

Evaluating the Effectiveness of the Problem-Based Learning Model for Students in the Economics Education Study Program

Abstrak: Penelitian ini menyelidiki dampak penerapan dan efektivitas Problem-Based Learning (PBL) terhadap hasil belajar mahasiswa dalam mata kuliah akuntansi pengantar pada program Pendidikan Ekonomi. Menggunakan desain One-Group Pre-test Post-test, penelitian ini mengukur kinerja mahasiswa sebelum dan sesudah penerapan model PBL. Hasilnya menunjukkan peningkatan signifikan pada nilai rata-rata, dari 83,1509 menjadi 91,7547, dengan nilai p 0,000, yang menunjukkan bahwa PBL secara efektif meningkatkan prestasi akademik mahasiswa. Penelitian ini juga mengeksplorasi alasan di balik efektivitas PBL, menyoroti peningkatan keterlibatan aktif, pemikiran kritis, kolaborasi, dan penerapan pengetahuan dalam situasi dunia nyata. Temuan ini menekankan pentingnya mengintegrasikan PBL dalam praktik pendidikan untuk meningkatkan hasil belajar kognitif dan non-kognitif.

Kata kunci: Problem Based Learning, Model Pembelajaran, Hasil Belajar

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Abstract: This study investigates the impact of Problem-Based Learning (PBL) on student learning outcomes in an introductory accounting course within the Education Economics program. Utilizing a One-Group Pre-test Post-test Design, the research measures students' performance before and after implementing the PBL model. The results indicate a significant improvement in mean scores, rising from 83.1509 to 91.7547, with a p -value of 0.000, suggesting that PBL effectively enhances students' academic achievement. The study also explores the reasons behind PBL's effectiveness, highlighting its promotion of active engagement, critical thinking, collaboration, and the application of knowledge to real-world situations. These findings underscore the value of incorporating PBL into educational practices to improve both cognitive and non-cognitive learning outcomes.

Kata kunci: Problem Based Learning, Learning Model, Learning Outcomes

INTRODUCTION

Student learning outcomes remain a critical issue within the field of education, presenting challenges for educational systems globally. Despite numerous initiatives aimed at enhancing educational quality, disparities in student performance continue to exist across various schools, academic programs, and regions. Learning outcomes serve as a key measure of educational effectiveness, indicating the extent to which students acquire the necessary knowledge and skills for their academic and professional growth. Consequently, improving these outcomes has become a primary focus for educators and policymakers worldwide (Li & Wang, 2022).

Recent research has delved into the elements contributing to variations in learning outcomes, identifying teaching methods, student engagement, and environmental factors as major influences (Lee et al., 2021). Traditional teacher-centered approaches, characterized by students as passive recipients of knowledge, have proven less effective in cultivating essential 21st-century skills such as critical thinking and problem-solving (Wang & Chen, 2021). As the educational landscape evolves to emphasize competencies like creativity, collaboration, and analytical thinking, there is a growing demand for instructional methods that actively engage students and foster these skills (Shen et al., 2023).

Learning outcomes encapsulate the achievements students attain following an extended learning process. (Bloom, (1956) provides a framework to categorize these outcomes into three domains: cognitive (knowledge), psychomotor (skills), and affective (attitudes). Studies assessing learning outcomes often employ both quantitative and qualitative methodologies—surveys, experimental designs, and case studies—to evaluate the impact of instructional strategies on student performance (Gagne & Briggs, n.d.). Additionally, national curricula and competency standards, such as the Learning Outcomes Framework or Graduate Competency Standards (SKL) in Indonesia, guide the definition of these outcomes (Kementerian Pendidikan, 2016).

Problem-Based Learning (PBL) has emerged as a powerful student-centered approach that leverages real-world problems as the starting point for learning. This method encourages active student participation, facilitating a deeper understanding of course content, critical thinking, and collaborative skills. PBL's emphasis on applying academic knowledge to practical situations enhances students' engagement and retention of information, making the learning experience more meaningful and relevant (Nguyen et al., 2023; Roschelle et al., 2021).

Studies consistently show that PBL improves both cognitive outcomes (e.g., academic achievement) and non-cognitive skills such as teamwork, communication, and problem-solving (Yoo & Lee, 2022). By fostering autonomy and self-directed learning, PBL equips students with the confidence and critical thinking abilities needed for lifelong learning and professional adaptability (Brahim et al., 2023).

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PBL aligns with the evolving demands of the workforce by integrating academic learning with real-world applications. This connection not only enhances student engagement but also prepares them to navigate complex challenges in professional settings. As industries increasingly prioritize skills like collaboration, adaptability, and creative problem-solving, PBL provides a holistic educational approach that meets these expectations (Edgar et al., 2022; Zainuddin et al., 2021; Zainuddin & Halili, 2020). Therefore, this study aims to examine the effectiveness of Problem-Based Learning (PBL) in improving student learning outcomes, with a particular focus on both cognitive and non-cognitive domains.

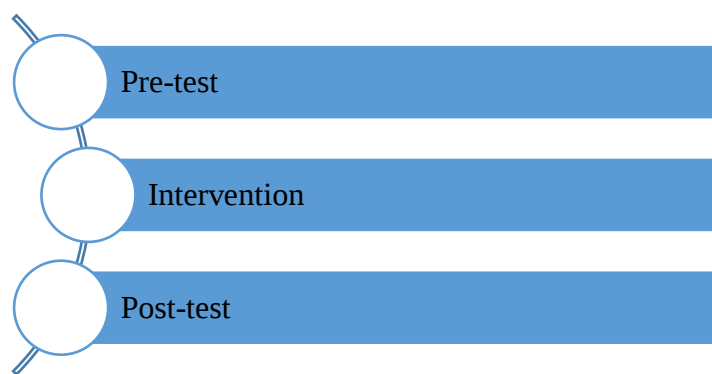
METHODS

One-Group Pre-test Post-test Design is a quasi-experimental research method involving a single group of participants. In this approach, the variables under study are measured both before and after an intervention or treatment is introduced. While this design lacks a control group for comparison, it is widely used in situations where creating such a group is impractical or unethical (Campbell & Stanley, 1963).

Pre-test : This initial stage involves assessing the variable of interest before the intervention is applied. For instance, in educational research, a pre-test might measure students' knowledge or skills in a particular subject area prior to introducing a new teaching method. The pre-test serves as a baseline for evaluating subsequent changes (Fraenkel et al., 2012).

Treatment Implementation: Following the pre-test, the intervention or treatment is carried out. This step could involve applying a novel instructional strategy, implementing training sessions, or testing a new teaching methodology. The intervention is designed to influence the measured variable and is central to the research question (Gay et al., 2011).

Post-test: After the intervention, a post-test is conducted to measure the variable again. The results from this stage are compared with those from the pre-test to determine the effectiveness of the treatment. Differences between the pre-test and post-test scores provide insights into the impact of the intervention (Creswell, 2012)



Picture 1. Design Flow Pre-test → Intervention → Post-test

One-Group Pre-test Post-test Design has notable advantages, primarily its simplicity and practicality. It is especially beneficial in contexts where resources, such as time, funding, or participants, are limited. Unlike experimental designs that require control groups, this design focuses on measuring changes within a single group, making it an accessible option for researchers (Creswell, 2012).

Data Analysis

To evaluate the effectiveness of the intervention, researchers typically compare the results of the pre-test and post-test using statistical methods. The choice of method depends on the characteristics of the data:

Paired t-test: Used to compare the mean scores of the pre-test and post-test when the data follows a normal distribution. This test assesses whether there is a statistically significant difference between the two sets of scores within the same group (Fraenkel et al., 2012).

Wilcoxon Signed-Rank Test: A non-parametric alternative to the paired t-test, suitable for data that do not meet the assumptions of normality. This test evaluates whether there is a significant difference in the ranks of paired data, making it a robust option for analyzing non-normally distributed data (Gay et al., 2011).

RESULTS AND DISCUSSION

The implementation of the Problem-Based Learning (PBL) model in the Education Economics program has demonstrated a substantial impact on improving students' learning outcomes in the introductory accounting course. The comparison of mean scores before and after the intervention

shows a notable increase, from 83.1509 to 91.7547 (refer to Table 1). The significance value of 0.000 (see Table 2) indicates a statistically significant difference between the pre-treatment and post-treatment results. Therefore, it can be concluded that the PBL model has a significant positive effect on enhancing the learning outcomes of students in the Education Economics program, particularly in the introductory accounting course.

These statistical findings affirm the theoretical foundations of Problem-Based Learning (PBL), particularly its impact on cognitive development and academic performance. The significant increase in mean scores from 83.15 to 91.75, supported by a p-value of 0.000, indicates not only a statistically significant improvement but also aligns with Barrows and Tamblyn's (1980) assertion that PBL enhances both knowledge acquisition and problem-solving capabilities. Furthermore, the strong correlation coefficient ($r = 0.688$) between pretest and posttest scores underscores the effectiveness of PBL in promoting consistent academic gains, as emphasized by Hmelo-Silver (2004), who highlighted PBL's capacity to foster deep understanding and critical thinking. These results substantiate the theoretical claims that student-centered, inquiry-based learning methods lead to meaningful and measurable improvements in learning outcomes.

Table 1. Paired Samples Statistics

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	83.1509	53	7.31541	1.00485
	Posttest	91.7547	53	7.15463	.98276

Tabel 2. Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Pretest & Posttest	53	.688	.000

Why PBL Is Proven to Enhance Learning Outcomes

Problem-Based Learning (PBL) enhances learning outcomes by employing real-world problems as the foundation for the learning process. This approach promotes active student engagement, where learners actively seek solutions to challenges, resulting in a deeper understanding of the subject matter and the development of critical and creative thinking skills. Research by Barrows & Tamblyn, (1980) demonstrates that PBL not only aids in knowledge acquisition but also enhances problem-solving abilities. Further studies, such as Hmelo-Silver, (2004), indicate that PBL fosters critical thinking skills, particularly in medical education. In higher education, Thomas, (2000) reviewed several studies and found that PBL contributes to improved collaboration, communication, and critical thinking, all of which support better learning outcomes. Thus, PBL is an effective model for enhancing both the quality of learning and the development of essential skills for students. Specifically, PBL is effective in improving learning outcomes due to several key characteristics:

Enhanced Concept Understanding: In PBL, students are not passive recipients of knowledge but are actively involved in applying concepts to solve real-world problems. This active engagement enables students to integrate new knowledge with existing understanding, leading to deeper conceptual comprehension. Savery, 2006, (2021) highlights that PBL strengthens conceptual understanding by encouraging students to apply their knowledge in problem-solving scenarios.

Vaughan, (2010) also noted that PBL positively impacts students' conceptual understanding, and Liu & Chen (2010) found that in engineering education, PBL helps students grasp complex technical concepts that traditional teaching methods fail to address. These findings show that PBL can improve understanding across various disciplines.

Development of Cognitive and Critical Skills: PBL fosters critical and analytical thinking, encouraging students to identify problems, gather information, analyze data, and make decisions based on evidence. These skills are essential both in academic contexts and in real-world situations. Koh & Khine, (2006) explain that PBL promotes critical thinking by challenging students to reflect on their assumptions, evaluate evidence, and develop solutions through deep, analytical thinking. Through group discussions and problem exploration, students enhance their analysis and problem-solving abilities compared to traditional learning models (M. , & C. S. Liu & Chen, 2010; M. Liu & Tsai, 2013). Savin-Baden, (2007) similarly emphasizes that PBL enhances critical thinking skills, enabling students to challenge assumptions and evaluate evidence critically.

Collaboration and Social Skills: PBL often involves group work, which enhances students' collaboration skills. Working in teams teaches students to share ideas, cooperate, and provide constructive feedback, improving communication and problem-solving within a social context. Research by Johnson & Johnson, (1994) on cooperative learning shows that PBL fosters collaboration among students. This model encourages group work to solve problems, thus improving social skills like communication, negotiation, and teamwork. Leung & Kember, (2003) found that PBL enhances social skills through group interactions, while (Thomas, 2000) demonstrated that PBL strengthens leadership, conflict management, and collaboration skills, which are critical for success in both academic and professional settings.

Application of Knowledge in Real-World Situations: PBL often involves solving problems that are directly relevant to real-world situations or professions, making learning more applicable and contextual. Students are more motivated to learn because they can see how the material connects to challenges outside the classroom. (Norman & Schmidt, 1992) found that PBL enhances students' ability to apply theoretical knowledge to real-world scenarios. By tackling relevant problems, students can integrate theory with practice, deepening their understanding and problem-solving skills. Duch et al., (2001) and (Hmelo-Silver, 2004a, 2004c, 2004b) found that PBL students are better equipped to apply their knowledge in professional contexts, improving their ability to recall and use information effectively.

CONCLUSION

The study demonstrates that implementing Problem-Based Learning (PBL) in the Education Economics program significantly enhances students' learning outcomes in the introductory accounting course. The substantial increase in mean scores—from 83.1509 to 91.7547—indicates that PBL effectively improves academic achievement. This improvement is attributed to PBL's emphasis on active engagement, critical thinking, collaboration, and the application of knowledge to real-world situations. These findings underscore the value of incorporating PBL into educational practices to enhance both cognitive and non-cognitive learning outcomes.

This conclusion aligns with existing research highlighting the effectiveness of PBL in enhancing learning outcomes. For instance, a meta-analysis found that PBL has a high effect size, indicating a significant positive impact on learning outcomes. Additionally, studies have shown that PBL improves critical thinking, problem-solving, and collaborative skills, all of which contribute to better academic performance

REFERENCE

- Barrows, H. S., & Tamblyn, R. M. (1980). *Problem-based learning: An approach to medical education*. Springer Publishing Company.
- Bloom, B. S. (1956). *Taxonomy of educational objectives: The classification of educational goals*. Longmans Green.
- Brahim, M. L., Ayad, M., & Malik, M. (2023). The impact of Problem-Based Learning on enhancing critical thinking and problem-solving skills in higher education. *Journal of Educational Psychology and Practice*, 24(1), 345–360.
- Campbell, D. T., & Stanley, J. C. (1963). *Experimental and quasi-experimental designs for research*. Houghton Mifflin.
- Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed). Pearson Education.
- Duch, B. J., Groh, S. E., & Allen, D. E. (2001). *The power of problem-based learning*. Stylus Publishing.
- Edgar, P., Simpson, M., & Miller, T. (2022). Enhancing student collaboration through problem-based learning. *Teaching and Learning in Higher Education*, 21(4), 335–348.
- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2012). *How to design and evaluate research in education* (8th ed). McGraw-Hill.
- Gagne, R. M., & Briggs, L. J. (n.d.). Principles of instructional design and learning outcomes. *Journal of Educational Psychology*.
- Gay, L. R., Mills, G. E., & Airasian, P. W. (2011). *Educational research: Competencies for analysis and applications* (10th ed). Pearson Education.
- Hmelo-Silver, C. E. (2004a). *Problem-based learning: Effects on the early acquisition of cognitive skill in medicine*. 13(1), 39–78.
- Hmelo-Silver, C. E. (2004b). Problem-based learning: Effects on the early acquisition of cognitive skills in medicine. *Journal of the Learning Sciences*, 13(1), 39–78.
- Hmelo-Silver, C. E. (2004c). Problem-based learning: What and how do students learn? . *Educational Psychology Review*, 16(3), 235–266.
- Johnson, D. W., & Johnson, R. T. (1994). *Learning together and alone: Cooperative, competitive, and individualistic learning*. Prentice Hall.
- Kementerian Pendidikan. (2016). *Standar kompetensi lulusan dan capaian pembelajaran nasional*. Penerbit Pemerintah.
- Koh, H. K., & Khine, M. S. (2006). Problem-based learning and students' critical thinking skills: A review of the literature. *Educational Technology & Society*, 9(3), 79–91.
- Lee, Y., Kim, H., & Choi, J. (2021). Engagement and learning outcomes in active learning environments: A systematic review. *Educational Psychology Review*, 33(2), 369–391.
- Leung, K., & Kember, D. (2003). The influence of problem-based learning on students' perceptions of their learning environments. *Higher Education*, 45(3), 361–377.
- Li, X., & Wang, W. (2022). The role of problem-based learning in fostering cognitive and non-cognitive skills in higher education. *Journal of Educational Development*, 11(1), 22–35.
- Liu, M. , & C. S., & Chen, S. (2010). Problem-based learning and its effects on students' understanding and learning in an engineering education environment. *Journal of Engineering Education*, 99(3), 301–312.
- Liu, M., & Tsai, C. (2013). Investigating the effect of problem-based learning on students' critical thinking and creativity in science education. *Journal of Educational Psychology*, 105(4), 813–825.

- Nguyen, T., Tran, T., & Nguyen H. (2023). Real-world problem solving and student motivation in PBL: A longitudinal study. *Journal of Educational Research*, 116(5), 481–495.
- Norman, G. R., & Schmidt, H. G. (1992). The psychological basis of problem-based learning: A review of the literature. *Medical Education*, 26(1), 28–36.
- Roschelle, J., Duschl, R., & Kelley, M. (2021). Problem-based learning in practice: A model for developing critical thinking skills in the classroom. *International Journal of STEM Education*, 8(4), 42–58.
- Savery, J. R. (2006). Overview of problem-based learning: Definitions and distinctions. *Interdisciplinary Journal of Problem-Based Learning*, 1(1), 9–20.
- Savery, J. R. (2021). Problem-based learning: An introduction to the special issue on problem-based learning in higher education. *Educational Technology Research and Development*, 69(1), 1–4.
- Savin-Baden, M. (2007). *Problem-based learning in higher education: Untold stories*. McGraw-Hill Education.
- Shen, X., Zhang, L., & Zhang, D. (2023). Fostering 21st-century skills in higher education: The role of problem-based learning. *International Journal of Educational Technology in Higher Education*, 20(1), 16–30.
- Thomas, J. W. (2000). A review of research on project-based learning. *The Autodesk Foundation*.
- Vaughan, N. D. (2010). Perspectives on problem-based learning. *Canadian Journal of Higher Education*, 40(3), 43–56.
- Wang, C., & Chen, D. (2021). The impact of traditional teaching versus active learning on student engagement and performance. *Asia-Pacific Journal of Educational Research*, 19(2), 157–173.
- Yoo, S., & Lee, D. (2022). Problem-based learning and its impact on academic achievement and student engagement: A meta-analysis. *Educational Psychology Review*, 34(3), 539–557.
- Zainuddin, Z., & Halili, S. H. (2020). The effectiveness of problem-based learning in enhancing students' critical thinking: A systematic review. *Journal of Educational Psychology*, 26(1), 45–60.
- Zainuddin, Z., Keong, H. H., & Abdul Kadir, M. (2021). Problem-based learning in higher education: A systematic review of its impact on students' learning outcomes. *Educational Research Review*, 16(2), 123–139.