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The Implementation of Project Based Learning integrated Ethno-STEM in Indonesia

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Abstract

This study is driven by the need to develop instructional approaches that foster 21st-century skills. As an archipelagic country with rich cultural diversity, Indonesia has significant potential to link cultural values with science education through the Ethno-STEM approach. The integration of Project-Based Learning (PjBL) with Ethno-STEM in Indonesia has demonstrated promising results. However, systematic investigations into research trends, local wisdom topics, and integration with other instructional approaches remain limited. Given the increasing interest in Ethno- STEM learning, this review aims to identify key trends and gaps in the integration of Project-Based Learning and Ethno-STEM in Indonesia over the past decade. The Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) framework was employed as a guideline for conducting the systematic literature review. Data were gathered using the Publish or Perish (PoP) application, drawing from the Google Scholar, Crossref, and OpenAlex databases. A rigorous selection process was applied, ultimately yielding 25 relevant articles for in-depth analysis. The findings reveal that the publication trend of PjBL-Ethno STEM in Indonesia has experienced significant growth since 2019, peaking in 2023. Development research (36%) and quantitative studies (32%) dominate the body of literature. Most of these studies were conducted on Java Island (76%), while no studies from Kalimantan and Papua were identified. The local wisdom topics explored in the literature include food, beverages, regional arts, traditional technologies, and native flora and fauna. Moreover, the integration of PjBL-Ethno STEM with inquiry-based learning, Ethno-STEAM, and virtual technology has emerged as a significant trend. Overall, PjBL-Ethno STEM stands out as an innovative instructional approach with great potential to cultivate essential 21st-century skills such as critical thinking, creative thinking, collaboration, and communication.

Keywords: Project Based Learning; PjBL Ethno-STEM; Ethnoscience; STEM Education

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INTRODUCTION

The development of the 21st century is characterized by advancements in technology, communication, and information, as well as increased accessibility in various aspects of life. This era also demands increasingly high-quality human resources (Soffel, 2016). The essential skills that students must acquire in the 21st century include critical thinking, communication, collaboration, creativity, and innovation. Enhancing these skills requires implementing appropriate learning models, approaches, and strategies. One instructional model that can support achieving these goals is the Project-Based Learning model (Mere, 2023).

Project-Based Learning (PjBL) is an instructional approach that emphasizes students' direct engagement with real-world problems. This model has been shown to effectively enhance students' interest and participation, particularly in STEM education, by promoting collaboration, authentic problem-solving, and the development of practical solutions (Artama et al., 2023). PjBL also fosters creative thinking skills through processes such as identifying issues, analyzing information, logical reasoning, and informed decision-making (Nuraini et al., 2023). Aligned with John Dewey's learning by doing philosophy, this approach positions students as active participants in the learning process, while teachers act as facilitators who guide the formulation of meaningful questions and tasks (Efstratia, 2014). Therefore, PjBL is considered relevant for cultivating 21st-century competencies and is highly applicable across various educational contexts.

STEM is a learning approach that integrates Science, Technology, Engineering, and Mathematics into instructional activities, with a focus on real-world problem-solving processes (Kelley & Knowles, 2016; Pinnell et al., 2013). The comprehensive integration of these four disciplines holds significant potential for enhancing the quality of education. STEM encourages students to develop skills in designing, developing, and utilizing technology, as well as applying interdisciplinary knowledge to solve problems (Kapila & Iskander, 2014). As a result, STEM education has attracted considerable interest from both researchers and educators.

The integration of Science, Technology, Engineering, and Mathematics (STEM) has advanced collectively. However, this progress has raised concerns regarding the potential neglect of national cultural identity, particularly when educational focus is directed solely toward technological development. Indonesia, as a nation renowned for its rich and diverse cultural heritage, offers a unique context in this regard . The country's status as an archipelagic state, characterized by geographic and cultural heterogeneity, provides a distinctive opportunity to connect cultural values with science education. Instructional approaches that incorporate local wisdom and cultural perspectives within scientific contexts, viewed through a multicultural lens, can enrich the learning process and maintain cultural relevance in the midst of global STEM advancement (Idrus, 2022). Despite the increasing interest in Ethno-STEM approaches, there remains a limited understanding of how Project-Based Learning (PjBL) has been operationalized within Indonesia's diverse cultural contexts.

One approach that effectively bridges culture and science in education is the ethnoscience-based approach (Sudarmin, Woro Sumarni, et al., 2019). Indigenous knowledge, a central component of ethnoscience, emerges from community-based understandings and practices. The ethnoscience approach incorporates indigenous knowledge validated through scientific literature and explanations, making it an authentic source for science instruction (Izzah et al., 2020; Turiman et al., 2012). Ethnoscience is inherently interdisciplinary, representing a collaboration across fields such as science, social studies, and mathematics. By allowing both teachers and students to draw on their local cultural heritage in the classroom, ethnoscience-based learning creates a more engaging and contextually meaningful environment. Consequently, integrating STEM with ethnoscience offers a promising pedagogical strategy for fostering students' potential and making learning more relevant to their lived experiences. By employing content analysis on several articles from reputable national and international scientific journals, this study aims to identify research

trends related to the implementation of Project-Based Learning integrated with Ethno-STEM in Indonesia, hereinafter referred to as PjBL–Ethno-STEM. The articles analyzed were published within the last ten years.

METHOD

Research Design

This study was a systematic literature review (SLR). SLR applies a scientific approach to minimize research bias by identifying, evaluating, and synthesizing relevant studies to answer specific research questions (Petticrew & Roberts, 2008). This study employed the PRISMA method. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) is a reporting guideline designed to assist researchers in preparing systematic review and meta-analysis reports in a transparent, comprehensive, and accurate manner. PRISMA provides a complete checklist that guides researchers from the initial stages to the reporting of findings, along with a clear flow diagram to illustrate the review process (Page & Moher, 2017; Veroniki et al., 2021). The checklist and flow diagram used in this study were adopted from Page et al. (Page et al., 2020). The research flow is illustrated in Figure 1.

Research Focus

The focus of this study is to identify research trends on PjBL–Ethno-STEM in Indonesia. The collected information includes the number of PjBL–Ethno-STEM publications per year, research locations, types and designs of the studies, topics addressed, dependent variables related to PjBL–Ethno-STEM, as well as the integration of PjBL–Ethno-STEM with other learning models, approaches, methods, or strategies.

Data Collection

Data collection for this study was conducted using the Publish or Perish (PoP) application, a software tool widely recognized for its ability to retrieve and compile academic citations across multiple bibliographic databases. This capability makes PoP particularly suitable for bibliometric analyses in systematic literature reviews. The databases accessed through PoP include Google Scholar, Crossref, and OpenAlex, each offering distinct advantages. Google Scholar provides extensive coverage of scholarly works, making it valuable for capturing a wide array of academic literature. Crossref ensures reliable citation linking and adherence to publication standards, while OpenAlex promotes inclusivity by indexing metadata from a broad range of global sources (Céspedes et al., 2025; Gallifant et al., 2023; Jiao et al., 2023).

These databases were selected based on their continuous updates, multidisciplinary scope, and geographical breadth. Studies have demonstrated that platforms like OpenAlex even outperform traditional databases (e.g., Scopus, WoS) in terms of article coverage and global representation, making them particularly suitable for SLRs (Maddi et al., 2025; Torres, 2024). The integration of these sources through PoP strengthens the comprehensiveness and robustness of the literature retrieval process, thereby enhancing the overall quality of the review (Bhattarai et al., 2023; Page et al., 2021).

Inclusion Criteria

To ensure the relevance and quality of the studies included in this review, a set of inclusion criteria was established. These criteria helped filter the initial pool of

literature for suitability based on publication period, content, source quality, and geographical context, as summarized in Table 1.

Table 1. Inclusion Criteria for Selected Articles

Criterion No.	Description
1	Articles published between 2014 and 2024
2	Keywords include *ethno-STEM education*, *Project-Based Learning (PjBL)*, and *ethnoscience*
3	Literature sourced from reputable journals indexed in SINTA or Scopus, and conference proceedings
4	Research conducted within the Indonesian context

Screening and Selection Process

The article search using the Publish or Perish (PoP) application yielded 39 articles from the Google Scholar database, 1,000 from Crossref, and 8 from OpenAlex, resulting in a total of 1,047 articles. A total of 1,018 articles were excluded due to irrelevance to the title and keywords, leaving 39 articles. These articles were then further filtered to remove duplicates and those without full-text access, resulting in 25 articles. These selected articles were subsequently analyzed and synthesized according to the research objectives.

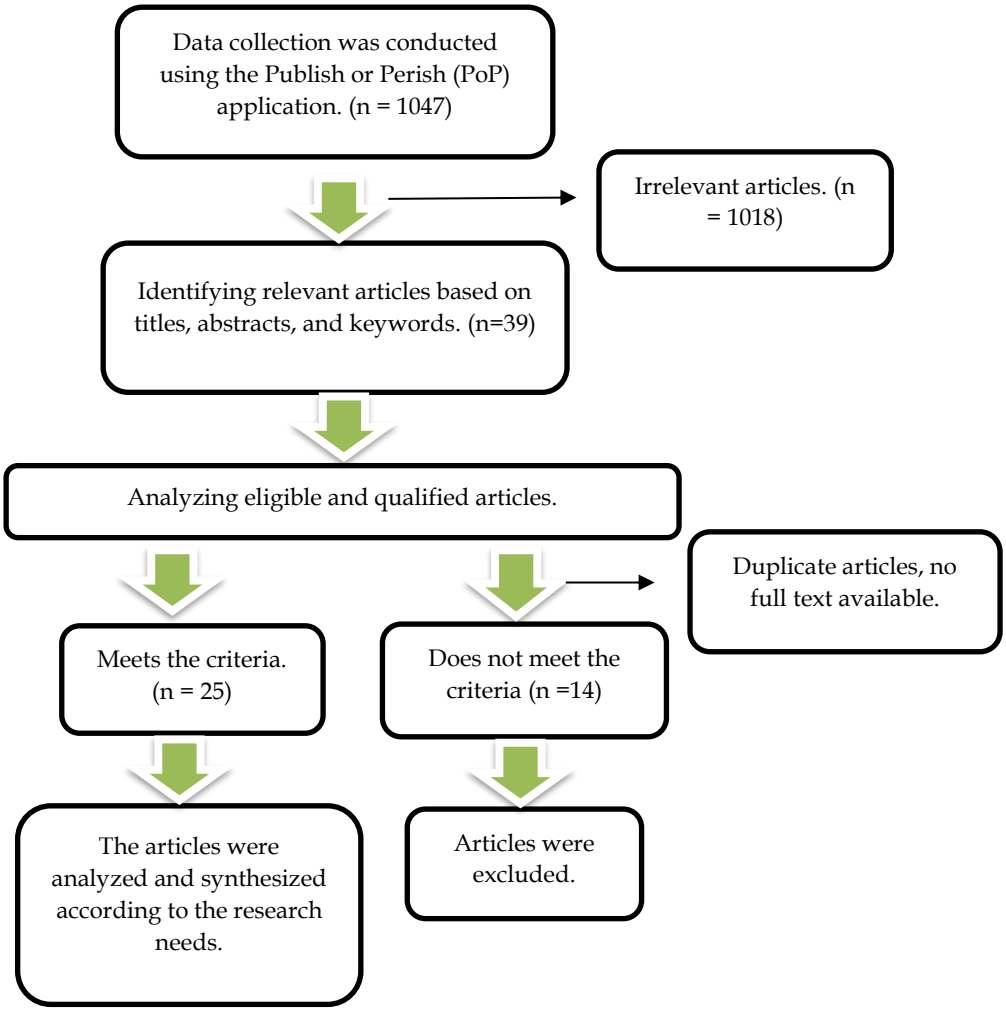

Figure 1. The research flowchart

RESULTS AND DISCUSSION

Overview of Article Selection and Descriptive Summary

The next step in this literature review is to map the selected articles. A total of 25 articles were analyzed, all of which were related to the implementation of Project-Based Learning (PjBL) integrated with Ethno-STEM (PjBL Ethno-STEM) in Indonesia. After confirming that each study met the inclusion criteria, a summary was created for each article covering several aspects, namely the type of research, research location, year of study, the local wisdom topics addressed by the authors, independent variables, and dependent variables. The data are presented in Table 2, which contains a percentage analysis of the number of articles for each aspect.

Table 2. Descriptive information related to the reviewed articles

Aspects	Article code	N	%
Research Type			
Quantitative	5,11,15,16,21,24,28,22	8	32
Qualitative	3,19,23,25,26,27	6	24
Mix methods	1,12	2	8
R & D	2,4,8,9,10,13,14,18,20	9	36
Research Location			
Sumatera	1,8,14,20	4	16
Java	2,3,4,5,9,10,12,13,16,18,19,21,22 ,23,24,25,26,27,28	19	76
Sulawesi	11	1	4
Nusa Tenggara	15	1	4
Year of Publication			
2024	1,2,3,4,5,8	6	24
2023	9,10,11,12,13,14,15,16,18	9	36
2022	19,20,21	3	12
2021	22,23	2	8
2020	24	1	4
2019	25,26,27,28	4	16
Local Wisdom Topics			
Foods		**6**	**24**
Pindang Bangkong	19		
Red Ganjel Bread	5		
Nagasari, muloh, Simplah Oil	14		
Tofu and cincau	24		
Tofu, meatball, jenang, dumpling	10		
Bakpia	9		
Beverages		**2**	**8**
Herbal tea	23, 1		
Arts		**3**	**12**
Wayang	2		
Traditional musical instrument	20		
Gendang beleq	15		
Plants and Animals		**4**	**16**

Aspects	Article code	N	%
Parijoto and Bulus	21		
Water Hyacinth	12		
Black soybean	4		
Moringa seeds	27		
Technology		**7**	**28**
Brick fabrication	28		
Herbal soap	22		
Design of Gadang, katidiang, and kombuk	8		
Pendopo joglo design	18		
Batik Manufacturing	26, 13, 25		
Others		**3**	**12**
Tempe lake	11	**1**	
Unidentified	16, 17	2	
Dependent Variable			
PjBL-Ethnoscience	2,3,4,14,21	5	20
PjBL - Ethno STEM	5,9,10,11,13,16,19,20,22,23,24,25,26,27,28	15	60
PjBL - Ethno STEAM	8	1	4
IBPJLM-EthnoSTEM	1	1	4
PjBL - Ethnoecological STEAM	12	1	4
PjBL - STEM - Ethno mathematics	18	1	4
Hybrid ethno PjBL integrated VAT	15	1	4
Independent Variable			
Critical Thinking Skills		7	21
Critical thingking	2,14,15,18,22,24,28		
Creative Thinking Skills		4	15
Creative thingking	19,22,24		
Creativity	2		
Communication		1	3
Scientific communication skill	28		
Collaboration		3	9
Cooperative skill	2		
Gotong royong	5		
Collaboration skill	28		
Others		16	52
Science literacy	3,16		
Science process skill	4		
Numeracy literacy	8		
Interpersonal literacy	10		
HOT skill	11		
Physics misconception	11		
21 century skill	12		
Entrepreneurial character	13,25		
Science concept understanding	21,28		
Life skill	23		

Aspects	Article code	N	%
Problem solving	28		
Information technology skill	28		
Objective and environmentally caring attitudes	28		

Trends in Publication Year

Between 2014 and 2024, publications on the implementation of Project-Based Learning integrated with Ethno-STEM in Indonesia began in 2019. The number of published articles reflects the frequency of research conducted within a certain period. Based on Figure 2, articles on the implementation of PjBL Ethno-STEM in Indonesia first appeared in 2019. The number of publications declined the following year but gradually increased in subsequent years. The highest number of publications was reported in 2023. This upward trend indicates a growing interest among researchers in studying the implementation of PjBL integrated with Ethno-STEM.

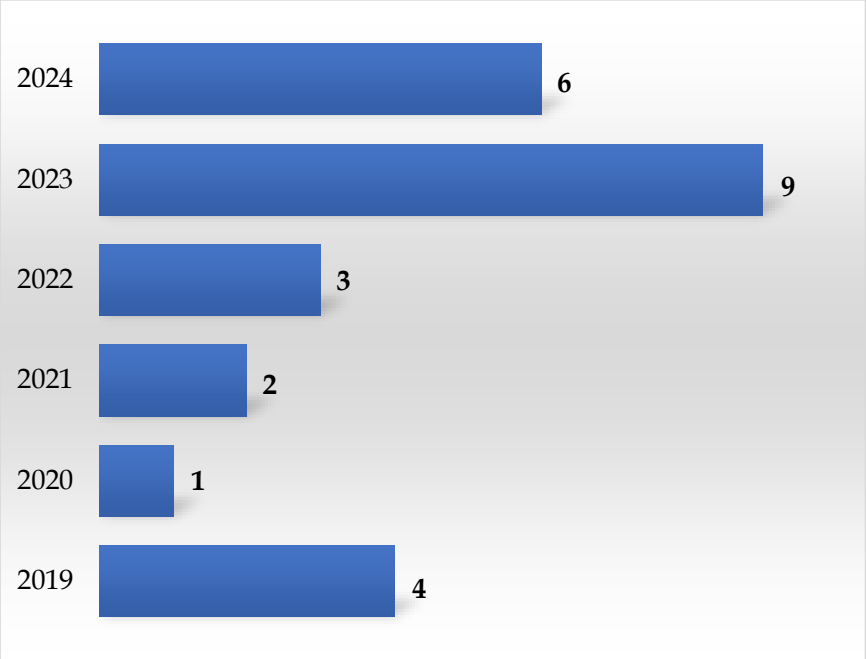

Figure 2. Number of PjBL Ethno-STEM Publications per Year

Research Types and Designs

The type and design of research play a crucial role in determining the direction of a study. Research on PjBL Ethno-STEM is still dominated by quantitative designs, accounting for 32%, followed by Research and Development (R&D) studies at 36%, qualitative research at 24%, and mixed methods research at 8%. The qualitative approach is still considered relatively new in the field of educational research. Nonetheless, the trend toward using qualitative designs has been increasing and is increasingly applied in social research, including education (Susetyarini & Fauzi, 2020). This condition is closely related to the strengths of the qualitative approach in providing an in-depth and comprehensive description of phenomena. Therefore, the limited number of qualitative studies presents an opportunity for researchers to utilize this approach to further explore the implementation of Project-Based Learning integrated with Ethno-STEM.

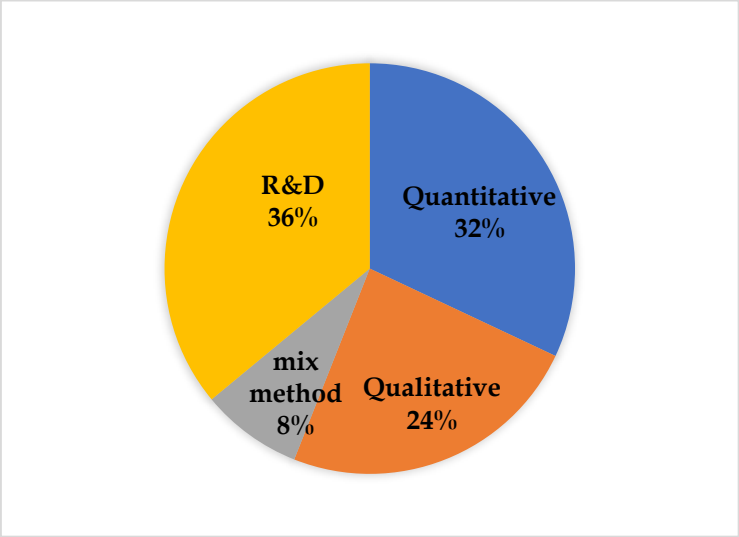

Figure 3. Trends in Research Design and Types in the Implementation of PjBL Ethno-STEM in Indonesia

Geographic Distribution of Research

Publications on the implementation of PjBL Ethno-STEM in Indonesia are dominated by research from Java Island, accounting for 76%, followed by Sumatera 16%, Sulawesi 4%, and Nusa Tenggara 4%. Java Island demonstrates a strong dominance in research related to Ethno-STEM Project-Based Learning (PjBL). Its rich socio-cultural diversity has inspired educators to design instructional approaches that integrate scientific concepts with local knowledge, thereby creating more contextualized and meaningful learning experiences (Nurhasnah et al., 2022). Researchers from various universities and research institutions across Java have also been actively involved in developing Ethno-STEM-integrated projects, resulting in a substantial body of scholarly literature that enriches the field (Gumilar et al., 2022). This dominance is likely supported by the numerous educational and research institutions on the island, which foster the emergence of active scholars who make significant contributions to the advancement of education in Indonesia.

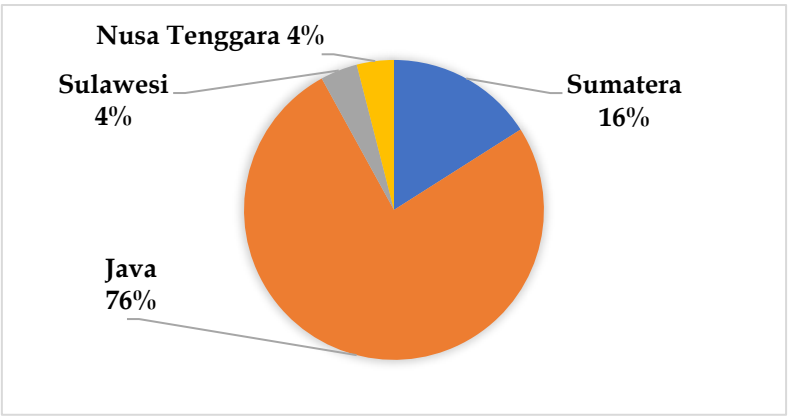

Figure 4. Distribution of Research Locations on the Implementation of PjBL Ethno-STEM in Indonesia

Based on Figure 4, there are no reported research publications from the regions of Kalimantan and Papua. This presents an opportunity to further explore the implementation of PjBL Ethno-STEM related to the local wisdom of these areas.

Indonesia is a country rich in ethnic diversity, with unique cultures, customs, languages, and traditions. This diversity is also reflected in various traditional arts, such as dances, music, and traditional clothing. Such uniqueness offers the potential for novel research developments in the field of Ethno-STEM.

Local Wisdom Topics Integrated in Ethno-STEM

Local wisdom topics that have been addressed in Ethno-STEM based learning are grouped into several categories, namely local food, local beverages, regional arts, traditional technology, local animals and plants, and other topics that do not fall into these five categories. Local food topics include Pindang Bangkong from the Cirebon area (Rinto et al., 2022); red ganjel bread from Semarang (Nur & Susilaningsih, 2024); nagasari, muloh, and simplah oil from Bireun, Aceh (Hanum* et al., 2023); tofu and cincau (Sumarni & Kadarwati, 2020); tofu, meatballs, cassava and banana chips, jenang, and dumplings (Setiawan et al., 2023); as well as Bakpia (Maryanti et al., 2023). In the local beverages category, there is Herbal Tea (Sudarmin, Harjono, Rahayu, & ..., 2024). Regional arts include wayang(Fitriana et al., 2024); traditional musical instruments (Yulkifli et al., 2022); and the gendang beleq from West Nusa Tenggara (Wahyudi et al., 2023). The local plants and animals category includes parijoto plants and Bulus turtles (Ardianti & Raida, 2022); water hyacinth (Rohman et al., 2021); black soybean (Anggrella & Sudrajat, 2024); and moringa seeds (Sudarmin, Kurniawan, et al., 2019). Traditional technology includes conventional brick fabrication (Harto, 2019); herbal soap manufacturing (Ariyatun, 2021); designs of Gadang, Katidiang, and Kombuk houses (Haryanto et al., 2024); Pendopo Joglo Sinom Blora design (Aini et al., 2023); batik manufacturing (Sudarmin et al., 2023; Sudarmin, Woro Sumarni, et al., 2019; Sumarni et al., 2023) well as local wisdom related to specific places such as Lake Tempe in South Sulawesi (Martawijaya, Swandi, et al., 2023).

Local wisdom is part of the traditions or customs of a community that are rooted in the culture of a nation and manifested in various aspects of life. As an archipelagic country, Indonesia possesses a wealth of traditions that can be utilized as a unifying force rather than a potential source of conflict. Traditions or local wisdom can serve as distinctive characteristics of a region and need to be preserved and passed on to future generations. The introduction of these traditions and cultures can be carried out through education. Culture, traditions, and community customs can be integrated into the learning process, instructional materials, and learning media (Idrus, 2022).

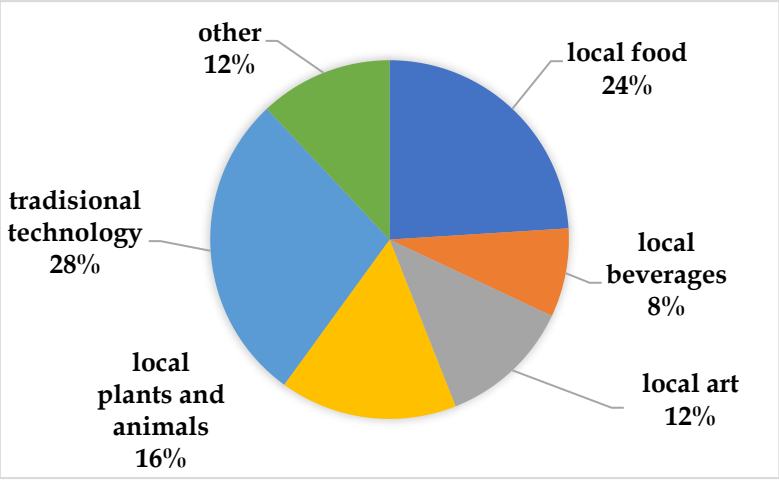

Figure 5. Local wisdom topics

Integration with Other Models and Approaches

Project-Based Learning can be integrated or combined with various approaches, models, and strategies. The distribution of research on Ethno-STEM PjBL integrated with other models, approaches, and strategies is presented in Figure 6.

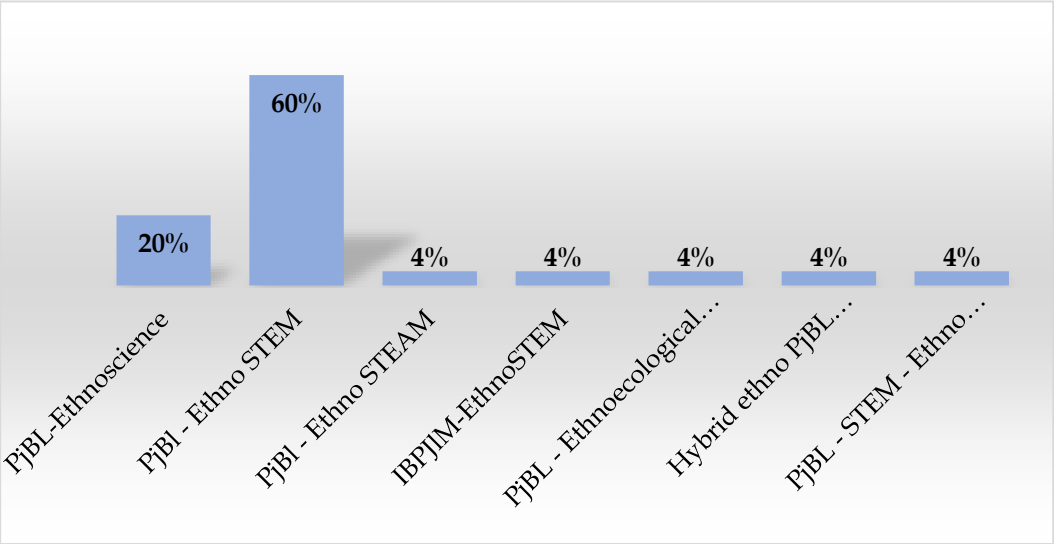

Figure 6. Distribution of PjBL Ethno-STEM Research Integrated with Other Models, Approaches, and Strategies

Based on the findings of this review, 60% of publications employed Project-Based Learning integrated with Ethno-STEM, and 20% integrated it with ethnoscience. This makes it the most widely used combination in research. This indicates that elements of ethnoscience and local culture are not merely used as supplementary components, but rather as the foundational basis for the learning process, aiming to create more relevant, authentic, and meaningful learning experiences for students. The dominance of this combination reflects educators' and researchers' strong commitment to embedding local culture into science education. This trend aligns with national curriculum policies that emphasize contextual learning and the cultivation of character in accordance with the *Profil Pelajar Pancasila* (Profile of Pancasila Students). Moreover, this finding suggests an effort to reform the traditional STEM learning model, often generalized and detached from cultural values, toward one that is more inclusive and reflective of Indonesia's rich cultural diversity.

Beyond Ethno-STEM, there are other integrative approaches, such as PjBL combined with ethnomathematics, which enables students to understand mathematical concepts based on local cultural patterns (Aini et al., 2023). Ethno-STEAM, which incorporates the element of art, is exemplified in the study by Haryanto et al, focusing on numeracy literacy (Haryanto et al., 2024). Ethnoecological-STEAM, as presented by Rohman et al, highlights local ecological values along with 21st-century competencies (Rohman et al., 2023). These integrations reflect a multidisciplinary and transdisciplinary approach, where science is not taught in isolation, but is closely connected with art, culture, and ecology. The STEAM-based approach is more conducive to fostering creativity and aesthetic thinking (Haryanto et al., 2024), while ethnoecological-STEAM tends to nurture students' environmental awareness and social responsibility (Rohman, 2021).

In addition to integrations with ethnomathematics, ethno-STEAM, and ethnoecological-STEAM, Project-Based Learning has also been combined with other innovative models, including Ethno-STEM IBPjLM and Hybrid Ethno-PjBL with Virtual Assistive Technology. The Ethno-STEM IBPjLM model merges inquiry-based learning within the framework of Ethno-STEM and PjBL, emphasizing scientific investigation grounded in local wisdom, such as the exploration of herbal tea aromas. This model strengthens the inquiry dimension, which is essential for developing scientific attitudes and problem-solving abilities (Sudarmin, Harjono, Rahayu, Widiarti, et al., 2024). Meanwhile, the Hybrid Ethno-PjBL with Virtual Assistive Technology targets the enhancement of critical thinking among physics students through virtual technology support. The integration of virtual technology opens new avenues for hybrid and multimodal learning, which is highly relevant in the post-pandemic era (Wahyudi et al., 2023). In Indonesia, Ethno-STEM PjBL has evolved dynamically through various forms of integration that enrich both the pedagogical and cultural domains. However, to reinforce its theoretical and practical contributions, a deeper thematic synthesis and more systematic evaluation of the impact across models are needed. Thus, the development of Ethno-STEM PjBL should not only be innovative in concept but also measurable and impactful in educational practice.

Focus of Dependent Variables

Based on a review of relevant publications, the implementation of Project-Based Learning (PjBL) integrated with Ethno-STEM has been predominantly employed to enhance 21st-century skills, particularly critical thinking (21%), creative thinking (15%), collaboration (9%), and communication (3%). It is shown in Figure 7. This distribution indicates a significant emphasis on the development of higher-order cognitive skills, especially critical and creative thinking, as a response to the demands of learning in a globalized era. However, the relatively low focus on collaboration and communication suggests an imbalance in implementation strategies, despite the fact that these interpersonal skills are essential for scientific collaboration, teamwork, and workplace readiness. This points to the need for a strategic shift toward a more balanced emphasis on both cognitive and socio-emotional competencies.

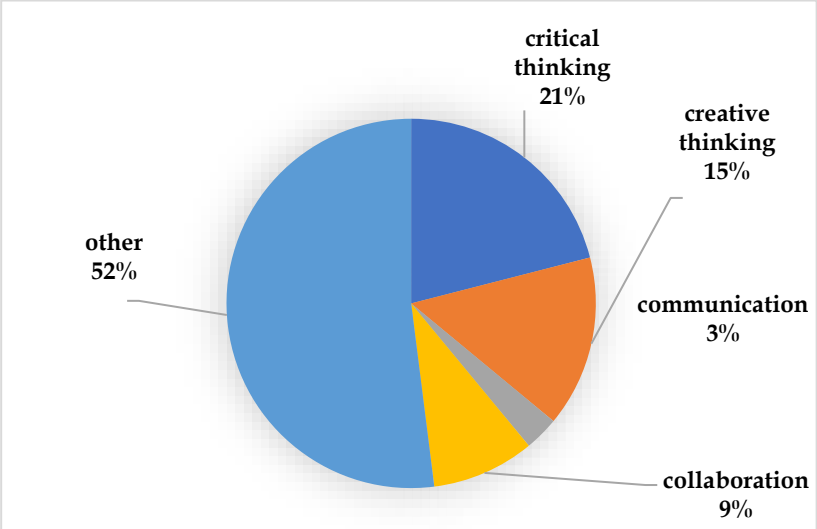

Figure 7. Dependent Variables in PjBL Ethno-STEM Research

Broader Educational Implications

Beyond 21st-century skills, the integration of PjBL and Ethno-STEM has also been directed at strengthening various indicators of scientific literacy and competencies. These include scientific literacy (Hidayah et al., 2024; Sumarni et al., 2023), numerical literacy (Haryanto et al., 2024), scientific process skills (Anggrella & Sudrajat, 2024), conceptual understanding, higher order thinking skill, misconception resolution (Ardianti & Raida, 2022; Martawijaya, Rahmadhanningsih, et al., 2023), as well as problem-solving, information technology skills, objectivity, and environmental awareness (Harto et al., 2019). The comprehensive scope of these learning outcomes suggests that this pedagogical approach not only targets the final project output but also emphasizes the cognitive and conceptual processes occurring throughout the learning experience. Furthermore, the identification of interpersonal literacy and entrepreneurial character as dependent variables indicates that PjBL-Ethno-STEM holds strong cross-disciplinary potential, effectively bridging scientific, social, and economic domains (Setiawan et al., 2023; Sudarmin et al., 2023; Sudarmin, Sumarni, Rr Sri Endang, et al., 2019). This cross-cutting integration adds value in shaping well-rounded and globally competitive learners.

Overall, the PjBL Ethno-STEM approach has proven effective in developing learners who are not only academically proficient but also creative, culturally aware, and capable of addressing real-world challenges. Practically, these findings advocate for a curriculum that is more adaptive to both local contexts and global challenges, while encouraging educators to design project-based learning experiences that balance hard skills (science and technology) with soft skills (collaboration, communication, and empathy). Nonetheless, future efforts should include longitudinal and systematic evaluations of the interrelations among dependent variables to ensure sustainable impact. Furthermore, incorporating broader socio-cultural dimensions, such as civic literacy and environmental sustainability, may serve as critical extensions in future research and model development. This strategy must be expanded and rigorously assessed to realize its full pedagogical potential.

CONCLUSION

This systematic review reveals key patterns and gaps in the implementation of Project-Based Learning integrated with Ethno-STEM in Indonesia. It has gained increasing scholarly attention, particularly from 2019 onwards. The model has shown strong potential in fostering 21st-century skills, especially critical and creative thinking, through culturally contextualized and inquiry-driven instructional strategies. While these cognitive skills dominate the research focus, social competencies such as collaboration and communication remain underexplored, indicating the need for more balanced pedagogical designs. The PjBL-Ethno-STEM framework has been extensively applied to enhance not only cognitive and metacognitive skills but also scientific literacy, numeracy, scientific process skills, and values such as environmental responsibility and entrepreneurship. Its cross-disciplinary nature, linking science, technology, culture, and local wisdom, has enabled meaningful learning experiences grounded in students' cultural contexts.

Despite its growing implementation, the research is predominantly centered in Java, with a noticeable absence in regions such as Kalimantan and Papua. This geographical disparity highlights the need for more inclusive research efforts that

encompass Indonesia's vast cultural diversity. Future research should also prioritize deeper thematic synthesis and long-term impact evaluations, as well as explore integration with other models and digital technologies to sustain and scale its transformative potential in diverse educational landscapes.

RECOMMENDATIONS

For future research, the qualitative studies should be increased to explore the implementation of PjBL Ethno-STEM in more detailed and in-depth ways. Local wisdom topics in various regions of Indonesia, especially in Kalimantan and Papua, need to be examined more thoroughly. To date, there have been no publications integrating local wisdom from these areas with the PjBL learning model. The PjBL-Ethno STEM can be further developed by combining it with other models, approaches, methods, or learning strategies. This opens up the possibility for the emergence of new, more effective learning models that enhance 21st-century skills while also promoting the unique local wisdom of each region.

Author Contributions

Each author has read and approved the published version of the manuscript, has contributed sufficiently to the study, and agrees with the findings and conclusions.

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Conflict of interests

The author declares that there are no conflicts of interest in this study.

Ethical Statement

Not applicable.

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