

## The Effectiveness of Local Wisdom-Based Project-Based Learning in Environmental Learning: A Systematic Review of PRISMA

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**Abstract:** Environmental learning requires a contextual approach so that students are able to understand environmental problems in a real and meaningful way. Project Based Learning (PjBL) based on local wisdom is considered relevant because it integrates learning projects with local cultural and environmental potential. This study aims to analyze the application of PjBL based on local wisdom in environmental learning and its impact on learning outcomes and students' environmental awareness. The research method used is a Systematic Literature Review (SLR) by searching national and international journal articles published in the last ten years through Google Scholar. The results of the study indicate that PjBL based on local wisdom can improve students' critical thinking skills, creativity, problem solving, and environmental awareness. The conclusion of this study confirms that PjBL based on local wisdom is effectively applied in environmental learning and has the potential to support sustainable education.

**Keywords:** Environmental Learning; Local Wisdom; PjBL.

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## **Introduction**

Environmental learning is important for shaping students' knowledge, attitudes, and behavior toward environmental issues. Issues of pollution, ecosystem damage, and climate change show that environmental education needs to foster awareness as well as responsibility in preserving nature through the active involvement of students (UNESCO, 2020).

One learning model that is relevant in environmental education is Project Based Learning (PjBL). This model places students as active subjects through project activities that originate from real-world problems. Through PjBL, students are trained to think critically, collaborate, and solve problems contextually. Bell explains that PjBL is able to improve higher-order thinking skills and provide meaningful learning experiences for students (Bell, 2010).

The effectiveness of PjBL in environmental learning can be strengthened through the integration of local wisdom. Local wisdom contains cultural values and community practices that reflect a harmonious relationship between humans and the environment. Learning that integrates local wisdom is considered more relevant because it is directly connected to the social and cultural context of the learners. Marlina states that learning based on local wisdom contributes to the formation of students' character and their attitudes of environmental care (Marlina et al., 2023).

Previous research has shown that the implementation of local wisdom-based PjBL has a positive impact on environmental learning. Widiarini reported that integrating local wisdom into science learning can increase students' environmental awareness (Widiarini et al., 2025). Another study by Nurohmah and Nurlaila showed that local wisdom-based PjBL contributed to increasing environmental literacy and active involvement of students in the learning process (Nurohmah & Nurlaila, 2025). In addition, Arfida found that local wisdom-based PjBL was effective in increasing students' creativity in learning related to local environmental issues (Arfida et al., 2024).

However, these research results are scattered and use diverse approaches, both in terms of educational level, learning context, and effectiveness indicators used. Some studies emphasize cognitive aspects, while aspects of environmental attitudes and character have not been comprehensively examined. Therefore, this study aims to analyze the implementation of local wisdom-based PjBL in environmental learning and its impact on students' learning outcomes and environmental attitudes.

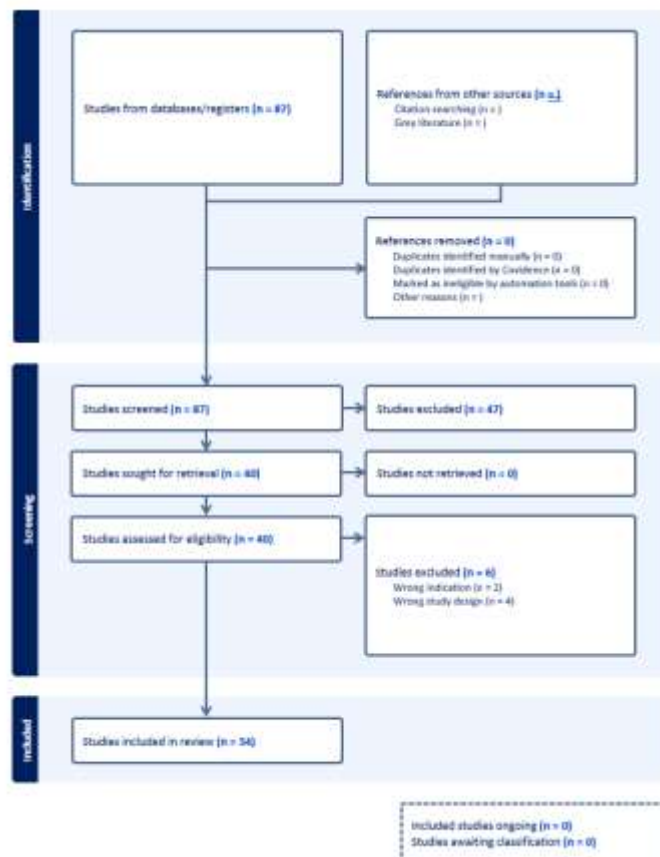
Based on this, this research was conducted using a Systematic Literature Review (SLR) approach guided by PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). This study aims to examine research trends, implementation methods, and the impact of local wisdom-based Project Based Learning in environmental learning. This research can serve as a reference for educators and researchers in developing contextual and sustainable environmental learning.

## Methods

This study employed the Systematic Literature Review (SLR) method, adhering to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The SLR method was chosen because it presents a systematic, transparent, and structured synthesis of previous research findings, making it suitable for assessing the effectiveness of implementing local wisdom-based Project-Based Learning in environmental education. The PRISMA guidelines were used to ensure that the process of identifying, screening, and selecting articles was conducted clearly and replicable (Page et al., 2021).

The article search process was conducted through the Google Scholar database with the help of Publish or Perish software. Google Scholar was chosen because of its extensive literature coverage and widespread use in educational research. Using Publish or Perish helps researchers systematically collect and manage article metadata (Hetami et al., 2023). The article search was limited to the period 2015–2020 to obtain relevant and up-to-date literature. Keywords used in the search included Project-Based Learning, PjBL, Local Wisdom, Local Wisdom, Environmental Learning, and Environmental Education, which were used separately according to the study's focus.

**Figure 1.**  
PRISMA diagram



The article selection process was carried out in stages according to the PRISMA process, including identification, screening, feasibility assessment, and inclusion. The initial search yielded 87 articles, which were then screened based on title and abstract, eliminating 47 articles for relevance to the research focus. Furthermore, 40 articles were fully reviewed, and during the feasibility assessment stage, 6 articles were excluded due to inconsistencies between indicators and research design. Thus, 34 articles were deemed to meet the criteria and were included in the systematic review for further analysis. This selection approach aligns with SLR practices, which emphasize thoroughness and consistency in the literature analysis process (Xiao & Watson, 2019). The article selection flow is presented in the form of a PRISMA diagram in the next section.

## Results & Discussion

A literature search identified several journal articles discussing the application of local wisdom-based Project Based Learning in environmental education. The articles were obtained through the Google Scholar database, covering publications spanning the last ten years. Through a selection process based on inclusion criteria and suitability to the research focus, 34 articles were identified as relevant for analysis. All articles were synthesized to identify implementation characteristics, learning impacts, and research trends, which are then presented in a synthesis table.

**Table 1.**

Synthesis of the Results of the Systematic Literature Review of Local Wisdom-Based PjBL

No	Author and Year of Publication	Article Title	Dependent Variable	Method	Key Findings
1.	(Abidah, 2025)	Implementasi Model Pembelajaran Project Based Learning Berbasis Kearifan Lokal dalam Meningkatkan Kreativitas Siswa Kelas VI MI At-Tanwir	MI Student Creativity	Experiment	Local wisdom-based project-based learning effectively enhances student creativity.
2.	(Azizah et al., 2025)	Profiling Students' Problem-Solving Skills through the Ethno-STEAM Approach in Elementary School Contexts	Problem-Solving skills	Descriptive	The Ethno-STEAM approach enhances problem-solving
3.	(Cahyaningsih et al., 2025)	Integrating Local Cultural Wisdom in Project-Based Learning to Improve Science Education: A Study of Kudus	Quality of Science Learning	Experiment	Integrating local culture improves learning outcomes.
4.	(Carolina et al., 2024)	Integrasi Potensi Lokal dalam Implementasi Kurikulum Merdeka	Curriculum Implementation	Case Study	Local potential strengthens contextual learning.
5.	(Dalem et al., 2025)	Interactive Multimedia Based on Daily Life Nuances	Fourth-grade	R&D	Local multimedia improves

No	Author and Year of Publication	Article Title	Dependent Variable	Method	Key Findings
		of Balinese Local Wisdom to Improve Learning Outcomes of Fourth Grade Elementary School Students	elementary school students' learning outcomes		students' understanding
6.	(Dewi et al., 2024)	Pengembangan Bahan Ajar IPAS Menggunakan Metode Project Based Learning Bermuatan Etnosains untuk Meningkatkan Kemampuan Berpikir Kreatif Siswa SD	Creative Thinking Skills	R&D	Effective Ethnoscience PjBL Module
7.	(Fatahidin, 2025)	Ecopedagogic Model: A Teacher's Approach to Implementing Learning in Elementary Schools to Foster Students' Critical Awareness of the Environment	Environmental Awareness	Qualitative	The ecopedagogical model increases ecological awareness
8.	(Firnanda et al., 2025)	Exploration of Gresik Local Wisdom (Tegal Deso-Okol) as Student Learning Resources on Environmental Pollution to Build Awareness of Cultural Values	Awareness of Cultural Values	Descriptive	Local wisdom is effective as a learning resource
9.	(Fithri et al., 2021)	Implementasi LKPD berbasis STEM untuk meningkatkan keterampilan berpikir kritis peserta didik	Critical Thinking	Experiments	STEM worksheets improve thinking skills
10.	(Fithriyah et al., 2024)	Pengembangan Modul P5 PPRA Berbasis Kearifan Lokal di Madrasah Ibtidaiyah	Strengthening the Pancasila Student Profile	R&D	Modules to Improve Student Character
11.	(Gagaramusu et al., 2024)	Sustainable Lifestyle Education: An Ecobrick Module for Enhancing Students' Creativity in Pancasila Student Profile Projects	Student Creativity	R&D	Effective Environment-Based Modules
12.	(Handayani et al., 2019)	Exploring Local Potency of Purbalingga Regency to Improve Creative Thinking Skill of Elementary School Students	Creative Thinking	Experimentation	Local Potential Enhances Creativity
13.	(Hendriyani et al., 2024)	Ethnobotanical Study of Cosmetics of Baduy Community as a Recommendation for Biology Learning Content	Biology learning resources	Descriptive	Ethnobotany is relevant to learning
14.	(Hidayah et al., 2024)	Implementation of ethnocience-based PjBL on	Students' Science	Experiment	PjBL ethnocience improves literacy

No	Author and Year of Publication	Article Title	Dependent Variable	Method	Key Findings
		science literacy learning outcomes	Literacy		
15.	(Nurohmah & Nurlaila, 2025)	Penerapan Project-Based Learning (PjBL) Berbasis Kearifan Lokal untuk Meningkatkan Literasi dan Kolaborasi Siswa MI pada Mata Pelajaran IPAS di MIS Nurul Huda 016 Berbak Tanjung Jabung Timur Jambi	Literacy & Collaboratio n	Experiment	PjBL Improves Literacy and Collaboration
16.	(Ariyatun, 2021)	Analysis of Project Based Learning Integrated with Ethno-STEM on Students' Critical and Creative Thinking Skills	Critical & Creative Thinking	Experiment	Effective Ethno-STEM Integration
17.	(Kusumawati et al., 2025)	Water filtration based on local wisdom products for Kalimantan and Java	Environment al Solutions	Experiment	Local products are effective as learning media
18.	(Prasetya et al., 2025)	PENGEMBANGAN MODUL SUSTAINABLE PROJECT-BASED LEARNING (S-PjBL) BERBANTUAN AUGMENTED REALITY SEBAGAI INOVASI PEMBELAJARAN	Learning Innovation	R&D	S-PjBL Increasing Student Engagement
19.	(Pratiwi et al., 2024)	Unveiling the needs for ethnoscience-based e-worksheets to enhance the nature of science and environmental awareness of elementary school students	Environment al Awareness	R&D	E-LKPD improves NOS and awareness
20.	(Rahman et al., 2023)	Meta-Analysis: Pengaruh pendekatan STEM berbasis etnosains terhadap kemampuan pemecahan masalah dan berpikir kreatif siswa	Problem- solving	Meta- analysis	STEM ethnoscience has a significant impact
21.	(Rahmawati et al., 2025)	Integration of the ethnopedagogy of Jolotundo Temple's Ruwat Petirtaan tradition as the development of biology learning in the Merdeka curriculum	Biology Learning Developmen t	Descriptive	Local traditions relevant to the curriculum
22.	(Raida et al., 2025)	Analysis of Ethnostem Content in Making Jenang Kudus A Science Learning Resource for Junior High School Students	Science learning resources	Descriptive	Cultural processes support learning
23.	(Ramli et al., 2022)	The Impact of Student Responses and Concepts Understanding on the	Elementary School Students'	Correlational	Conceptual Understanding Influences

No	Author and Year of Publication	Article Title	Dependent Variable	Method	Key Findings
		Environmental Care Character of Elementary School Students	Attitudes		Character
24.	(Retnowati et al., 2020)	Developing project-based learning related to local wisdom in improving students' problem-solving skills	Problem solving	R&D	Local PjBL enhances problem solving
25.	(F. R. Sari, 2019)	Needs analysis in the development of natural science teachers' book of Junior High School based on local wisdom of West Sumatra	Needs Analysis	Descriptive	Teachers Need Local Wisdom
26.	(T. N. I. Sari et al., 2025)	Effectiveness of PjBL Worksheet Based on Local Potential to Improve Critical and Creative Thinking Skills of Phase E High School Students	Critical and creative thinking	Experiment	Effective local worksheets
27.	(Sihombing et al., 2025)	Integrating local wisdom into environmental education: A systematic review of ethnoscience research in Indonesia	Ethnoscienc e Research Trends	SLR	Ethnoscience is dominant in environmental education
28.	(Susanti et al., 2025)	Analysis of the implementation of local wisdom-based learning in the integrated thematic curriculum at MI Pelangi Alam	Implementa tion analysis	Qualitative	Effective contextual learning
29.	(Susanto et al., 2021)	Students' Mathematical Critical Thinking Ability with Project Based Learning (PjBL) Model Based on Local Culture	Critical thinking in mathematics	Experiment	Cultural PjBL enhances skills
30.	(Ulfah & Hidayah, 2025)	Analysis of Local Natural Resource Utilization in Project Based Learning (PjBL) in Higher Education in Indonesia-Malaysia Border Regions	Higher Education	Case Study	Local Natural Resources Relevant to PjB
31.	(Wahidin & Sumantri, 2023)	Map of Middle School Teachers' Ability to Respond to Changes in Community Culture, Local Wisdom and Literacy in Science Learning in the Digital Era	Teacher Competence	Survey	Teachers Need Cultural Adaptation
32.	(Wahyudi & Wuryandani, 2024)	Integrating Cultural Values in Nationalism Character Education: A Study on	Character Education	Qualitative	Cultural values strengthen character

No	Author and Year of Publication	Article Title	Dependent Variable	Method	Key Findings
		Merdeka Curriculum Implementation			
33.	(Zaki et al., 2024)	Integrating local wisdom with project-based learning to enhance 21st-century skills in the Society 5.0 era	21st-Century Skills	Mixed	Local PjBL relevant to the digital era
34.	(Zidan et al., 2023)	Learning strategies on ecosystem concepts and environmental change: A pedagogical study analysis	Pedagogical analysis	Review	Dominant contextual learning

*RQ1. What are the characteristics of the application of local wisdom-based Project-Based Learning (PjBL) in environmental learning?*

Based on the results of a literature synthesis, the application of local wisdom-based PjBL in environmental learning is generally characterized by the integration of cultural values, traditions, and local environmental potential into learning project activities. The projects designed are not abstract but rather originate from real-life environmental issues close to the students' lives, thus making learning more contextual and meaningful. Abidah demonstrated that the application of local wisdom-based PjBL provides space for students to explore their surrounding social and cultural environment through project activities, which results in increased creativity and student engagement (Abidah, 2025). Similarly, Retnowati explained that the integration of local wisdom in PjBL encourages students to develop problem-solving skills because learning is directly linked to the context of everyday life and the local environment (Retnowati et al., 2020).

In addition to the cultural context, the characteristics of local wisdom-based PjBL are also evident in the use of ethnoscience as a learning resource. Hidayah emphasized that ethnoscience-based PjBL can strengthen students' scientific literacy because scientific concepts are linked to environmental phenomena they encounter directly (Hidayah et al., 2024). Thus, the main characteristics of local wisdom-based PjBL in environmental learning are real-life, contextual, and project-based learning, oriented toward solving local environmental problems.

*RQ2. What is the impact of implementing local wisdom-based PjBL on students' learning outcomes and environmental awareness?*

The study results show that implementing local wisdom-based PjBL has a positive impact on improving cognitive learning outcomes, critical and creative thinking skills, and fostering students' environmental awareness. Learning that links academic concepts to local environmental issues helps students understand the material more deeply while fostering ecological awareness. Ramli found that understanding environmental concepts

gained through contextual learning significantly contributes to the development of environmental awareness in elementary school students (Ramli et al., 2022).

Firnanda also reported that utilizing local wisdom as a source for environmental learning not only improves conceptual understanding but also fosters students' awareness of cultural values and environmental sustainability (Firnanda et al., 2025). In addition to the affective aspect, Ariyatun demonstrated that integrating the Ethno-STEM approach into PjBL significantly improved students' critical and creative thinking skills through project activities that required analysis and problem-solving based on local contexts (Ariyatun, 2021). These findings confirm that PjBL based on local wisdom is effective in integrating cognitive aspects, 21st-century skills, and environmental awareness in learning.

### *RQ3. What are the research trends in local wisdom-based PjBL in environmental learning?*

Based on the results of the literature analysis, research on local wisdom-based PjBL in environmental learning has shown an increasing trend over the past ten years. Most of the research has been conducted at the elementary and secondary education levels, with experimental and developmental research methods as the most dominant approaches. Sihombing, through his systematic review, revealed that ethnoscience and local wisdom research in Indonesia is increasingly directed at environmental education and sustainability issues, in line with the growing attention to education based on local contexts (Sihombing et al., 2025).

Furthermore, Zaki emphasized that the integration of local wisdom-based PjBL is relevant to the demands of 21st-century skills, particularly in developing environmental awareness, collaboration, and problem-solving skills in students (Zaki et al., 2024). This trend indicates that local wisdom-based PjBL has developed into a strategic learning approach in environmental education and has great potential for further development at various levels of education.

## **Conclusion & Recommendation**

The results of a systematic review indicate that Project Based Learning based on local wisdom is effective in environmental learning because it links contextual projects with the problems and potential of the environment around students. The results of the study indicate that Project Based Learning based on local wisdom has a positive impact on learning outcomes, thinking skills, problem-solving abilities, and the formation of students' environmental care character. The integration of local wisdom in learning projects also increases ecological awareness and strengthens socio-cultural values. In addition, research in the last ten years has shown an increasing application of Project Based Learning based on local wisdom in environmental education, especially at the elementary and secondary education levels.

Based on these conclusions, it is recommended that educators implement Project Based Learning (PBL) based on local wisdom more broadly in environmental education by utilizing the potential of culture and the surrounding environment as contextual learning resources. The development of supporting learning tools, such as modules, student worksheets, and project-based learning media, is also needed to improve the quality of learning. Furthermore, further research is recommended to examine in more depth the impact of PjBL based on local wisdom on character formation and environmental awareness in the long term, as well as develop learning innovations by combining this approach with digital learning technology.

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