



Ethnoscience-Integrated Project-Based Learning Model for Enhancing Elementary School Students' Creativity

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ABSTRACT

This study examines the enhancement of creativity among first-grade elementary students through the implementation of ethnoscience-integrated Project-Based Learning. The research applied a classroom action research design that emphasized both the learning process and students' creative products, supported by a numerical comparison of pretest and posttest results. Data were gathered through observations, student work, and reflective responses produced during four ethnoscience-based projects utilizing local cultural practices and accessible natural materials. The results show that these projects effectively developed students' creativity across four dimensions: idea fluency, flexibility in expressing cultural concepts through varied approaches, originality grounded in personal and cultural experiences, and elaboration shown in more detailed and meaningful products. Quantitatively, the mean creativity score increased from 65.2 to 83.5, indicating a significant improvement. These findings suggest that integrating local cultural knowledge with everyday scientific experiences creates developmentally appropriate learning conditions while offering meaningful cognitive challenges. This approach connects abstract learning goals with familiar cultural contexts, enhancing relevance and motivation. Overall, ethnoscience-integrated Project-Based Learning represents an effective and innovative strategy for fostering creative thinking in early elementary education and supports the advancement of culturally responsive teaching practices.

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1. INTRODUCTION

Ethnoscience-integrated Project-Based Learning (PjBL) is increasingly recognized as a relevant instructional approach for elementary education because it connects scientific learning with students' local cultural environments and has been shown to enhance creative thinking, conceptual understanding, literacy, collaboration, and critical thinking skills in primary education (Aisah et al., n.d.; Dewi et al., 2024; Nurohmah & Laila, 2025; Prameisthi et al., 2025). For early-grade elementary students, learning is most effective when concepts are presented through concrete, contextual, and experience-based activities that align with their cognitive development stages. Ethnoscience positions local culture, traditions, and natural resources as legitimate sources of scientific knowledge, making learning more meaningful and accessible to young learners (Hidayati & Julianto, 2025). In this context, creativity becomes a central learning outcome, as students are encouraged to generate ideas, explore materials, and express understanding through culturally grounded projects (Mustikaati et al., 2025; Nursaya'bani et al., 2025).

Previous studies have demonstrated that Project-Based Learning effectively enhances students' creativity, motivation, and learning outcomes by actively engaging learners in designing and producing learning artifacts (Chang et al., 2022; Chen et al., 2022). Research at the elementary level shows that PjBL improves science process skills, collaboration, responsibility, and conceptual understanding (Hendrawati et al., 2025; Pangestu et al., 2024). Moreover, creativity development through PjBL is reflected in students' fluency, flexibility, originality, and elaboration during project work. However, most PjBL implementations reported in the literature focus on general scientific themes and are not explicitly connected to students' local cultural contexts.

Recent research highlights the potential of ethnoscience integration to strengthen learning relevance and improve higher-order thinking skills, literacy, collaboration, and creativity (Emdan, 2023; Sari et al., 2025). Ethnoscience-integrated PjBL enables students to learn science through familiar cultural practices and locally available materials, thereby increasing engagement and conceptual understanding (Maulidiyah, 2025; Rayis et al., 2025). Nevertheless, empirical studies examining this approach are predominantly conducted in upper elementary grades or through digital learning media (Septi & Masjid, 2025). Consequently, evidence regarding its implementation and impact on early-grade elementary students remains limited.

Based on these issues, the main weakness in existing studies lies in the lack of empirical research focusing on first-grade elementary students and the systematic examination of creativity indicators within ethnoscience-integrated PjBL. Although creativity is frequently cited as a learning outcome, few studies explicitly analyze how fluency, flexibility, originality, and elaboration emerge in students' learning products at the early elementary level (Rizal, 2025). Therefore, this study aims to examine the implementation of ethnoscience-integrated PjBL and its effectiveness in enhancing the creativity of first-grade students at SDN 1 Somagede. This research seeks to address the identified gap by providing empirical evidence on culturally grounded, developmentally appropriate instructional practices that support creativity development in early elementary education.

2. METHODS

This study employed classroom action research with a descriptive qualitative approach to examine improvements in students' creativity through the implementation of ethnoscience-

integrated Project-Based Learning. The research design focused on iterative instructional cycles aimed at refining the learning process and enhancing creative outcomes through project-based activities grounded in local cultural and scientific contexts.

The research subjects were first-grade elementary school students who participated in a series of ethnoscience-based learning projects. The learning activities were conducted across several cycles, each involving systematic planning, classroom implementation of project-based learning, observation of student engagement and creative performance, and reflective evaluation to inform instructional improvements in subsequent cycles.

Data were collected throughout the learning process using classroom observations, documentation of students' project work, and reflective field notes. Observations were used to capture students' creative behaviors during project activities, while project documentation provided evidence of creative products generated by students. Reflective notes supported the interpretation of learning dynamics and instructional effectiveness during each cycle.

Data analysis was conducted qualitatively through data reduction, data display, and conclusion drawing. The analysis emphasized patterns of change in students' creativity based on indicators of fluency, flexibility, originality, and elaboration. These analytical procedures enabled a comprehensive understanding of how ethnoscience-integrated Project-Based Learning contributed to the development of creative thinking among early-grade elementary students.

3. RESULTS AND DISCUSSION

This classroom action research aimed to enhance the creativity of first-grade elementary school students through the implementation of Project-Based Learning (PjBL) integrated with ethnoscience. The results indicate a significant improvement in students' creativity scores following the application of ethnoscience-integrated PjBL. As shown in **Table 1**, students' creativity scores increased significantly after the implementation of ethnoscience-integrated PjBL.

Table 1. Comparison of students' creativity pretest and posttest scores

Indicator	Pretest	Posttest
Fluency	60.5	82.1
Flexibility	65.2	85.5
Originality	62.1	83.2
Elaboration	63.5	84.5
Average	65.2	85.5

The average creativity score improved by 20.3 points, rising from 65.2 in the pretest to 85.5 in the posttest. This improvement reflects the effectiveness of project-based activities that incorporate local cultural knowledge and everyday scientific experiences in fostering creative thinking skills among early-grade elementary students. Such activities not only enhance students' engagement and motivation in learning but also provide meaningful opportunities to connect academic concepts with their cultural and social environment.

Research has shown that project-based learning can improve scientific practices among young children in both urban and Indigenous contexts (Hsin & Wu, 2023). Strengthen conceptual understanding of cultural diversity, and foster 21st-century skills, including critical thinking, creativity, collaboration, and problem-solving (Pratiwi & Setiawan, 2025).

Furthermore, integrating local wisdom and culturally responsive teaching in elementary lessons has been found to increase students' appreciation for cultural heritage while improving their cognitive and social skills and even culinary-based ethnosience projects can significantly enhance critical reasoning abilities in students (Nurbayanti et al., 2025; Raihan et al., 2025).

Ethnosience-integrated Project-Based Learning (PjBL) emphasizes learning experiences that connect academic content with students' cultural and environmental contexts. For early-grade elementary students, such an approach is particularly relevant because learning occurs most effectively through concrete, meaningful, and experience-based activities. By integrating local culture and natural materials into project-based learning, students are not only introduced to cultural knowledge but also actively engaged in constructing understanding through exploration, collaboration, and creation. This section discusses how ethnosience-integrated PjBL was implemented in first-grade elementary school learning activities, focusing on the design of learning projects, classroom interactions, and the role of culture as a learning resource.

3.1 Implementation of Ethnosience-Integrated Project-Based Learning

The implementation of ethnosience-integrated Project-Based Learning (PjBL) in elementary schools, using local cultural practices, natural materials, and traditional crafts, effectively fostered students' creative thinking and engagement. Similarly, STEM-based PjBL and PjBL integrated with Culturally Responsive Teaching (CRT) significantly improved critical thinking, problem-solving, and learning outcomes across subjects, with N-gain scores ranging from moderate to high and mastery levels reaching over 90% (Firdausy et al., 2024; Hannah et al., 2024). These studies confirm that culturally and scientifically contextualized project-based activities enhance meaningful learning, higher-order thinking, and student achievement.

The first project, Local Culture Poster: Tari Ebeg of Kebumen, introduced first-grade elementary students to regional cultural heritage through visual representation. Students created simple posters illustrating elements of the Tari Ebeg performance, such as dancers' costumes, kuda lumping, masks, and gamelan music. This activity encouraged them to observe cultural symbols, express ideas visually, and develop fine motor skills. Engaging with familiar cultural elements fostered enthusiasm, pride in their local culture, and active participation in learning. The project demonstrated that contextual, hands-on activities can enhance student engagement and meaningful learning experiences.

These findings are supported by previous studies showing the effectiveness of project-based learning integrated with cultural and ethnosience elements. PjBL using local crafts and batik motifs strengthens creativity and innovation (Sutianah & Sobandi, 2025). Reported that combining Culturally Responsive Teaching with PjBL develops 21st-century skills, including creativity, communication, collaboration, and critical thinking (Maharotunnisa et al., 2025). Ethnosience-based PjBL improves students' conceptual understanding and links science learning to local culture, highlighting the importance of incorporating cultural knowledge into formal education (Liswijaya et al., 2025).

The second project, Mini Experimental Project Using Local Natural Materials, integrated basic scientific concepts into culturally relevant learning. In this project, students conducted simple experiments using natural dyes derived from teak leaves, butterfly pea flowers, and turmeric. Through hands-on exploration, they observed phenomena such as color changes and capillary action, which allowed them to experience scientific concepts in a concrete and accessible manner. This approach supported inquiry-based learning, encouraging students to

investigate cause-and-effect relationships and apply scientific thinking using materials available in their local environment.

These findings align with previous research highlighting the benefits of culturally and locally grounded learning. Integrating local wisdom and natural resources into teaching enhances students' scientific attitudes, critical thinking, and engagement (Ramadani, 2025; Sudirman et al., 2025). By connecting science learning with familiar cultural and environmental contexts, educators can foster deeper understanding, creativity, and a sense of pride in local heritage, while simultaneously promoting practical, hands-on skills.

The third project, Illustrated Short Stories Based on Cultural Experiences, focused on early literacy and creative expression. Students created illustrated stories describing their experiences watching Tari Ebeg performances and the moral values conveyed. This activity enabled students to combine visual and verbal expression, reflect on cultural experiences, and communicate ideas in simple narrative forms. The integration of ethnoscience supported students' understanding of culture as part of everyday learning experiences. Similarly, Project-Based Learning has been shown to improve children's storytelling skills, enhance literacy, and foster creativity and collaboration in culturally relevant contexts (Nurfita, 2023; Riski & Huda, 2025). Students engaged in creating ethnostories-based comics and illustrated narratives demonstrate improved reading and writing skills while connecting learning to their cultural heritage.

The fourth project, Collage Using Bamboo Weaving Materials, introduced students to traditional craftsmanship through creative production. Students used small pieces of bamboo weaving to create collages representing local cultural and environmental objects. This project fostered visual creativity while familiarizing students with traditional materials in a safe and engaging way. These activities align with previous research indicating that Project-Based Learning (PjBL) in SBdP, such as Tie-Dye handicraft projects, leaf-based crafts, ecoprinting, or bamboo weaving, effectively enhances student creativity and engagement in traditional arts and crafts (Fahrurrozi et al., 2022; Ilmitriayuni et al., 2025; Usman et al., 2023). Overall, these projects illustrate that ethnoscience-integrated PjBL was implemented through student-centered, hands-on activities that connected cultural knowledge with learning processes, making learning meaningful and appropriate for first-grade elementary students.

3.2 Students' Learning Outcomes in Relation to Fluency and Flexibility

Research has shown that Project-Based Learning (PjBL) can significantly enhance students' fluency and flexibility in thinking (Kastur et al., 2025; Yunita et al., 2024). Students' learning outcomes related to fluency and flexibility were observed across the four ethnoscience-integrated PjBL activities. These outcomes were reflected in students' ability to generate ideas, express thoughts, and adapt strategies while engaging in culturally contextual learning experiences. The use of local culture and natural materials created a familiar and meaningful learning environment that encouraged active participation and experimentation.

In the Local Culture Poster: Tari Ebeg of Kebumen activity, fluency was evident as students generated multiple visual ideas related to dancers, costumes, musical instruments, and performance settings. Students were able to express ideas smoothly during discussions and poster design activities. Flexibility emerged when students used various colors, drawing techniques, and layout arrangements to represent cultural elements. Some students modified their initial ideas after observing peers' work, indicating adaptive thinking during the learning process.

The Mini Experimental Project Using Local Natural Materials strongly supported the development of flexibility. Students experimented with different natural dyes, adjusted

techniques when colors did not appear as expected, and explored multiple ways to apply materials. Fluency was observed as students verbally expressed predictions, observations, and simple explanations during the experiment. These activities encouraged students to respond spontaneously to changes and explore alternative approaches.

In the Illustrated Short Stories Based on Cultural Experiences project, fluency was reflected in students' ability to narrate experiences related to cultural performances and moral values. Students expressed ideas verbally and visually with increasing ease. Flexibility appeared in the diversity of story structures, illustrations, and narrative sequences chosen by students, showing their ability to adapt storytelling approaches according to personal experiences.

The Collage Using Bamboo Weaving Materials activity further demonstrated students' fluency and flexibility. Students proposed multiple design ideas and experimented with arranging bamboo pieces in different ways. When faced with material limitations, students adapted their plans and modified designs accordingly. These behaviors indicated an improvement in generating ideas and adjusting strategies during creative tasks.

The analysis shows that ethnoscience-integrated project-based learning supported students' learning outcomes related to fluency and flexibility by providing open-ended, culturally meaningful tasks. The learning environment encouraged students to express ideas freely and adapt approaches throughout the project process, demonstrating the development of creative thinking skills appropriate for first-grade elementary students.

3.3 Students' Learning Outcomes in Relation to Originality and Elaboration

Students' learning outcomes related to originality and elaboration were observed across the four ethnoscience-integrated project-based learning activities. These outcomes were reflected in students' ability to generate unique ideas, creatively combine elements, and develop detailed work while engaging in culturally contextual learning experiences. The integration of local culture, natural materials, and traditional craftsmanship created opportunities for students to explore, innovate, and elaborate on their creative outputs (Pertiwi et al., 2024).

In the Local Culture Poster: Tari Ebeg of Kebumen activity, originality was evident as students created unique visual interpretations of dancers, costumes, gamelan instruments, and performance settings. Each poster reflected personal ideas and creative choices, while elaboration appeared in the details included, such as intricate mask designs, decorative patterns on costumes, and placement of symbolic cultural elements. Students compared and refined their work, demonstrating thoughtful expansion of initial ideas.

The Mini Experimental Project Using Local Natural Materials supported originality through experimentation with natural dyes from teak leaves, butterfly pea flowers, and turmeric. Students developed distinct approaches in applying dyes, observing color changes, and arranging materials. Elaboration was shown in their documentation of experimental steps, predictions, and observations, as well as in explaining cause-and-effect relationships observed during the experiments. Students actively extended simple scientific concepts into meaningful, tangible outcomes.

In the Illustrated Short Stories Based on Cultural Experiences project, originality appeared in the diversity of story ideas and ways of illustrating experiences related to Tari Ebeg performances. Each student expressed personal interpretations of moral values and cultural lessons. Elaboration was evident in the integration of narrative details, visual storytelling elements, sequencing of events, and connections between illustrations and text, highlighting students' ability to expand on ideas and create richer narratives.

The Collage Using Bamboo Weaving Materials activity further demonstrated originality in students' proposals for collage designs representing local cultural and environmental objects. Students experimented with various arrangements and combinations of bamboo pieces. Elaboration was observed in the intricate layering, attention to textures, and detailed representation of cultural symbols within their collages. Students adapted their designs in response to material constraints, showing ongoing refinement and extension of ideas.

The analysis shows that ethnoscience-integrated project-based learning supported students' learning outcomes related to originality and elaboration by providing open-ended, culturally meaningful tasks. The learning environment encouraged students to generate unique ideas, develop them in detail, and refine creative outputs throughout the project process, demonstrating the development of creative thinking skills appropriate for first-grade elementary students.

The improvement in students' creativity after the implementation of ethnoscience-integrated Project-Based Learning (PjBL) can be attributed to several factors. First, ethnoscience-integrated PjBL enhances students' motivation and interest in learning, as students engage in direct and contextual learning experiences. Second, this approach improves students' ability to generate ideas, as they are encouraged to experiment and explore various ways of solving problems. Third, ethnoscience-integrated PjBL strengthens students' critical and analytical thinking skills, as students are guided to analyze and evaluate the outcomes of their own work.

Therefore, it can be concluded that the implementation of ethnoscience-integrated PjBL effectively enhances the creativity of first-grade elementary school students. The findings of this study may serve as a reference for teachers in improving the quality of instruction and fostering students' creative abilities.

4. CONCLUSION

This classroom action research demonstrates that the implementation of ethnoscience-integrated Project-Based Learning (PjBL) effectively enhances the creativity of first-grade elementary school students, as evidenced by a significant increase in average creativity scores from 65.2 to 85.5, with improvements in fluency, flexibility, originality, and elaboration in producing creative outcomes. By engaging students in direct and contextual learning experiences, this approach not only fosters motivation and interest in learning but also develops creative and analytical thinking skills through idea generation and problem-solving in meaningful project activities. Therefore, ethnoscience-integrated PjBL represents an innovative instructional strategy that contributes to the advancement of teaching practices in early elementary education, and the findings can serve as a practical reference for teachers aiming to enhance instructional quality and promote creative learning among young students.

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