students' critical thinking skills during instruction (Sari & Prasetyo, 2021b). PBL is an instructional model that utilizes real-world problems as the starting point for the learning process, thereby requiring students to think critically and creatively while collaborating to devise solutions. This method is learner-centered, with the teacher acting as a facilitator.

Critical thinking in classrooms is largely enacted through talk: learners must articulate claims, give reasons, respond to challenges, and draw conclusions aloud. Studies with language learners have linked critical thinking to speaking proficiency (Sanavi & Tarighat, 2014) and to active, discussion-based learning (Kusumoto, 2018), but the role of PBL in creating occasions for oral reasoning among pre-service teachers has received little attention. Understanding this link matters because PPG graduates will teach through language, whatever their subject.

Based on the background outlined above, the researcher formulated the research question for this study as follows: "Can the implementation of the Problem-Based Learning model enhance students' language skills and critical thinking abilities?"

2. Literature Review

2.1 Problem-Based Learning: Definition and Characteristics

Problem-Based Learning (PBL) is a student-centered instructional model that utilizes real-world problems as the foundation of the learning process. This model aims to train students

in critical thinking and problem-solving while fostering independent learning skills. In PBL, students are encouraged to actively seek information, engage in discussions, and discover solutions to the problems presented. According to Yew & Goh (2016), PBL is an instructional model that helps students develop thinking and problem-solving skills through direct engagement with authentic problems. Meanwhile, Musa et al. (2012) describe PBL as an educational innovation that emphasizes optimal student activity, through both group and individual work, in resolving problems (Yew & Goh, 2016; Bell, 2010; Musa et al., 2012).

Based on the preceding explanation, it can be concluded that PBL is an instructional model that utilizes real-world or contextual problems as the starting point for the learning process. This approach demonstrates that students do not merely receive material from the lecturer; instead, they are actively engaged in identifying problems, seeking and processing information, participating in discussions, developing alternative solutions, and presenting their problem-solving outcomes with creativity.

The PBL model possesses several characteristics, including:

Student-centered learning. Student-centered learning means the learning process places the student—rather than the teacher—at the center of activities. Students actively seek, understand, discuss, and solve problems, while the teacher acts as a facilitator and guide. The concept of student-centered learning focuses on directing the entire learning process toward maximizing the student's potential. The teacher is no longer the sole source of knowledge but rather a facilitator who helps students discover, process, and apply information. This statement can be compared with the views of the following experts (Chukwuere, 2023; Crompton et al., 2024; Fongkanta & Buakanok, 2024; Gee & Hayes, 2011; Gozali et al., 2024; Li & Liu, 2021; Sari, 2019; Tamim & Grant, 2013).

Using real-world problems as the focus of learning. This concept entails using real-world problems as the learning focus, meaning students learn through issues that actually occur in daily life rather than merely through artificial problems or abstract theories. This makes learning more relevant and meaningful while fostering skills that can be directly applied.

Encouraging students to think critically and solve problems. PBL fosters critical thinking and problem-solving skills—core elements of modern education. The fundamental goal is not merely for students to master the subject matter, but also to enable them to apply that knowledge to real-world challenges. Consequently, this method trains students to analyze information and evaluate arguments to substantiate their own views; they do not simply accept raw information without careful consideration (Amirian et al., 2023, 2023; Annan-Brew et al., 2024). Based on the statement above, it is evident that students learn to seek creative and practical solutions to complex problems. Through critical thinking, students will naturally become accustomed to making their own decisions, devising their own strategies, and taking personal responsibility for the issues they encounter during their learning process.

Developing group collaboration skills. Through this method, students are trained to communicate, listen, and respect the opinions of their group members—and even those outside their group. They practice developing group collaboration skills, which entails learning to work together with others to achieve shared goals. This is a crucial aspect of student-centered learning, given that the real world demands collaboration rather than merely individual capability. Consequently, the tangible result is the development of collaboration skills that shape students into individuals capable of collaborating,

communicating, and respecting differences.(Alkamel & Alwagieh, 2024; Beh & Ganapathy, 2021; Beka & Bicaj, 2025; Carpenter & Staudt Willet, 2021; Chukwuere, 2023).

The teacher acts as a facilitator in the learning process. Acting as a facilitator means the teacher is no longer the central source of information dominating the classroom; instead, they serve as a guide who helps students discover, understand, and develop their own knowledge. The teacher's role focuses on providing direction, motivation, and resources so that students can learn actively and independently (Afshar & Movassagh, 2017; Akatsuka, 2020; An Le & Hockey, 2022).

2.2 Critical Thinking Skills

Critical thinking is the ability to analyze information logically, systematically, and objectively in order to make decisions or solve problems. Critical thinking skills are crucial in the learning process because they help students understand material deeply and enable them to connect concepts to real-life situations (Dhari & Maisarah, 2025; Akatsuka, 2020; Amirian et al., 2023; An Le & Hockey, 2022; Budiyono, 2023; Changwong et al., 2018; Cossu et al., 2024; Kerruish, 2025; Khan, 2017). According to Goodsett (2020), critical thinking is a reflective and rational thought process focused on making decisions about what to believe or do, whereas Macknish (2011) notes that critical thinking encompasses the abilities of interpretation, analysis, evaluation, inference, and explanation (Goodsett, 2020; Howes, 2017; Kerruish, 2025; Khan, 2017; Leong, 2013; Macknish, 2011). Critical thinking is a crucial competency in the learning process because it enables students to understand material more deeply, analyze information logically, and evaluate various concepts based on relevant evidence. Through critical thinking skills, students are not only able to master concepts theoretically but can also connect them to real-life situations and problems (Abdelhalim, 2024; Proulx, 2004; Sanavi & Tarighat, 2014; Sari & Wardhani, 2020; Yanti & Susilo, 2023; Zamsiswaya et al., 2024; ŽivkoviĿ, 2016).

Consequently, learning is not merely oriented toward knowledge mastery but also toward developing the ability to solve problems, make sound decisions, and generate creative, responsible solutions. This is because mastering knowledge alone is insufficient. Students who merely memorize concepts may be able to answer recall-based questions, yet they may not necessarily be capable of applying that knowledge to resolve the problems they encounter. Therefore, learning must foster the ability to apply, analyze, and evaluate information, as well as to create solutions (Budiyono, 2023; Sanavi & Tarighat, 2014; ŽivkoviĿ, 2016).

Based on this view, it can be concluded that critical thinking is a student's ability to analyze, evaluate, and solve problems logically and systematically.

2.3 The Relationship between Problem-based Learning and Critical Thinking Skills

The Problem-Based Learning (PBL) model is closely linked to students' critical thinking skills. In PBL, students are presented with a problem that must be analyzed and resolved through discussion, information gathering, and inquiry. This process encourages students to think actively, logically, and systematically. Through the implementation of PBL, students learn to identify problems, gather information, present arguments, and draw conclusions based on the facts discovered. Therefore, the use of the PBL model is believed to enhance students' critical thinking skills during the learning process. There is a strong relationship between PBL

and critical thinking skills. PBL is an instructional model designed to train learners to solve real-world problems through processes of inquiry, analysis, and decision-making (Bell, 2010; Hmelo-Silver, 2004; Howes, 2017).

Thus, PBL is not merely a learning model but also a means of systematically fostering the indicators of critical thinking skills. The conclusion is that the relationship between PBL and critical thinking skills is causal within the learning context; specifically, the implementation of PBL serves as a learning strategy that promotes the enhancement of students' critical thinking skills. Therefore, PBL is frequently selected as a learning model in research aimed at improving critical thinking skills through activities involving problem-solving, inquiry, discussion, argumentation, and reflection (Van Tonder et al., 2021; ŽivkoviĿ, 2016).

Thus, the more effectively the PBL model is implemented in the instructional process, the greater the likelihood of enhancing students' critical thinking skills. Consequently, the implementation of PBL is considered an appropriate approach to improving these skills. PBL is a crucial instructional model in education because it fosters a student-centered learning process. By using real-world problems as a starting point, PBL encourages students to think critically, analyze information, solve problems systematically, and make decisions based on evidence and logical reasoning. (An Le & Hockey, 2022). In addition to enhancing critical thinking, PBL fosters collaboration, communication, creativity, and independent learning skills. Students act not merely as passive recipients of information but as active learners capable of constructing knowledge through inquiry and discussion. This renders the learning experience more meaningful, as the concepts studied are linked to real-life situations (Barrows, 1986; Bell, 2010).

Therefore, implementing PBL is vital in higher education, particularly for preparing graduates who possess Higher-Order Thinking Skills (HOTS), are equipped to face workforce challenges, and are competent in solving various problems effectively, creatively, and responsibly (Cossu et al., 2024; Fongkanta & Buakanok, 2024; Koşar, 2023; Sanavi & Tarighat, 2014). In summary, PBL serves as an effective instructional strategy for enhancing the quality of both the learning process and student learning outcomes.

3. Research Methodology

3.1 Research Design

This study is a Classroom Action Research (CAR) project, as it aims to improve and enhance the quality of the learning process through the implementation of the PBL model to boost students' critical thinking skills. Classroom action research is conducted by a lecturer in their own class through a series of systematically designed actions, which are then observed, evaluated, and reflected upon to achieve continuous improvement in learning.

This study employs an action model carried out in several cycles. Each cycle consists of four stages: (1) planning, (2) acting (implementation of the action), (3) observing, and (4) reflecting. The results of the reflection in each cycle serve as the basis for refining the implementation of actions in the subsequent cycle until the research success indicators are met.

This study is categorized as CAR because it possesses the following characteristics:

a) It is oriented toward improving the quality of the learning process.

b) It is conducted by the lecturer in the class for which they are responsible.
c) It utilizes an intervention in the form of the PBL model.
d) It is carried out in cycles comprising the stages of planning, acting, observing, and reflecting.
e) It aims to enhance students' critical thinking skills as a result of the implemented action.

Thus, this study qualifies as Classroom Action Research (CAR) because its primary focus is not merely to test relationships between variables, but to implement concrete actions to improve the learning process, thereby fostering continuous improvement in students' critical thinking skills.

3.2 Research Setting and Subjects

The research subjects are students in the Teacher Professional Education Program enrolled in the "Principles of Teaching and Assessment I in Primary and Secondary Schools" course during the semester the research is conducted. The study involves all students in a single class taught by the researcher (acting as the lecturer). The researchers utilized a single intact class taught by the researchers themselves; consequently, this approach is more accurately described as the selection of an intact class. Accordingly, data collection was conducted using convenience sampling—or criterion-based selection—within the context of action research. The number of research subjects is determined by the conditions of the class being studied; for instance, if a class consists of 24 students. Consequently, all students in the class served as the research subjects. The study was conducted at the higher education institution where the researcher teaches—specifically within the Teacher Professional Education program at Universitas Widya Dharma Klaten, which caters to prospective teachers (formerly referred to as the pre-service program). This location (Widya Dharma University) was selected because preliminary observations revealed a need to enhance the students' critical thinking skills, thereby necessitating the implementation of a more innovative instructional model: PBL. The research was carried out during the current semester, in accordance with the course schedule established by the study program.

3.3 Data Collection Technique

The data collection techniques employed in this study are as follows:

Observation. Observations were conducted to gather data on the implementation of the learning process using the PBL model, as well as the activities of lecturers and students during the learning sessions. These observations utilized a structured observation sheet based on indicators of PBL model implementation and students' critical thinking skills. Observations were conducted to gather data on the implementation of the learning process using the PBL model, as well as the activities of lecturers and students during the learning sessions. These observations utilized a structured observation sheet based on indicators of PBL model implementation and students' critical thinking skills.

Critical Thinking Skills Test. Since critical thinking ability is a key focus of this study, a tool is required to measure critical thinking skills. Therefore, a test is needed to assess students' critical thinking levels both before and after the implementation of the PBL model in each cycle. The test comprises essay questions, case studies, or problem-solving tasks designed

based on critical thinking indicators—such as the ability to analyze, evaluate, construct arguments, draw conclusions, and solve problems.

Documentation. Documentation is required to supplement research data, including items such as student attendance records, instructional materials (subject syllabi, modules, and student worksheets), assignments, test scores, photographs of classroom activities, and other documents that support the conduct of the research. This is why documentation is essential.

Field Notes. Researchers require field notes to record events occurring during the learning process that are not captured in the observation sheets—such as student responses, challenges and issues encountered, interaction dynamics during discussions, and other findings that can serve as a basis for reflection in each cycle. These significant details can be used to substantiate the findings or analysis within the study.

3.4 Data Analysis Techniques

This CAR study involves both quantitative and qualitative data analysis. Quantitative analysis is used to measure the improvement in students' critical thinking skills, while qualitative analysis serves to describe the implementation process and the changes that occur during instruction. These two types of analysis complement each other in providing a comprehensive picture of the improvement in students' critical thinking skills and the quality of the instructional process.

Quantitative Data Analysis. Quantitative data are obtained from the results of students' critical thinking skills tests in each cycle. The analysis results were compared across the initial condition, Cycle I, and Cycle II to determine whether there was an improvement in students' critical thinking skills following the implementation of the PBL model.

Qualitative Data Analysis. Qualitative data were obtained from observations, documentation, and field notes. Analysis was conducted using an interactive model comprising: 1). Data condensation: selecting, focusing, simplifying, abstracting, and transforming raw data. 2) Data presentation: organizing data into narratives, tables, or graphs to facilitate understanding. 3) Conclusion drawing and verification: interpreting research results based on findings from each cycle to determine the success of the actions taken. The results of the qualitative analysis served as a basis for reflection in determining improvements to the actions for the subsequent cycle.

The research is considered successful if it meets the following indicators:

1) The students' average critical thinking ability score increases from the initial state through each cycle.
2) At least 80% of the students meet the established mastery criteria.
3) Student activity during instruction using the PBL model falls into the "good" or "very good" category based on observation results.

3.5 Data Validity

Data validation in this study was conducted to ensure that the data obtained possessed a high level of credibility and could be scientifically substantiated. The data validation techniques employed were as follows:

Methodological Triangulation. This study employs the triangulation method. Triangulation is carried out by comparing data obtained through several data collection techniques: observation, critical thinking skills tests, documentation, and field notes. If the results from these various techniques show a consistent trend, the data are considered to possess an adequate level of validity. The consistency of results across different data collection techniques serves as a basis for increasing confidence in the validity of the data.

Source Triangulation. Source triangulation in this study was conducted by comparing information obtained from various sources, namely: 1) students (research subjects), 2) lecturers/researchers, and 3) collaborators (observers). Comparing data across these sources aimed to ensure consistency and alignment with actual conditions.

Peer Researcher Triangulation. In each research cycle, the researcher engages in discussions with collaborators to review observation results, the implementation of actions, and the outcomes of the reflection process. These discussions aim to minimize researcher subjectivity and enhance objectivity in decision-making and the formulation of conclusions. Through the application of triangulation, instrument validation, and collaborator discussions, the study seeks to ensure that the data obtained possess a high degree of credibility, consistency, and objectivity, thereby rendering the research findings scientifically defensible.

4. Results

The research results indicate that the implementation of the PBL model was able to improve students' critical thinking skills progressively across each cycle. This improvement is evident from the critical thinking test results, student engagement during the learning process, and the increasingly effective implementation of the learning model.

4.1 Pre-Cycle Test Results

During the pre-cycle stage, students' critical thinking skills were classified as low. The majority of students struggled to identify problems, analyze information, construct logical arguments, and draw conclusions based on available evidence. The learning process was dominated by the lecturer, resulting in suboptimal student participation. Observations indicated that student learning activity fell into the "poor" category. The results were far from satisfactory and fell well short of meeting expectations; indeed, if a score of 7 is the benchmark for meeting the standard, virtually no students succeeded. Consequently, the critical thinking test results demonstrate that most students failed to achieve the established success indicators.

At baseline, critical thinking was low. The class mean was 5.04 (*SD* = 0.81; Table 1), ten students (41.7%) scored at the floor value observed (4.33), and only one student (S05; 4.2%) reached the mastery criterion. Observation indicated that lessons were lecturer-dominated and that student activity was in the "poor" category: students seldom asked questions, hesitated to express opinions, and rarely supported claims with evidence.

4.2 Results in Cycle I

In Cycle I, students worked on contextual problems in groups, gathered information, formulated alternative solutions and presented their results. Observation recorded more participation in discussion, more frequent expression of opinions and better collaboration. The mean score rose to 6.37 (*SD* = 0.70), a 26.4% increase over baseline, and 21 of 24 students

improved. However, only four students (16.7%) reached mastery, so the 80% success criterion was not met. Two students (S05 and S09) scored lower than at baseline. Field notes indicated that many students lacked confidence in presenting arguments and did not yet evaluate alternative solutions critically. Reflection with the collaborator identified four causes: problems were too open for novices, roles within groups were unclear, lecturer guidance during discussion was limited, and feedback did not address the quality of arguments. These became the refinements for Cycle II.

4.3 Results in Cycle II

After the refinements, the mean rose to 7.72 (*SD* = 0.44), a 21.2% increase over Cycle I and a 53.2% increase over baseline. Twenty-three students improved relative to Cycle I and one (S01) remained at 7.33; both students who had declined in Cycle I recovered (S05: 7.33; S09: 8.66). All 24 students (100%) reached mastery, meeting the success criterion. The spread of scores also narrowed (SD from 0.81 at baseline to 0.44), with 12 students at 7.33, 10 at 8.00, and 2 at 8.66.

Table 1. Descriptive statistics for critical thinking scores (N = 24)

Occasion	M (SD)	Median	Range	95% CI of M	Mastery ≥ 7.00, n (%)
Pre-cycle	5.04 (0.81)	5.00	4.33–7.33	[4.70, 5.38]	1 (4.2)
Cycle I	6.37 (0.70)	6.66	5.00–7.33	[6.07, 6.67]	4 (16.7)
Cycle II	7.72 (0.44)	7.67	7.33–8.66	[7.54, 7.90]	24 (100.0)

The researcher also conducted observations to strengthen the research data. Observations indicated that the lecturer's implementation of the PBL syntax was rated "very good" in Cycle I and "excellent" in Cycle II, while student activity moved from "poor" at baseline to the "good" or "very good" range by Cycle II, meeting the third success criterion.

5. Discussion

The results of this study indicate that the implementation of Problem-Based Learning (PBL) helps enhance students' critical thinking skills. This improvement is evident in changes to students' learning behaviors during the instructional process and in the assessment results of critical thinking skills conducted across each research cycle. Prior to the implementation of PBL, most students tended to be passive during learning activities. They generally merely received information from the instructor, rarely asked questions, hesitated to express opinions, and struggled to analyze and solve problems posed by the lecturers. Their critical thinking skills were also relatively low, as they were unaccustomed to providing logical reasoning based on evidence. Following the implementation of the PBL model, improvements in their thinking performance were observed. Students became more active in identifying problems, seeking information from diverse scholarly sources, analyzing and evaluating issues, presenting evidence-backed arguments, and drawing logical conclusions. Group discussions and result presentations encouraged students to defend their opinions rationally, while also fostering an attitude of respect for others. Indirectly, a clear improvement in their language skills was also evident, particularly in the realm of speaking. It should be noted that language skills encompass reading, listening, speaking, and writing; however, this study focused exclusively on speaking skills. Consequently, the researcher

invites readers to relate these findings to other language skills—such as reading, listening, or writing—based on their own preferences, capabilities, opportunities, and specific circumstances.

Critical thinking scores increased substantially and consistently across the two cycles, with large within-group effects and complete attainment of mastery by the end of Cycle II. The direction of these results is consistent with meta-analytic evidence that PBL benefits critical thinking in higher education (Liu & Pásztor, 2022) and with studies of inquiry-based designs in teacher education (Fongkanta & Buakanok, 2024; Van Tonder et al., 2021). The magnitude, however, should not be compared directly with between-group effect sizes. Within-group changes in an uncontrolled design also absorb practice effects from repeated testing, ordinary growth across a semester, possible differences in test difficulty, and the expectations of a lecturer who is also the researcher. The narrowing of the score range in Cycle II may also reflect a ceiling in the test or the rubric. The appropriate claim is therefore that critical thinking scores improved markedly under PBL in this class, not that PBL caused an effect of a given size.

6. Conclusion

Problem-Based Learning (PBL) can enhance students' critical thinking performance. In this student-centered learning process, students are encouraged, trained, and required to solve real-world problems. This method not only improves mastery of the subject matter but also develops higher-order thinking skills—particularly critical thinking—while simultaneously compelling them to practice speaking (thereby honing their oral communication skills). PBL also created repeated opportunities for students to articulate and defend their reasoning orally. Given the single-group design, these findings offer practice-based evidence and a specific design hypothesis—that structure in problem framing, roles, facilitation and argument feedback amplifies PBL's contribution to critical thinking—which should now be tested in controlled studies across teacher education settings.

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