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Effectiveness of Project-Based Learning in Accounting Practicum: A Quasi-Experimental Study

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Abstract: *This study aims to analyze the effectiveness of implementing Project-Based Learning (PBL) in improving student learning outcomes and perceptions in the Accounting Practicum course. The primary background of this research is the gap between theory and practice, as well as the industry demand for graduates capable of solving real-world problems. The research method employed was a quasi-experimental design with pre-test and post-test measures involving 62 students. The PBL implementation was conducted in two stages: the structured conceptual briefing stage (pre-test) and the design stage of an accounting module project based on actual micro, small, and medium enterprises (post-test). The results indicate a statistically significant improvement in learning outcomes ($p < 0.001$), with the mean score increasing from 77.06 to 81.46. Qualitative analysis of student project reports demonstrated enhanced abilities in problem identification, system design, and solving complex problems. The findings conclude that PBL is effective in enhancing students' cognitive competencies and practical skills, as well as transforming their roles from passive recipients to active and creative solution designers.*

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INTRODUCTION

Accounting education today cannot be separated from the rapid advancement of information technology. The digitalization of business processes, the adoption of cloud-based accounting, and the utilization of big data analytics have transformed how accountants operate across various industries. Accounting graduates are now expected to possess the ability to operate modern accounting software, analyze financial data efficiently, and present information in formats that support strategic decision-making. Weli et al. (2023) note that a considerable digital divide still exists among accounting students in Indonesia, where disparities in access to technology and digital literacy skills serve as significant barriers to improving learning quality. This gap not only reduces graduates' work readiness but also impacts the competitiveness of Indonesia's workforce in the global market. In this context, vocational education systems—particularly in the field of accounting—must adapt their curricula to align with the latest technological developments. Integrating technology into learning should extend beyond the mere use of accounting software to include the implementation of blended learning, virtual simulation, and data-driven case studies. This demands innovative learning methods that can simultaneously combine theory, practice, and technological proficiency.

Conventional learning methods, such as lecturing and textbook-based exercises, remain predominant in many accounting education institutions. While these methods

provide structured content delivery, they often fail to offer authentic experiences that can shape students' practical skills and knowledge. In the professional world, accountants face complex situations requiring critical thinking, problem-solving, and the ability to quickly adapt to regulatory and technological changes. Overreliance on passive methods hinders the development of essential problem-solving and decision-making skills. Yetti (2023) found that students taught using traditional methods demonstrated lower learning gains compared to those engaged in project-based learning in computerized accounting courses. This limitation also diminishes student motivation, as the material often feels disconnected from the challenges they will encounter in the workplace. Furthermore, traditional approaches tend to overlook the collaborative dimension, which has become a vital competency in the modern work environment. Therefore, an alternative learning model is needed—one that fosters active participation, teamwork, and the application of concepts in real-world contexts.

Project-Based Learning (PBL) emerges as a response to the limitations of conventional methods, prioritizing student-centred learning processes. This model actively engages students in completing projects relevant to course materials, enabling them to apply the knowledge they acquire directly. Suryanti et al. (2023) demonstrated that the application of PBL based on the ADDIE model in financial accounting courses significantly enhanced students' analytical abilities. The strength of PBL lies in its capacity to bridge theory and practice through real-world problems that require both critical and creative thinking. The projects assigned are often collaborative, simultaneously cultivating communication skills, teamwork, and time management. Moreover, PBL offers authentic experiences that closely mirror professional scenarios, allowing students to encounter real challenges before entering the workforce. In vocational education contexts, PBL is particularly relevant as it encourages students to produce tangible outputs, such as MSME-based financial statements or business performance analyses. Through this approach, learning becomes more meaningful and motivates students to take an active role in their educational process.

In addition to strengthening technical abilities, PBL has been proven effective in developing soft skills essential in the professional world, such as communication, leadership, and teamwork. Liawati et al. (2025) found that PBL significantly improved critical thinking, communication, and collaboration skills among vocational high school students, in addition to enhancing cognitive and psychomotor achievements. Suandi et al. (2024) reported that the success of PBL in higher education is influenced by students' self-efficacy—their belief in their ability to complete assigned tasks. Students with higher self-efficacy tend to be more active, motivated, and capable of overcoming challenges in project execution. PBL also creates opportunities for students to learn from mistakes, thereby reinforcing their confidence. This aligns with labor market demands for individuals who are not only technically competent but also adaptable and proactive in dynamic situations. Thus, PBL serves a dual role: enhancing academic competence while shaping professional character that is competitive in the global job market.

Despite extensive evidence of PBL's benefits, its implementation in accounting practicums using real MSME-based cases remains relatively uncommon. Most existing studies focus on theoretical instruction or simulated case studies, which, although beneficial, do not fully reflect the actual challenges of the workplace. Direct student engagement in real MSME-based projects can provide deeper insights into accounting processes, including recording, financial reporting, and business performance analysis.

Fadillah et al. (2024) proposed employing the CDIO (Conceive, Design, Implement, Operate) framework to maximize the effectiveness of PBL—particularly in vocational education—ensuring that projects are genuinely relevant and well-integrated into curriculum requirements. This approach enables students not only to hone technical skills but also to develop managerial and interpersonal competencies essential for business operations. Moreover, MSME-based PBL implementation can facilitate collaboration between higher education institutions and local entrepreneurs, yielding mutual benefits. Given these considerations, the present study aims to make a significant contribution to the development of more applicable, relevant, and industry-responsive accounting practicum models that directly enhance graduates' work readiness.

THEORETICAL FRAMEWORK

2. Theoretical Framework

2.1 Constructivism Theory

Constructivist theory emphasizes that knowledge is actively constructed by learners through their experiences, reflections, and social interactions (Novitasari et al., 2022). Within this paradigm, students are not merely passive recipients of lecturers' explanations; instead, they take an active role in discovering, testing, and applying concepts in authentic contexts. This principle aligns with the authentic learning approach, which underscores the importance of connecting instructional content to real-world work situations, thereby ensuring that acquired knowledge and skills remain relevant. In vocational education settings, constructivism plays a pivotal role as the learning orientation prioritizes applied outcomes over mere theoretical understanding. For instance, the application of constructivist models has been proven to enhance students' autonomy as well as their ability to solve real-world problems. Novitasari et al. (2022) reported that when students actively participate in the process of knowledge construction, they develop stronger critical thinking and analytical skills. Moreover, constructivism fosters collaborative learning, in which cross-individual interactions enable learners to gain more diverse and enriched insights. Consequently, employing constructivism as a philosophical foundation is highly relevant in designing accounting practicum learning that emphasizes authentic experiences and contextual analysis.

2.2 Project-Based Learning (PBL)

Project-Based Learning (PBL) is an instructional model that provides in-depth learning experiences through engagement in projects aimed at solving complex and authentic problems. In contrast to the traditional linear approach, PBL requires students to integrate cognitive, affective, and psychomotor skills while simultaneously engaging in team collaboration. Meta-analyses indicate that PBL significantly improves learning outcomes and students' critical thinking skills, including within vocational accounting education (Novitasari et al., 2022). Specifically, in vocational contexts, PBL has proven effective in developing industry-relevant competencies such as communication, time management, and technological responsiveness (Martini et al., 2023). Studies conducted in vocational high schools (SMK) have reported that the implementation of PBL in computerized accounting increased students' average scores from 71.85 to 85.61 and their mastery level from 48.48% to 78.78% (Yetti, 2023). Furthermore, literature reviews on vocational education reveal that PBL supports the development of cognitive, psychomotor, critical thinking, communication, and teamwork skills (Liawati et al., 2025). PBL has also

been shown to significantly enhance accounting students' critical thinking abilities compared to conventional methods (Rahman et al., 2024). Accordingly, PBL stands out as an up-and-coming method for bridging the gap between theory and practice in vocational accounting education.

2.3 Synergy between Constructivism and PBL in Accounting Education

Constructivism offers a philosophical foundation suggesting that effective learning occurs when students construct their knowledge through both passive and active reflective interactions. PBL operationalizes this principle by engaging students in authentic projects that mirror real-world challenges. For example, Prasetyo & Hernando (2023) implemented PBL in an advanced accounting course within a diploma program and observed increased student creativity and innovation in understanding course material. Similarly, Hizazi & Mansyur (2023) demonstrated that PBL employing team-based approaches enhanced students' perspectives and collaborative spirit, broadening their viewpoints on accounting issues. Purnamasari et al. (2025) developed an electronic PBL-based module that was found to be valid and effective in strengthening vocational accounting students' comprehension and technical competencies. This approach facilitates the transition from passive to active and reflective learning, enabling students to formulate solutions within professional contexts. Participation in authentic projects also heightens students' motivation and self-confidence, as they perceive direct benefits from their learning efforts. In conclusion, integrating constructivism and PBL offers substantial benefits to accounting education, merging theory, practice, and authentic experiences, with the overarching aim of enhancing graduates' employability and professional autonomy.

RESEARCH METHOD

This study employed a quasi-experimental method using a one-group pretest-posttest design. The approach was quantitative, supplemented by qualitative data to strengthen the interpretation of results (explanatory sequential design). This design was chosen due to its relevance in educational research contexts where the random assignment of control groups is often unfeasible or unethical, particularly when the intervention is applied to a single class (Creswell, 2018). Moreover, this design allows the researcher to measure the effectiveness of the Project-Based Learning (PBL) intervention by comparing student learning outcomes before and after treatment, with the participants serving as their controls.

The participants consisted of 62 students from the Management Accounting Study Program at Politeknik Negeri Malang, enrolled in the Accounting Practicum for Service and Trading Companies course during the even semester of the 2023/2024 academic year. Purposive sampling was used, as all students registered for the course were automatically included as respondents. Participants were relatively homogeneous in terms of academic background, as they came from the same program and cohort. Official permission was obtained from the department, and all data were collected and analyzed in aggregate form without disclosing individual identities.

The study was conducted at Politeknik Negeri Malang, a vocational higher education institution emphasizing practice-based learning. The Accounting Practicum for Service and Trading Companies course was selected due to its strong technical skills component, which includes completing the entire accounting cycle using both simulated

cases and real data. The research procedure was systematically designed over one semester (16 weeks) and divided into two main stages, as illustrated in the following flowchart:

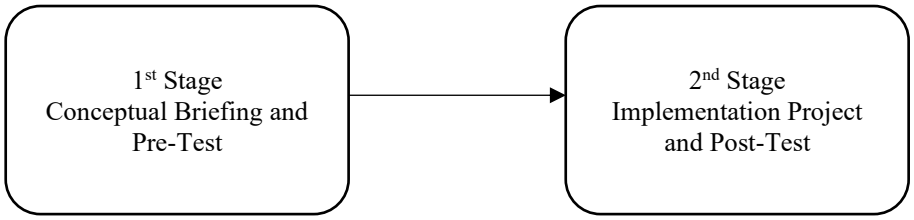

Figure 1. Research Implementation Flowchart

The first stage was the Conceptual Briefing and Pre-test phase (Weeks 1–7, before midterms). In this phase, students acted as "executors." They were provided with a structured accounting practicum module developed by the instructor. The objective was to build a foundational understanding and technical skills uniformly across all students concerning the accounting cycle for service and trading companies. The learning process consisted of brief lectures, guided discussions, and structured case studies. At the end of this phase, a Midterm Examination (Pre-test) was administered. The scores from this exam, measuring students' understanding of the structured material, served as pre-test data.

The second stage was the Project Implementation and Post-test phase (Weeks 9–15, after midterms). In this phase, students transitioned to the role of "designers." Working in groups of 4–5, they were assigned a project with clear stages: (a) identifying real MSME objects in the surrounding environment, (b) conducting observations and interviews to identify existing accounting problems, (c) analyzing needs and designing business processes, (d) developing a complete set of practical accounting modules offering solutions for the MSMEs, (e) implementing the design in the form of financial reports, and (f) conducting project reviews. The project output consisted not only of reports but also of tangible products in the form of teaching aids usable by the department. At the end of the semester, students took the Final Examination (Post-test), which assessed comprehensive understanding of the project outcomes, and the scores were used as post-test data.

Data collection instruments comprised two types. First, for quantitative data, objective test results from the Midterm Examination (pre-test) and Final Examination (post-test) were used to measure cognitive learning outcomes. The validity of the test instruments was ensured through content validation by a team of expert lecturers. Second, for qualitative data, Project Implementation Reports (PIR) prepared by each student group were used. These reports served as portfolios, containing problem analyses, system designs, and reflections on the challenges faced during the projects, providing in-depth insights into students' learning processes.

Quantitative data were analyzed using a Paired Samples T-Test statistical analysis with the assistance of SPSS version 26 software to determine the significance of differences between the pre-test and post-test mean scores. Qualitative data from the PIR were analyzed through thematic content analysis following the approach described by Kiger and Varpio (2020), including: (1) data familiarization, (2) initial coding, (3) theme searching, (4) theme reviewing, (5) defining and naming themes, and (6) report writing.

RESULTS AND DISCUSSION

This section presents the research findings, both quantitative and qualitative, followed by an in-depth discussion linking the results to relevant theories and previous studies.

4.1. Research Results

4.1.1. Quantitative Improvement in Learning Outcomes

Quantitative data analysis revealed a significant improvement in students' learning outcomes following the implementation of project-based learning.

Table 1. Descriptive Statistics and Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre	77.0619	62	10.59206	1.34519
	Post	81.4602	62	5.81194	.73812

The table shows an increase in the students' mean scores from 77.06 in the pre-test to 81.46 in the post-test. The reduction in standard deviation from 10.59 to 5.81 indicates that, after the project-based learning intervention (PBL), the variation in scores among students decreased. This suggests that PBL not only enhanced academic achievement but also helped equalize the level of understanding among students within the class.

Table 2. Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Pre & Post	62	.942	.000

A very high correlation coefficient ($r = 0.942$) with a significance level of $p < 0.000$ indicates a strong relationship between scores before and after the intervention. This indicates that students with initially high understanding maintained high performance after PBL, while students with lower initial scores also showed notable improvement.

Table 3. Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre - Post	-4.398	5.476	.695	-5.788	-3.007	-6.324	61	.000

A p-value of 0.000 (< 0.05) confirms that the difference in mean scores between the pre-test and post-test is statistically significant. The mean difference of 4.398 points

indicates a substantial increase in student learning outcomes following the PBL intervention.

Table 4. Paired Samples Effect Sizes

			Standardizer[a]	Point Estimate	95% Confidence Interval	
					Lower	Upper
Pair 1	Pre - Post	Cohen's d	5.47630	-.803	-1.087	-.514
		Hedges' correction	5.51026	-.798	-1.081	-.511

a. The denominator used in estimating the effect sizes.
Cohen's d uses the sample standard deviation of the mean difference.
Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

Cohen's d value of 0.803, categorized as a significant effect, indicates that the implementation of PBL has a substantial practical impact that extends beyond mere statistical significance. This demonstrates that the observed improvement in learning outcomes is a direct effect of the applied instructional strategy.

4.1.2. Qualitative Findings from the Project Implementation Process

Content analysis of the Project Implementation Reports (PIR) revealed several key qualitative themes explaining the "why" behind the improvement in learning outcomes:

- •Problem Identification Skills: Students demonstrated the ability to engage directly with MSMEs and identify authentic problems. For instance, one group discovered that "Veey Laundry" and "Gajayana Petshop" still used manual bookkeeping, which is prone to errors. Another group identified that "Kost Andong" lacked a structured payment monitoring system. This ability reflects a shift from merely solving textbook exercises to functioning as problem analysts.
- Transformation into System Designers: The pinnacle of the PBL process occurred when students designed solutions. Almost all groups proposed and developed simple digital-based accounting systems. They created not only journals and ledgers but also features such as data validation and automated formulas. This indicates that students reached the highest cognitive level, namely creating, by the revised Bloom's Taxonomy developed by Krathwohl et al. (2019).
- Learning through Unforeseen Problems: The most significant challenges—and learning experiences—arose from problems not found in textbooks. One group studying the business "Es Teh Poci" realized its business model resembled simple manufacturing rather than pure trading. They then took the initiative to design a cost of goods sold (COGS) simulation per cup, demonstrating problem-solving skills that would not typically emerge in conventional practicum settings.

4.2. Discussion

The results of this study indicate that implementing Project-Based Learning (PBL) with a two-stage design—structured conceptual preparation and project implementation—has a significant impact on improving student learning outcomes in the "Service and

Trading Company Accounting Practicum" course. Quantitative data recorded an increase in the average score from 77.06 in the pre-test to 81.46 in the post-test, with a statistically significant difference ($p < 0.001$) and a large effect size (Cohen's $d = 0.803$). These findings demonstrate that the two-stage learning model is not only statistically effective but also holds high practical relevance in enhancing students' conceptual mastery and skills. This model supports the findings of Suryanti et al. (2023), which suggest that the development of PBL in financial accounting enhances higher-order thinking skills and facilitates the integration of concepts with field practice. Furthermore, a meta-analysis by Anggono et al. (2022) also suggests that the consistent application of PBL leads to improved academic achievement in accounting education. A curriculum design that combines conceptual preparation with practical application enables students to effectively integrate theory into real-world work contexts. This approach facilitates a seamless transition from conceptual understanding to practical application in a strategic manner. Therefore, this two-stage strategy can be widely adopted to improve learning quality in vocational education.

Qualitative findings reveal that students experienced substantial development across three learning domains: cognitive, affective, and psychomotor. Their ability to identify real-world problems—such as error-prone manual record-keeping or inadequate payment monitoring systems in MSMEs—reflects a shift from passive learning toward more independent, investigative learning. This process aligns with the revised Bloom's Taxonomy (Krathwohl et al., 2019), in which students reached the highest cognitive level, namely "creating," through the design of spreadsheet-based solutions featuring data validation and automated calculations. These results are consistent with Sulistiyowati et al. (2024), who reported that PBL enhances learning engagement, teamwork, and critical thinking skills among accounting students. Despite challenges such as confidence issues during presentations, this experience encouraged students to refine their communication skills. Such investigative learning also facilitated self-reflection and ongoing evaluation, enabling students to improve their problem-solving strategies. Consequently, students not only mastered technical skills but also developed a critical mindset aligned with industry needs.

Beyond cognitive achievement, this study found that students were able to adapt to unforeseen problems that emerged during project execution. For instance, adjusting the calculation of the Cost of Goods Sold (COGS) for "Es Teh Poci" businesses—whose production characteristics resemble those of small-scale manufacturing—required an alternative approach to the standard method taught in class. This situation compelled students to think critically, creatively, and flexibly, reflecting adaptive learning as suggested by Busnawir et al. (2022). Successfully addressing such unforeseen problems also indicates that PBL promotes the application of contextual learning strategies relevant to professional practice. This is crucial, as the professional world demands the ability to respond swiftly to changing dynamics and uncertainties. By training students to handle such situations, PBL enhances their job readiness compared to traditional learning methods. The adaptations made during the project demonstrate that students not only mastered theoretical knowledge but also were able to modify it according to field requirements. Therefore, PBL has proven to be an approach that prepares students to face real-world challenges directly.

Qualitative results also indicate a notable improvement in students' soft skills, including communication, teamwork, leadership, time management, and professional ethics. During the project, students were required to collaborate, allocate roles, and

manage time effectively to meet project deadlines. This finding aligns with Riadi & Zelmiyanti (2023), who assert that PBL strengthens attitudes, problem-solving abilities, teamwork, organizational skills, and work ethics. Despite shortcomings such as less-than-optimal discipline, the collaborative learning process provided authentic experiences in conflict management and trust-building within teams. The interactions also reinforced both oral and written communication skills, particularly when presenting project results to stakeholders. This approach yields not only academic achievements but also graduates with strong interpersonal competencies. Thus, PBL offers added value in the form of more comprehensive job readiness for vocational accounting graduates.

From a theoretical perspective, the link between PBL and constructivism further strengthens the scientific justification for applying this model in vocational education. Constructivism provides the philosophical foundation that learning occurs optimally when students construct knowledge through authentic experiences, whereas PBL offers the operational framework to realize this. Dewi (2025) emphasises that the synergy between the two produces more effective and meaningful learning compared to traditional methods. Suandi et al. (2024) also found that students' self-efficacy plays a crucial role in the success of PBL, with confidence growing through collaborative completion of real-world projects. In this study, students' success in identifying problems, designing solutions, and presenting them professionally fostered their self-confidence. This factor serves as essential capital in facing career challenges in accounting, which requires a combination of technical competence and self-assurance. Therefore, integrating PBL with constructivism can be considered a strategic approach to producing outstanding vocational graduates.

The application of PBL in this study also positively influenced the mastery of technology relevant to modern accounting practices. Students not only utilized basic accounting software but also integrated spreadsheets with automation features, data validation, and real-time monitoring capabilities. This experience aligns with Kurniawan et al. (2023), who found that integrating technology in PBL promotes improved digital literacy among students, now considered a core competency in vocational education. PBL provides students with opportunities to explore various digital tools tailored to project needs, fostering independent technological exploration. This is particularly important given the increasing reliance of the accounting industry on cloud-based systems and business intelligence. The ability to quickly adapt to new technologies is an added value that the labor market expects. Thus, PBL enhances not only students' technical competence but also cultivates sustainable learning habits crucial in the digital era.

Beyond technology, this study revealed that PBL strengthens students' analytical skills in decision-making. Through projects involving the financial statement analysis of MSMEs, students were trained to identify trends, calculate financial ratios, and assess the overall health of businesses. This approach is consistent with Situmorang et al. (2022), who stated that PBL improves quantitative analysis skills and data-driven decision-making. During the process, students also learned to consider non-financial aspects such as customer satisfaction and marketing strategies that influence the financial condition of MSMEs. Integrating quantitative and qualitative analysis provided a more comprehensive perspective on business situations. With regular practice in data-based evaluation, students became better prepared to act as problem solvers in complex work environments. Therefore, PBL has proven effective in developing deep, applicable analytical skills.

The findings also indicate an increase in students' intrinsic motivation throughout the learning process. Their engagement in real-world projects relevant to professional

practice made the learning materials feel more meaningful and engaging. This phenomenon aligns with Ramadhani et al. (2021), who reported that PBL enhances learning motivation because students perceive their learning as having tangible impacts. In this case, students were motivated not only to earn grades but also to make meaningful contributions to the MSMEs with which they were partnered in the projects. This sense of social responsibility added a new dimension to the learning process, namely, integrated service learning. Consequently, PBL not only produces good academic outcomes but also fosters students' social awareness toward their surroundings. This impact aligns with the goals of vocational education, which aim to produce graduates with both professional competence and social sensitivity.

From a curriculum development perspective, the results of this study imply that project-based learning models can be systematically integrated into other accounting practicum courses. Nugroho et al. (2023) reported that implementing PBL across multiple courses can create stronger continuity of skills and knowledge. In this context, the two-stage model can be adapted to accommodate varying difficulty levels, ranging from introducing basic concepts to mastering ERP-based accounting systems. Cross-course implementation also has the potential to enhance collaboration among students from different majors, thereby adding an interdisciplinary dimension to learning. Therefore, the results of this study are not only relevant to one course but can also serve as a reference for developing comprehensive vocational learning strategies. Consistent application will strengthen the profile of graduates who are both competent and adaptive.

Ultimately, this study highlights that the success of PBL hinges on effective planning, facilitation, and evaluation. Facilitators or lecturers play a key role as learning coaches, guiding students without diminishing their independence in completing projects. This finding is supported by Widyastuti et al. (2024), who stated that the success of PBL is greatly influenced by lecturers' ability to provide constructive and timely feedback. In this study, feedback was provided continuously at each project stage, enabling students to promptly correct errors and optimize their work. The evaluation mechanism, which combined process and product assessment, also ensured that student achievements reflected their actual competencies. Therefore, the success of PBL implementation is determined not only by curriculum design but also by the quality of interaction between lecturers and students throughout the learning process.

CONCLUSION

The implementation of Project-Based Learning (PBL) in accounting practicum courses has been proven to create a more meaningful, contextualized, and competency-oriented learning process. This approach combines structured conceptual briefings with authentic project execution involving MSME partners, enabling students not only to comprehend the material but also to construct knowledge through direct field experience. This aligns with constructivist theory principles, where learning occurs as learners actively build meaning through environmental interactions, and with PBL theory, which centers on solving real-world problems as the core of professional skill development. As a result, students demonstrated improvements in critical thinking, problem-solving, teamwork, and professional communication skills—competencies highly relevant to the demands of the accounting industry.

Based on these findings, it is recommended that structured PBL be integrated more broadly into practicum courses within vocational education, particularly in accounting.

Future research should expand the context and participant scope to other study programs to test the generalizability of the results. Integrating digital technologies, such as accounting software or cloud-based systems, is also crucial to enhance learning relevance to current industry practices. Additionally, employing deeper qualitative approaches, such as interviews, focus group discussions, or on-site observations at partner locations, is recommended to enrich the understanding of project-based learning dynamics in authentic contexts.

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