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Ecobrick as a Sustainable Lifestyle Implementation in Shaping Students' Creativity and Environmental Care

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ABSTRACT
The low levels of creativity and environmental care among elementary school students are the main issues addressed in this study. Implementing a sustainable lifestyle through the Pancasila Student Profile Strengthening Project (P5) is necessary to overcome these challenges. This research focuses on exploring Ecobrick activities within the P5 project as an effort to effectively and sustainably foster students' creativity and environmental awareness. The study employs a descriptive qualitative approach using instruments such as closed questionnaires, interviews, observations, and documentation to analyze the implementation of Ecobrick activities in enhancing the creativity and environmental care of elementary school students. Data collection, reduction, presentation, and conclusion drawing were used in the analysis process. The results of this research show that the implementation of the Pancasila Student Profile Strengthening Project (P5) with the theme of sustainable lifestyle through Ecobrick activities is effective in enhancing elementary school students' creativity. The findings indicate that Ecobrick activities successfully met all student creativity indicators, such as curiosity, questioning skills, generating creative ideas, and independent learning, while also increasing students' environmental awareness. This research contributes empirical evidence regarding the effectiveness of the P5 project themed on sustainable lifestyle through Ecobrick activities in fostering students' creativity and environmental care. It strengthens theoretical understanding of the benefits of project-based learning in developing student creativity and provides practical guidance for teachers and schools to implement similar activities as part of a curriculum integrated with Pancasila values.

INTRODUCTION

School environments often lack attention to cleanliness, evidenced by litter and no distinct bins for separating organic from inorganic waste (Herdiansyah et al., 2021; Pilapitiya & Ratnayake, 2024). It is essential to teach students early on about sorting and cleaning waste, particularly inorganic materials, before disposal. Plastic, widely used in various industries, has become a substantial waste problem in Indonesia, with waste accumulation steadily increasing (Hahladakis et al., 2020; Aqil et al., 2023; Kachef & Chadwick, 2023). Creatively repurposing plastic waste into crafts can transform it into an educational resource, promoting student involvement in recycling activities (Saavedra & Opfer, 2012; Mihai et al., 2022). This process not only fosters creativity but also instills a sense of environmental responsibility. Ecobrick, a method of packing cut plastic waste

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into bottles, offers a practical way to manage such waste, turning it into useful items like furniture and construction materials without the need for incineration (Abdullah, 2023; Durrans et al., 2022). This approach aligns with 21st-century skills development, emphasizing creativity, critical thinking, and problem-solving in education (Luhar et al., 2021; Suhendri, 2022).

Several researchers conducted studies on the use of Ecobrick as a learning method in class. Santi et al. (2023) investigated the impact of incorporating Ecobrick into a 3R (reduce, reuse, recycle) program on waste management knowledge among elementary students. Secondly, Azizah et al. (2023) discussed the implementation of the Ecobrick project in social sciences learning to enhance students' caring character towards the environment. Thirdly, Suhendri (2022) discussed the use of Ecobrick for waste management and creating eco-friendly structures like literacy parks. Next, Purwati et al. (2023) conducted a study about fostering environmental care and love through Ecobrick making. The previous studies, as stated above, lack information on the specific impact of using Ecobrick, especially in the 3R program on the waste management knowledge of students. They also do not explain or describe in detail about the implementation of Ecobrick in learning activities and lack of focus on evaluating the long-term sustainability and effectiveness of Ecobrick.

This study examines the implementation of Ecobrick in elementary schools implementing the Merdeka Curriculum, especially in the context of project-based learning designed to develop soft skills and character by the Pancasila Student Profile. This study is important because it helps understand how sustainable practices can be integrated into elementary education to enhance students' creativity and environmental awareness. The focus on Ecobrick allows this study to contribute to the environmental education literature by showing how simple actions in waste management can significantly impact environmental conservation. The results of this study are expected to stimulate more schools to adopt similar projects, strengthening the goals of the Merdeka Curriculum in fostering original works and actions that are beneficial to the environment. Thus, these findings offer guidelines for other schools that wish to increase student participation in environmental conservation activities from an early age while supporting the formation of character and 21st-century skills.

Based on the objectives and benefits described in this study, the hypothesis proposed is that implementing Ecobricks in a project-based curriculum in elementary schools that adopt the Merdeka Curriculum will increase creativity and environmental awareness among students. This study assumes that through creative activities such as making and using Ecobricks, students learn about the importance of sustainable waste management and develop critical and collaborative thinking skills needed for innovation. This hypothesis rests on the idea that education that combines theoretical aspects with real-world practices can effectively facilitate impactful and sustainable learning and strengthen students' commitment to environmental improvement. Thus, this study seeks to assess the direct impact of Ecobrick use on increasing students' ecological awareness and creativity, which are key elements in the Pancasila Student Profile.

RESEARCH METHOD

This qualitative study adopted a descriptive design to provide authentic insights into student teachers' experiences, as Marshall (2014) described. The descriptive design was explicitly chosen to explore and understand the phenomenon through the lived experiences of students involved in ecobrick-making. This approach allowed the researcher to collect in-depth data on how students responded to and interacted with the eco brick-making activity and the implications for their learning process and environmental awareness. Data analysis was conducted using theory-based qualitative content analysis, as outlined by Elo & Kyngäs (2008), which allowed the study to systematically identify, analyze, and report emerging patterns. The analysis process was guided by a straightforward research question, which helped to direct the focus of the analysis to ensure that the interpretation of the phenomenon was insightful and relevant to the research objectives (Sutton & Austin, 2015).

This study used a closed questionnaire and interviews as study instruments (Oben, 2021). The closed questionnaire aimed to collect data on students' perceptions and satisfaction during ecobrick-making activities. This questionnaire was designed with a dichotomous scale that only provided yes or no answer choices. In addition, this study also utilized an observation sheet to assess students' creativity using a 4-point Likert scale, where one means very invalid, two is less valid, three is valid, and 4 is very valid. This observation sheet contains twelve questions based on indicators of student creativity. The student creativity scale also includes questions to determine the achievement of creativity as an impact of ecobrick production. This allows this study to measure how practical eco-brick-making activities stimulate students' creativity quantitatively (Utibe, 2020).

This research took place at an elementary school in Gresik, with the researchers serving as the primary instrument in the study. Their direct involvement was crucial in understanding how Ecobrick activities were implemented as part of the Pancasila Student Profile Strengthening Project (P5). The study began with an initial observation phase to gain insight into classroom conditions and the integration of Ecobrick in daily activities. Following this, interviews were conducted with the classroom teacher and several students who actively participated in the observed learning process. These individuals served as key participants, providing valuable perspectives and experiences related to the project. In addition to observations and interviews, the researchers also collected documentation as supporting evidence to strengthen the research findings. This combination of data collection methods allowed for a comprehensive exploration of how Ecobrick contributed to promoting creativity and environmental care in the school context.

The collected data above were analyzed by using several stages: collecting, reducing, presenting, and concluding the data (Onwuegbuzie et al., 2009; Kotronoulas et al., 2023). Data were collected through interviews, observation, and documentation. The way the teacher implemented Ecobrick learning activities to increase students' creativity and environmental awareness was observed. For the reduction stage, the result of students' work was analyzed to get the development of students' creativity and environmental awareness. It was also required to analyze the interview results to acknowledge the challenges in doing the learning method. Next, all data were presented in the form of words rather than numbers. Last, concluding the data got in the field which were also supported by evidence

RESULTS AND DISCUSSION

Result

The Implementation of Ecobrick Project

In this Ecobrick project, the tools and materials to be prepared are plastic waste, well-food package waste, a 1.5-liter container bottle, small clothes, sticks to insert plastic waste pieces into the bottles, containers for washing, dishwasher soaps, glue for glass, duct-tape, and used cardboard-boxes. In implementing this Ecobrick project, students must go through several processes. See the table picture for the process.

Table 1. Collecting Plastic Waste

No	Picture	Description
1	 	The students collected plastic or food package waste. The picture above was taken before the cleaning service officer cleaned up the school area. There was a lot of garbage packaging trash scattered. After collecting plastics, the students cut them into two parts. It was aimed to make easier in the process of washing.
2	 	The third process is cleaning the plastics into the water. The students clean them together. They were cleaned by using soap. Next, drying plastic waste by using a small cloth. They used it to make the process of drying more maximal
3		The picture above showed that students cut plastics into small pieces.

	 	This process required several meetings. It was caused by the number pf plastics they found. The picture above shows that the students put the pieces of plastic into used bottles. They had to press them by using a stick until it was solid
4	 	Teachers and students collaboratively constructed furniture from Ecobricks by systematically arranging 16 Ecobricks into large square chairs, seven Ecobricks into hexagonal smaller chairs, and 20 Ecobricks into circular tables, securing them with glass glue, cardboard, and duct tape for stability. The Ecobrick project exhibition at school motivates students to actively participate, enhancing their creativity and engagement through displaying their environmentally-focused creations.

The Ecobrick project described here illustrates a commendable educational initiative that fosters environmental awareness and creativity among students. The project teaches them about recycling and sustainability by engaging students in the collection, cleaning, and processing of plastic waste into Ecobricks. It imbues a sense of responsibility towards the environment. However, the project could be further enhanced by incorporating a more comprehensive educational component that includes discussions on the impact of plastic waste on ecosystems, the importance of reducing plastic use and exploring alternative, sustainable materials. Additionally, while the exhibition of the Ecobrick furniture at Gresik Mall is a great way to showcase the students' hard work and creativity, extending this showcase to include interactive educational activities could help spread awareness to a broader audience. Such activities could involve visitors in making their mini-Ecobricks, thereby extending the educational impact of the project beyond the school and the immediate community.

The Students' Creativity

To find out the validity of the implementation of a sustainable lifestyle in shaping students' creativity, the researchers and teachers performed the assessment presented in Table 1 containing the evaluation of the suitability of students' activities to the indicators of creativity. The following table is the result of the questionnaire.

Table 2. Students' Creativity

No	Creativity Indicator	Statement	Average Score
1	Having great curiosity	Students are always curious about the project to be done	4
2	Frequently asking quality questions	The student always asks when the teacher explains about the project to be done	3
3	Giving lots of ideas and suggestions	Students gave the teacher an idea/proposal about the project to be made to look interesting.	3
4	Having the ability to express opinions spontaneously and without embarrassing	Students are not ashamed to express their opinions to teachers.	4
5	Having a sense of beauty	Students try to show interesting creations	3
6	Having an opinion of themselves and not easily influenced by others	Students always stick to their positions and are not easily influenced by their friends.	3
7	Having a high sense of humor	There's only student behavior that can melt the atmosphere while the project is going on	4
8	Having a strong imagination	Students can imagine what the teacher tells them.	3
9	Having the ability to convey thoughts and ideas that are different from others	Students are able to convey their thoughts even though they are different from others	3
10	Having the ability to work by themselves	Students are able to work on projects given by teachers, both individually and in groups.	4
11	Having the pleasure of trying new things	Students are always excited when they get a new project.	4
12	Having the ability to develop an idea	Students are able to develop their ideas so that they become more creative	3

Based on the table above and utilizing a Likert scale assessment (1 = very invalid, 2 = less valid, 3 = valid, and 4 = very valid), the findings indicate that the school has successfully achieved all creativity indicators. These outcomes demonstrate the school's effectiveness in fostering creativity through the structured implementation of sustainable lifestyle projects, explicitly using Ecobrick activities. The school successfully stimulated students' creativity through this approach, enhancing their curiosity, questioning skills, independent thinking, idea generation, and openness to exploring new activities. Consequently, the project significantly contributed to developing students' creative potential that was aligned with sustainable living principles.

Discussion

Ecobrick and Students' Creativity

The Ecobrick project evidently has a positive impact on fostering students' creativity. According to experts such as Miao et al. (2023) and Yadav et al. (2024), high scores across several creativity indicators reflect the effectiveness of such initiatives in enhancing students' creative capacities. Indicators that received a 'very valid' rating demonstrate a wide spectrum of cognitive and emotional traits essential for creative development. These include curiosity, a sense of humor, independence, a willingness to experiment, and the ability to generate ideas and ask insightful questions—skills highlighted as critical by Prime et al. (2023) and Vaisarova et al. (2024). These elements are crucial as they support students in thinking divergently and approaching challenges with innovative solutions.

However, a critical examination highlights concerns regarding the depth and practical application of creativity assessments. As emphasized by Long et al. (2022), the effectiveness of such assessments should be scrutinized beyond surface-level indicators. While high scores may suggest that the Ecobrick project promotes creativity, experts like Park et al. (2023) argue that it is equally important to consider the broader educational context. Questions arise, such as whether these creative traits are sustained beyond the duration of the project, and how such activities are integrated into other subjects or extracurricular programs to support the holistic development of students' creative capacities, as suggested by Mkude and Mubofu (2022). Furthermore, the impact of the project on creativity may not be evenly experienced by all students. Some students may benefit more than others, depending on their initial interest or their natural affinity for environmental issues. In line with this, Handoyo et al. (2024) and Setiani et al. (2025) advocate for complementing Likert scale assessments with more qualitative, narrative-based evaluations. Such approaches are considered more effective in capturing the nuanced and diverse ways in which students express creativity.

The use of Ecobricks as a creative medium in educational settings holds significant promise; however, it should be integrated into a broader, strategically designed curriculum that promotes sustained creative development and real-world application across diverse learning contexts. According to Onungwe et al. (2023) and Milad (2025), environmental projects like Ecobrick can effectively foster creativity when they are embedded within a well-structured pedagogical framework that encourages cross-disciplinary learning and innovation. Furthermore, these scholars emphasize the importance of longitudinal research to examine the lasting impact of such initiatives on students' attitudes toward sustainability and creativity. Exploring these long-term effects would offer deeper insights into the educational benefits of incorporating environmental projects like Ecobrick into school curricula—not just as isolated activities, but as integral components of character-building and creative skill development.

The development of student creativity through the Ecobrick program is shaped by a dynamic interaction between initial interest, curriculum integration, and the cultivation of long-term creative traits. According to Hapsari and Wahyuni (2020) as well as Ardiansari et al. (2024), students' early enthusiasm for Ecobrick activities tends to encourage active participation. However, experts caution that if engagement is driven solely by interest, the resulting creativity may be superficial and short-lived. To achieve sustained and meaningful creative development, scholars such as Hung and Pan

(2025) emphasize the importance of integrating Ecobrick activities into the formal school curriculum. Without such integration, students may demonstrate creativity only temporarily. In contrast, ongoing curricular support enables students to develop enduring creative traits that transcend the Ecobrick project and translate into broader problem-solving skills applicable to everyday life, as noted by Anjum et al. (2021) and Dellyana et al. (2024). Therefore, understanding the complex and evolving relationship among interest, integration, and long-term development is essential to maximizing the Ecobrick program's impact on student creativity.

The Ecobrick program's ability to foster student creativity goes beyond simply capturing their initial interest. While early enthusiasm can encourage participation, lasting creative growth requires consistent integration of Ecobrick activities into the formal educational curriculum. When these activities are embedded within structured learning, students are more likely to develop creativity that is not only deeper but also sustainable over time. This ongoing support allows creative thinking to extend beyond the scope of the Ecobrick project itself, contributing to the development of practical problem-solving abilities that can be applied in various real-life contexts and everyday challenges students may encounter.

Ecobrick and Enviromental Care

One of the key themes in the Pancasila Student Profile Strengthening Project is Sustainable Lifestyles, which, as noted by Rachman et al. (2024), is designed to help students comprehend the profound impact of human activity on the environment in both the short and long term. Scholars such as Børresen et al. (2022) emphasize that students need to understand how their daily choices affect environmental sustainability and the survival of ecosystems. Under this theme, students are actively involved in various project-based learning activities that are thoughtfully designed and facilitated by teachers. According to Van Poeck et al. (2024) and Schutte et al. (2025), such experiential projects not only engage students but also foster critical, creative, and responsible thinking about their relationship with nature. For instance, students may participate in activities like recycling programs, Ecobrick creation, waste reduction campaigns, and other initiatives that promote environmental stewardship. Sakti et al. (2024) and Andajani et al. (2024) highlight that by embedding the values of sustainability into the school curriculum, educators help students internalize the attributes of Pancasila learners—namely character development, collaboration, and responsibility toward environmental care. This holistic approach aims to prepare students to become conscientious citizens who uphold sustainability in both their personal lives and the broader community.

One important initiative in fostering student character in line with Pancasila values is the Pancasila Student Profile Strengthening Project. As emphasized by Susanti et al. (2023) and Prasetiyo et al. (2024), this project places a strong focus on nurturing collaboration and creativity among students. Experts such as Kozlowski and Ilgen (2006) and Meyers et al. (2023) highlight that the success of such projects relies heavily on effective teamwork, where students are required to communicate openly, contribute ideas, and actively support one another. Through this collaborative process, students in Indonesia begin to appreciate the value of collective effort and learn to work harmoniously with peers and community volunteers, as observed by Omar et al. (2022) and Soraya and Supadi (2022). This collaborative atmosphere not only facilitates smoother and more enjoyable task execution but also strengthens interpersonal and social responsibility. Creativity also plays a central role in these projects. According to van de Pol et al. (2010) and Marzuki et al. (2023), creative students demonstrate the ability to introduce new perspectives, adapt ideas, and think critically to produce innovative and meaningful outcomes that serve societal needs. By combining collaboration with creativity, students are better prepared to confront future challenges and generate impactful solutions. In doing so, they embody the essence of Pancasila—committed to community well-being and equipped to contribute positively to society.

This research is highly suitable for fostering students' higher-order thinking skills (HOTS), mainly because it involves making Ecobrick creations from plastic waste (Hapsari & Mauludea,

2024). This aligns well with Bloom's taxonomy, specifically the cognitive domain category C6—Creating, which emphasizes students' ability to design, construct, or produce something new. Creativity is demonstrated when students successfully transform materials that would otherwise be considered waste into useful, meaningful, and practical products. According to Loseby in Elvianasti et al. (2021), critical thinking skills do not stand alone; they need to be complemented by other crucial competencies such as creativity, complex problem-solving, and the ability to articulate ideas effectively. Furthermore, prior studies by Aqil et al. (2023) have established that Ecobricks are valuable learning resources and practical tools for stimulating student creativity and promoting environmental awareness. Through Ecobrick projects, students actively engage in innovative processes that develop their critical thinking and problem-solving capabilities.

Ecobrick in Shaping Students' Creativity and Enviromental Care

Based on the study's findings, the implementation of Ecobrick learning within the framework of the Pancasila Student Profile Strengthening Project (P5) has proven effective in enhancing students' creativity and curiosity. Experts such as Gagaramusu et al. (2024) and Janapati & Vijayalakshmi (2024) support this conclusion by highlighting how integrated learning models like Ecobrick promote active student engagement and foster key creative traits. This is consistent with the views of Hawari and Noor (2020), who emphasize that project-based learning strategies play a crucial role in strengthening students' moral and character values—particularly creativity and curiosity. Ecobrick serves as an exemplary model of project-based learning. According to Chen et al. (2024) and Yan et al. (2024), the Ecobrick initiative challenges students to engage directly in creative activities, encouraging them to devise innovative solutions to environmental issues through recycling and responsible waste management. Antico et al. (2017) and Noor et al. (2024) further argue that such projects inspire students to think critically, ask meaningful questions, and seek deeper understanding about environmental sustainability. As a result, students not only acquire practical and technical skills but also grow into more curious, motivated learners. More importantly, Ecobrick activities contribute to both cognitive development and character formation, fostering values that are closely aligned with the principles of Pancasila education.

The introductory stage, which focuses on introducing eco-literacy, successfully raises students' awareness regarding their surrounding environment. This finding aligns with prior studies conducted by Hasan et al. (2023), Nida et al. (2021), Mawarni et al. (2023), and Mukholifah et al. (2023), which emphasize the importance of eco-literacy education, especially concerning plastic waste management. According to these studies, students must have comprehensive knowledge about eco-literacy to address environmental issues effectively. Students can construct practical and sustainable eco-bricks through eco-literacy education, thereby significantly improving their waste management skills. Furthermore, Rahmawati (2019) support this idea, highlighting that enhancing students' literacy about Ecobricks offers practical solutions for environmental sustainability. When students understand the ecological consequences of plastic waste, they actively participate in environmental preservation through innovative and responsible behaviors (Kumar et al., 2021; Anokye et al., 2024). Ultimately, integrating eco-literacy and Ecobricks into education empowers students to actively contribute toward solving environmental challenges, promoting sustainable lifestyles aligned with ecological principles.

The visualization of Ecobrick implementation stages offers a clear representation of the environmental learning process, starting from initial introduction to active student participation. Scholars such as Herdiansyah et al. (2021) and Kadarisman et al. (2023) highlight the importance of structured environmental education that guides students through progressive stages of engagement. However, within the context of elementary education, several aspects still require further refinement to ensure effectiveness. A critical consideration, as pointed out by Guerrero and Sjöström (2024), is the alignment of eco-literacy content with students' cognitive abilities and developmental stages. When environmental concepts are presented in abstract or overly theoretical ways, younger learners may find them difficult to comprehend. To address this, eco-literacy should be introduced through

hands-on activities and real-world examples that are relatable to children's everyday experiences, thereby improving both understanding and engagement. In addition, fostering interest through interactive discussions and storytelling, as recommended by experts, can make learning more accessible, enjoyable, and meaningful for young students. Without such pedagogical adaptations, there is a risk that students may not fully grasp the importance of sustainability, which in turn could hinder their ability to adopt and practice environmentally responsible behaviors in daily life.

Another critical factor in the successful implementation of Ecobrick activities is the presence of structured and consistent teacher guidance to ensure both safety and effective learning outcomes. Given that Ecobrick construction involves handling plastic waste and assembling various materials, teacher supervision plays a vital role in preventing potential hazards while also channeling students' creativity in a meaningful direction. However, as noted by Setiadi et al. (2023) and Rubini et al. (2023), existing visualizations of the Ecobrick process often lack a clear depiction of the educator's role in guiding students through each stage. To optimize the educational impact of Ecobrick-based learning, experts suggest the need for a more detailed instructional framework. This should include pedagogical strategies, structured lesson plans, and teacher-led demonstrations that clarify the steps and expectations for both teachers and students. Furthermore, providing students with constructive feedback and problem-solving support throughout the activity—as recommended by educational researchers—can foster deeper understanding, critical thinking, and the development of long-term creative skills. With adequate teacher involvement and well-defined instructional support, Ecobrick activities can become not only a tool for promoting environmental awareness but also an effective medium for cultivating students' problem-solving abilities and sustainable behavioral habits.

CONCLUSION

Implementing the Pancasila Student Profile Strengthening Project (P5) under sustainable lifestyles effectively promotes creativity through Ecobrick craft activities in fourth-grade classes. Students engage practically by converting plastic waste into valuable products and showcasing them in exhibitions, enhancing their environmental awareness and creativity. The structured stages—introduction, contextualization, and action—ensure students understand waste impacts and actively solve environmental issues. Evaluation through questionnaires shows achievement across all creativity indicators, confirming the project's effectiveness in fostering student creativity. Activities like Ecobrick crafting successfully stimulate students' curiosity, questioning ability, idea generation, opinion expression, appreciation of beauty, independence, willingness to explore new ideas, and creative thinking.

The implementation of the Pancasila Student Profile Strengthening Project (P5) through Ecobrick craft activities offers both theoretical and practical implications. Theoretically, this research reinforces the concept that structured project-based learning significantly enhances students' creativity, curiosity, and environmental awareness. It validates educational theories emphasizing hands-on activities and eco-literacy integration as crucial factors for holistic student development. Practically, this study encourages educators and schools to incorporate sustainable projects systematically into curricula, using structured phases of introduction, contextualization, and action. Additionally, consistent use of creativity indicators can effectively assess student progress, enabling educators to refine instructional practices continually and enhance environmental education outcomes.

Future research should expand Ecobrick projects into community service programs that engage a broader audience beyond elementary students, including various community groups. This approach can enhance public awareness and collective responsibility for sustainable living, especially when plastic waste is a primary environmental concern. Involving more participants can also strengthen support for the 3R principles—reduce, reuse, and recycle—while fostering long-term environmental stewardship. By integrating Ecobrick activities into broader community initiatives, sustainability efforts can become more impactful, encouraging lasting behavioral

changes and a more significant commitment to reducing plastic waste at individual and societal levels.

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