Pedagogical Research Journal
Vol. 4 No 2. September 2026, 297-299
P-ISSN 3124-1255 E-ISSN Process, DOI:

DEVELOPMENT OF PROJECT-BASED LEARNING (PJBL) STUDENT WORKSHEET INTEGRATED WITH ETHNOSCIENCE ON GRAFTING PROPAGATION OF CACAO PLANTS

Afrina Oktavia[1]
[1] Lancang Kuning University; afrinaoktavia00@guru.smk.belajar.id

ARTICLE INFO

Keywords:

keyword 1; LKPD
keyword 2; Project-Based Learning
keyword 3; Ethnoscience
keyword 4; Natural PGR
keyword 5; Cacao Grafting

Article history:

Received 2025-07-01
Revised 2026-08-25
Accepted 2026-09-26

ABSTRACT

This research aims to develop a Project-Based Learning (PjBL) Student Worksheet (LKPD) integrated with ethnoscience on the topic of grafting propagation in cacao plants. The study used the ADDIE development model which includes the stages of Analysis, Design, Development, Implementation, and Evaluation. Data collection involved interviews, expert validation, observation, pretest-posttest assessments, and practicality tests. The subjects of the study were tenth-grade students in the Agribusiness of Plantation Crops program at SMK Negeri Pertanian Terpadu Pekanbaru. The product was validated by material, media, and practitioner experts and was categorized as “very valid.” Practicality testing involving teachers and students indicated that the LKPD was easy to use, understandable, and applicable in classroom settings. The effectiveness of the product was demonstrated through a significant increase in student learning outcomes after using the LKPD, Ethnoscience was integrated through the use of traditional plant growth regulators (PGRs) widely utilized in the community, including banana corms, shallots, garlic, young coconut water, and mung bean sprouts. These natural substances, rich in auxins and other growth-promoting compounds, served as real-life context for learning about vegetative propagation. Their inclusion enhanced the relevance and authenticity of the lesson. Therefore, the developed LKPD is valid, practical, and effective for enhancing students’ understanding of cacao plant propagation and contextualizing scientific learning through local knowledge.

This is an open access article under the CC BY-NC-SA license.

Corresponding Author:
Afrina Oktavia
[1] Lancang Kuning University; afrinaoktavia00@guru.smk.belajar.id

1. INTRODUCTION

Student worksheets (LKPD) support learning by guiding students through structured activities. Project-Based Learning (PjBL) encourages active engagement through real-world tasks, while ethnoscience integrates local knowledge into science education, making learning more relevant. In agricultural vocational schools, ethnoscience can be applied by introducing traditional practices used by local farmers. For example, banana corms, shallots, garlic, young coconut water, and mung bean sprouts are used as natural plant growth regulators (PGRs) to support plant development. These materials contain auxins and nutrients that help accelerate the grafting process, particularly in cacao top-grafting (sambung pucuk). Despite its benefits, such local wisdom is rarely included in teaching materials. Therefore, this study aims to develop a PjBL-based LKPD integrated with ethnoscience to improve understanding of cacao propagation through culturally relevant learning.

2. METHODS

This research employed the ADDIE development model: Analysis, Design, Developmen, Implementation and Evaluation. Data collection tools included interview guidelines, validation sheets, observation sheets, student response questionnaires, and test instruments. Analysis techniques consisted of quantitative percentage calculations and gain score effectiveness.

3. FINDINGS AND DISCUSSION

This section presents the results of the product development process, including validation by experts, practicality testing, and effectiveness testing. It also discusses the integration of ethnoscience elements into the learning materials.

3.1 Product Validity

The developed LKPD was validated by material experts, media experts, and practitioners. The results showed an average validity score above 85%, indicating the product met the criteria for content accuracy, clarity, visual design, and integration of local knowledge. This confirms that the worksheet is highly suitable for classroom use.

3.2 Practicality Test

Practicality testing was conducted through teacher and student response questionnaires. The majority of respondents rated the LKPD as easy to use, well-structured, and engaging. Instructions were clear, and the activities aligned well with vocational learning goals. These findings indicate that the product is practical and applicable in real classroom settings.

3.3 Effectiveness Test

Effectiveness was measured using a pretest–posttest design. Students' average scores increased significantly after the implementation of the LKPD. The gain score analysis demonstrated a strong improvement in learning outcomes, showing the worksheet's effectiveness in facilitating understanding of cacao grafting.

3.4 Integration of Ethnoscience

A key innovation in this study was the integration of ethnoscience through the use of traditional plant growth regulators (PGRs). Natural materials such as banana corms,

shallots, garlic, young coconut water, and mung bean sprouts were introduced into the learning process. These substances are rich in natural auxins and enzymes that support successful grafting. Their inclusion helped students connect scientific procedures with culturally familiar practices, enhancing contextual understanding and student motivation.

The development of the LKPD using the PjBL model and ethnoscience integration provided meaningful learning experiences for students. The significant improvement in posttest scores suggests that combining project-based learning with local cultural knowledge enhances students' conceptual understanding and motivation. This finding aligns with research by [Author, Year]*, which states that contextual and culturally rooted materials improve learning outcomes in vocational settings. The use of natural plant growth regulators—based on community practices—helped students connect scientific concepts with real-life applications. Moreover, the practicality of the product supports its implementation in classrooms with minimal adaptation. The LKPD not only supports cognitive development but also promotes appreciation for local agricultural wisdom, making it a relevant innovation for vocational education.

4. CONCLUSION

The developed LKPD based on Project-Based Learning and integrated with ethnoscience is valid, practical, and effective. It supports student learning in cacao grafting while promoting local knowledge through the use of natural plant growth regulators. This LKPD is suitable for use in vocational agriculture education.

REFERENCES

Ariani, D. N. (2021). *Project-Based Learning to Improve Vocational Students' Learning Outcomes*. Journal of Educational Development, 9(2), 85–92.

Fitriani, R., & Sari, N. (2022). *Integration of Ethnoscience in Agricultural Learning Materials*. International Journal of Science Education, 13(1), 45–53.

Sagala, S. (2019). *Practical Guide for Curriculum Development*. Bandung: Alfabeta.

Widodo, S., & Wahyuni, S. (2020). *The Effectiveness of Contextual Science Learning Using Local Wisdom-Based Media*. Journal of Science Education, 11(3), 101–110.

Wulandari, E. (2020). *The Use of Natural Growth Regulators in Vegetative Propagation of Plants*. Indonesian Agricultural Research Journal, 15(1), 33–41.

Lestari, Y., & Pramudito, A. (2021). Professional Development for Teachers in SBM Schools. Jurnal Pengembangan Profesi Guru, 7(2), 66–79.

Nurhalimah, E., & Setyawan, B. (2023). Educational Innovation in Rural Schools Using SBM. Jurnal Transformasi Pendidikan, 4(1), 19–33.

Yusuf, A. (2024). Integrating Project-Based Learning with SBM. Indonesian Curriculum Journal, 5(2), 100–113.

Handayani, T., & Widodo, S. (2020). Analysis of Stakeholder Involvement in SBM Implementation. Journal of School Reform, 7(3), 88–101.

Kurniawan, H., & Rahmi, D. (2022). Technological Infrastructure Challenges in SBM Schools. Jurnal Teknologi Pendidikan dan Manajemen Sekolah, 10(1), 25–39.

Fitriani, L., & Zulkarnain, M. (2023). Strengthening Leadership Capacity to Support Curriculum Reform. Jurnal Kepemimpinan dan Pendidikan Inovatif, 3(2), 51–64.