Vokatek : Jurnal Pengabdian Masyarakat
E-ISSN: 2986-0105 P-ISSN : 2985-8402
Vol. 4, No. 1, April 2026
https://journal.diginus.id/VOKATEK/index

A Inorganic Waste Management as a Medium for Environmental Education and Student Creativity Development

[1*]Sunardi, [2]Jumiati Ilham, [3]Didiet Haryadi Hakim, [4]Sitti Suhada, [5]Wildan, [6]Hasmah

[123456] *Universitas Negeri Gorontalo, Indonesia*

*Corresponding author: sunardi@ung.ac.id

ARTICLE INFO

Keywords:

Elementary school
Environmental education
Inorganic waste
Recycling
Student creativity

Article History

Received: April 13, 2026
Revised : April 20. 2026
Accepted : May 15, 2026

ABSTRACT

The problem of inorganic waste in school environments requires an educational approach that not only emphasizes knowledge but also provides practical experiences that foster students' creativity and environmental awareness. This community service program aimed to strengthen students' understanding of inorganic waste management and provide direct experience in transforming used materials into useful creative products. The activity was conducted at SD Negeri 1 Suwawa Selatan, Bone Bolango Regency, involving 30 fourth- and fifth-grade students. The implementation method consisted of preparation, interactive socialization, demonstration, group-based recycling practice, and descriptive evaluation through participation observation, product assessment rubrics, field notes, and documentation. The results showed positive achievements in four main aspects: students' active involvement in discussions and practice, their ability to identify organic and inorganic waste, their initial understanding of the 3R principles (reduce, reuse, recycle), and their ability to produce simple recycled products such as flower pots, pencil holders, and photo frames from used materials. The activity also promoted teamwork, responsibility in completing products, and awareness of maintaining school cleanliness. Therefore, inorganic waste management can be used as a concrete, low-cost, applicable, and easily replicable medium for environmental education to support character education and the development of elementary school students' creativity.

To cite this article : Sunardi, Ilham, J., Hakim, D. H., Suhada, S., Wildan, & Hasmah. (2026). Inorganic Waste Management as a Medium for Environmental Education and Student Creativity Development. *Vokatek : Jurnal Pengabdian Masyarakat, 4*(1), 8–15. Doi.10.61255/vokatekjpm.v4i1.936

INTRODUCTION

Waste is one of the major challenges in sustainable environmental development in Indonesia. Data from the National Waste Management Information System show that the reported national waste generation from various districts and cities remains at tens of millions of tons per year, with a proportion of unmanaged waste that still requires serious attention (KLHK, 2025). This condition indicates that waste management, particularly inorganic waste such as plastic, metal, glass, cardboard, and single-use packaging materials, cannot be addressed solely through technical approaches. Waste management also requires an educational approach that can shape knowledge, habits, and environmental awareness from an early age (Lintang et al., 2024; Husin et al., 2025).

Elementary schools have a strategic position in environmental education because students are in the early stage of character, habit, and behavioral pattern formation. At this level, environmental education is more effective when it is not delivered only through theoretical explanations, but is also connected to real experiences close to students' daily lives. In this context, inorganic waste management can be used as a contextual learning medium that enables students to recognize environmental problems, understand their impacts, and participate directly in simple efforts to address them. Environmental education in schools needs to be integrated into learning activities, school programs, and habituation so that students' knowledge, values, and skills can be developed sustainably (Fajarwati et al., 2021; Husin et al., 2025).

A practice-based educational approach to inorganic waste management is important because it can connect environmental literacy with creativity development. Through recycling activities, students do not merely learn to distinguish types of waste; they also gain experience in transforming used materials into simple products with practical value. Activities such as making flower pots, pencil holders, photo frames, or play media from used materials can train fine motor skills, imagination, cooperation, and responsibility. This learning model is consistent with participatory, experiential, and project-based approaches that position students as active subjects in the learning process (Sulistiyani, 2022; Putra et al., 2022; Syafi'atun et al., 2022).

Several studies and community service activities show that practice-based recycling education has positive effects on students' understanding and creativity. Yuningsih and Jaizul (2025) reported that recycling craft training in elementary schools encouraged students' creativity and environmental awareness through the practice of making products from plastic waste. Putra et al. (2022) showed that training in processing plastic bottles into simple products helped students understand the hazards of inorganic waste while fostering creativity. Syafi'atun et al. (2022) also showed that the use of household waste in project-based learning contributed to students' ecoliteracy and creativity. These findings are reinforced by Chaesar and Andayani (2024), who emphasized that project-based learning integrated with ecoliteracy can support elementary school students' creative thinking skills.

Nevertheless, the implementation of waste management education in elementary schools is often incidental and is not always directed toward applicable creative activities. In many school contexts, students have recognized waste as an environmental problem, but they are not yet accustomed to sorting, managing, and reusing inorganic waste in simple ways. A similar condition was found at the activity site, SD Negeri 1 Suwawa Selatan. Based on initial observations and coordination with the school, the use of inorganic waste as a medium for education and creativity had not yet become a structured and routine activity. Students still needed guidance to identify types of waste, understand the 3R principles, and practice transforming used materials into products with simple functions.

Based on this condition, the community service team from Universitas Negeri Gorontalo, through the Thematic Infrastructure Community Service Program, carried out inorganic waste management activities at SD Negeri 1 Suwawa Selatan, Bone Bolango Regency. The activity was designed not merely as socialization but also as participatory training that provided students with opportunities to learn through direct practice. The focus of the activity was directed toward introducing organic and inorganic waste, the 3R principles (reduce, reuse, recycle), and the production of creative products from used materials.

This community service activity aimed to strengthen students' understanding of inorganic waste management, encourage active involvement in recycling practice, and develop creativity through the production of simple works made from inorganic waste. The main contribution of this activity lies in the use of inorganic waste as a concrete, low-cost, applicable, and easily replicable environmental education medium in elementary schools. Through this approach, the activity is expected to support character education, strengthen environmental awareness, and develop students' creativity in a more contextual way.

METHOD

This community service activity was part of the Thematic Infrastructure Community Service Program of Universitas Negeri Gorontalo, which was conducted at SD Negeri 1 Suwawa Selatan, Bone Bolango Regency, Gorontalo Province. The target participants were 30 students from grades IV and V. Participant selection was based on the consideration that students at this level already possess adequate cognitive, motor, and social abilities to receive environmental education through participatory activities and creative practice. Teachers were involved as activity partners to help organize participants, assist group practice, and support the sustainability of the program in the school environment.

The implementation method used a participatory training approach combined with socialization, demonstration, direct practice, evaluation, and reflection. This approach was chosen because the activity aimed not only to deliver information about inorganic waste but also to build

concrete learning experiences for students. Through this approach, students were positioned as active subjects involved in recognizing, sorting, and utilizing inorganic waste to create useful creative products.

The activity was conducted in a single four-hour training session consisting of 35 minutes of socialization, 30 minutes of demonstration, 150 minutes of group practice, and 25 minutes of reflection and evaluation. Product assessment was conducted by the community service team by considering five aspects: the use of used materials, product function, neatness, design creativity, and product completion.

The activity was carried out through four main stages. The first stage was preparation, which included coordination with the school, participant selection, preparation of socialization media, identification of reusable materials, and development of observation instruments and product assessment rubrics. At this stage, the community service team also identified the school's initial needs related to inorganic waste management education. The second stage was interactive socialization. At this stage, students received explanations about the meaning of waste, the differences between organic and inorganic waste, the impacts of inorganic waste on the environment, and the 3R principles (reduce, reuse, recycle). The material was delivered using simple language, visual media, examples of used materials, and question-and-answer discussions to suit the characteristics of elementary school students. The third stage was demonstration and recycling practice. The community service team demonstrated how to transform used materials into simple products such as flower pots, pencil holders, and photo frames.

After the demonstration, students worked in groups to create products using used materials such as plastic bottles, cardboard, small cans, plastic spoons, and other available supporting materials. During the practice, the community service team and teachers provided guidance, technical direction, and assistance to groups that experienced difficulties. The fourth stage was evaluation and reflection. Evaluation was conducted through observation of student participation, assessment of products, field notes, and activity documentation. Reflection was carried out through a short discussion with students to identify their understanding, impressions, and experiences after participating in the activity. The evaluation in this activity was descriptive and qualitative, so the presented results focused on the achievements observed during the activity process.

The instruments used included student participation observation sheets, product assessment rubrics, field notes, and documentation. The observation sheets were used to record students' involvement in asking questions, answering questions, following instructions, working collaboratively, maintaining the cleanliness of the work area, and completing products. The product assessment rubric was used to assess students' products based on the suitability of used materials, product function, neatness, design creativity, and product completion. Field notes were used to record students' responses, activity constraints, and group-work dynamics, while documentation was used to strengthen the description of the activity.

The data were analyzed descriptively and qualitatively by grouping the findings into four main aspects: student participation and enthusiasm, understanding of inorganic waste management concepts, creativity and skills in producing recycled products, and environmental awareness and social cooperation. Because this activity did not use pretest-posttest measurement, the interpretation of the results was not directed toward claiming quantitative improvement, but toward showing positive achievements based on observation, product assessment, and activity reflection.

RESULTS AND DISCUSSION

The community service activity conducted at SD Negeri 1 Suwawa Selatan showed that inorganic waste management can be used as a contextual environmental education medium for elementary school students. The implementation of the activity through socialization, demonstration, group practice, and reflection gave students opportunities to learn not only through explanation but also through direct experience. Based on observation, product assessment, field notes, and reflective discussions, the achievements of the activity can be analyzed through four main aspects: student participation, conceptual understanding, creativity and skills, and the formation of environmental awareness and social values.

Student Participation and Enthusiasm in the Activity

Student participation was an initial indicator that the participatory training approach was appropriate for the characteristics of elementary school students. During the socialization stage, students showed involvement by answering questions, mentioning examples of waste found at home and school, and expressing opinions about waste disposal habits. This involvement indicated that the topic of waste management was close to students' daily experiences, making it a suitable entry point for environmental education.

During the practice stage, student participation was evident in their willingness to follow instructions, work in groups, select used materials, and complete products until the final stage. These activities showed that students were more easily engaged when the material was delivered through concrete and visual activities. This finding is consistent with the principle of experiential learning, which positions students as active actors in the learning process. In the context of this community service activity, student enthusiasm not only indicated interest in making products but also suggested that waste management can be packaged as a fun and meaningful learning activity.

Students' active participation also shows that environmental education does not always have to be carried out through lectures or the delivery of abstract concepts. When students are invited to observe examples of used materials, discuss their possible uses, and process them into simple products, the learning process becomes easier to understand. This supports the view that environmental education in elementary schools needs to be developed through contextual activities that connect knowledge with students' real experiences (Husin et al., 2025; Lintang et al., 2024).

Figure 1. Students' Enthusiasm in Participating in the Activity

Students' Understanding of Inorganic Waste Management

From the aspect of students' understanding, this activity showed positive achievements in introducing the basic concepts of inorganic waste management. Before the activity, some students still needed explanations about the differences between organic and inorganic waste and simple ways to reuse inorganic waste. After participating in the socialization and demonstration, students were able to mention examples of organic and inorganic waste, recognize materials that could be reused, and explain the 3R principles in simple language.

This achievement in understanding was observed from students' responses during discussions and reflection. Students were able to relate the material to examples they encountered in the school environment, such as plastic bottles, food packaging, cardboard, and small cans. Students also began to understand that inorganic waste does not always have to be thrown away, but can be sorted and reused into useful objects. In the context of environmental education, this kind of understanding is important because it becomes the basis for forming environmentally responsible habits.

These results strengthen the findings of previous community service activities showing that waste management education for elementary school students is more effective when it is connected to concrete examples and direct practice (Putra et al., 2022; Yuningsih & Jaizul, 2025). Thus,

inorganic waste management in this activity functioned as a learning medium that helped students understand environmental problems in a simple, real, and developmentally appropriate way.

Students' Creativity and Skills in Producing Recycled Products

The most prominent aspect of this activity was the emergence of students' creativity in transforming inorganic waste into simple products. Through group practice, students used discarded materials such as plastic bottles, cardboard, small cans, and plastic spoons to make flower pots, pencil holders, and photo frames. The products produced showed that students did not merely imitate the examples provided, but also attempted to add variations in shape, decoration, color, and function according to each group's imagination.

The recycling practice also trained students' fine motor skills through cutting, gluing, arranging, decorating, and tidying materials. In addition, students learned to choose appropriate materials, consider product functions, divide tasks, and complete their work step by step. This process shows that the main value of the activity lies not only in the final products but also in the learning experiences students gained throughout the production process.

This finding is consistent with Sulistiyani (2022), who showed that plastic bottle recycling training can serve as a learning medium for waste management as well as creativity. This result also supports Putra et al. (2022) and Yuningsih and Jaizul (2025), who emphasized that the practice of processing inorganic waste can encourage students' creativity through activities that produce simple products. From the perspective of project-based learning, this type of activity provides space for students to learn problem solving, collaborate, and produce works with practical meaning.

Figure 2. Students Presenting Creative Products Made from Inorganic Waste

Formation of Environmental Awareness and Social Values

In addition to supporting understanding and creativity, this activity also contributed to the formation of students' environmental awareness and social values. During the activity, students were encouraged to view inorganic waste as material that could still be utilized. This change in perspective is important because environmental education aims not only to increase knowledge but also to shape attitudes and habits.

Indications of environmental awareness were seen in students' willingness to select used materials that could still be used, maintain the cleanliness of the work area, and show interest in using waste more wisely. Although long-term behavioral change could not be measured through this short activity, students' responses during the activity showed the potential for forming positive habits if similar activities are carried out continuously at school.

From the social aspect, group practice encouraged students to communicate, share tasks, help one another, and appreciate their peers' work. This collaborative activity is relevant to the goals of elementary education because it can develop responsibility, empathy, self-confidence, and

cooperation skills. Thus, inorganic waste management functions not only as a medium for environmental education but also as a space for character and social-value learning.

Analysis of Program Success and Its Implications

The success of this activity was influenced by several factors. First, the material provided was close to students' daily lives, making it easy to understand. Second, the participatory training approach gave students opportunities to learn through real experiences. Third, the materials used were easy to find in the surrounding environment, making the activity low-cost and easy to replicate. Fourth, the involvement of teachers and facilitators helped create a conducive and collaborative learning atmosphere.

The results of this activity are consistent with several previous studies. The recycling practice carried out by students supports the finding of Syafi'atun et al. (2022) that the use of waste in project-based learning can strengthen ecoliteracy and creativity. The results also align with Chaesar and Andayani (2024), who showed that project-based learning integrated with ecoliteracy can foster elementary school students' creative thinking skills. Therefore, this community service activity strengthens the view that environmental education becomes more meaningful when students are involved in real activities that produce both products and learning experiences.

Nevertheless, this activity had several limitations. First, the evaluation was still descriptive and qualitative and did not use pretest-posttest measurement, so claims of improvement could not be stated quantitatively. Second, the number of participants was limited to 30 students from grades IV and V in one school, so the results cannot be widely generalized. Third, the activity duration was relatively limited, so it could not describe long-term changes in environmentally responsible behavior. Fourth, parents were not included in the program design, even though habituation in waste management is also influenced by the home environment.

Based on these limitations, future activities should be designed with more sustainable mentoring, more systematic evaluation instruments, and more intensive involvement of teachers and parents. Schools can also develop this activity into a routine program, such as a class project, an extracurricular activity, or a habituation program for sorting and reusing inorganic waste. In this way, inorganic waste management will not only become a one-time activity but can also develop into a school culture that supports environmental education and character formation.

Table 1. Indicators of Community Service Activity Results

Evaluation Aspect	Observation Indicator	Field Findings	Interpretation of Achievement
Student participation	Asking questions, answering questions, following instructions, and engaging in practice	Students participated in discussions, mentioned examples of waste, and took part in group practice	The participatory approach was appropriate for the learning characteristics of elementary school students
Conceptual understanding	Distinguishing organic and inorganic waste and mentioning the 3R principles	Students could mention examples of inorganic waste and explain reduce, reuse, recycle in simple terms	The activity showed positive achievement in introducing basic waste management concepts
Product creativity	Use of used materials, variation in form, product function, and neatness of work	Students produced flower pots, pencil holders, and photo frames from plastic bottles, cardboard, small cans, and other used materials	Recycling practice provided space for developing creativity and motor skills
Social values and character	Cooperation, responsibility, concern for cleanliness, and appreciation of products	Students shared tasks, helped one another, maintained the work area, and showed pride in their products	The activity supported character learning and environmental awareness

Evaluation Aspect	Observation Indicator	Field Findings	Interpretation of Achievement
Program sustainability	Potential of the activity to be repeated and developed at school	Materials were easy to find, and the activity could be carried out as a class project or extracurricular activity	The program has the potential to be replicated with more systematic mentoring and evaluation

CONCLUSION AND SUGGESTIONS

The community service activity through inorganic waste management at SD Negeri 1 Suwawa Selatan showed that inorganic waste can be used as a concrete and applicable environmental education medium for elementary school students. Through socialization, demonstration, and recycling practice, students showed active involvement, recognized the differences between organic and inorganic waste, understood the 3R principles in simple terms, and produced creative products such as flower pots, pencil holders, and photo frames from used materials.

The main contribution of this activity lies in the use of inorganic waste as a learning medium that is low-cost, easy to obtain, and easy to replicate in connecting environmental education with creativity development and the formation of environmentally responsible character. In addition to producing recycled works, this activity also provided space for students to learn cooperation, responsibility, cleanliness, and appreciation of the experiential learning process.

Nevertheless, the results of this activity should be understood proportionally because the evaluation was still descriptive and qualitative and did not use before-and-after measurement. Therefore, future activities are recommended to use more systematic evaluation instruments, involve teachers and parents more intensively, and be developed as a sustainable school program. With consistent mentoring, inorganic waste management has the potential to become part of a school culture that supports environmental education and the strengthening of students' character.

ACKNOWLEDGMENTS

The authors would like to thank the Institute for Research and Community Service of Universitas Negeri Gorontalo for its support and assignment in the Thematic Infrastructure Community Service Program based on Decree Number: 1396/UN47/HK.02/2025 dated July 30, 2025. The authors also express their gratitude to the principal, teachers, and students of SD Negeri 1 Suwawa Selatan, Bone Bolango Regency, for their participation and support in the implementation of this community service activity.

REFERENCES

Chaesar, A. S. S., & Andayani. (2024). Investigating the effectiveness of ecoliteracy-integrated project-based learning in fostering creative thinking skills among elementary school students. KEMBARA: Jurnal Bahasa, Sastra, dan Pengajarannya, 10(1), 295–311. https://doi.org/10.22219/kembara.v10i1.28030

Husin, A., Helmi, H., Nengsih, Y. K., & Rendana, M. (2025). Environmental education in schools: Sustainability and hope. Discover Sustainability, 6, 41. https://doi.org/10.1007/s43621-025-00837-2

Kementerian Lingkungan Hidup dan Kehutanan (KLHK). (2025). Sistem Informasi Pengelolaan Sampah Nasional (SIPSN): Data indikatif pengelolaan sampah. https://sipsn.menlhk.go.id/sipsn/

Laeli, S., Dafik, D., & Purwoningsih, T. (2024). The development of PJBL-STEAM learning design to improve the student creativity in handling waste: Utilizing used cardboard in making simple miniature ATMs. International Journal of Current Science Research and Review. https://doi.org/10.47191/ijcsrr/v7-i6-11

Lintang, A., Andiyani, R., Tiviani, Z., Indraputri, A., Aisyavarya, F., & Yunas, N. (2024). Introduction to the importance of waste management for elementary school students in Sumberejo. Community Engagement Journal. https://doi.org/10.69965/sahwahita.v2i1.88

Putra, K., Narayana, M., Utami, C., Wardani, V., Devi, N., Gama, A., & Permana, G. (2022). Education of inorganic waste processing into handicrafts with creativity value at Jegu 1 and 2 State Elementary Schools. Abdi Dosen: Jurnal Pengabdian Pada Masyarakat. https://doi.org/10.32832/abdidos.v6i3.1185

Sulistiyani, R. (2022). Pelatihan daur ulang sampah botol plastik sebagai media pembelajaran pengelolaan sampah dan kreativitas. Jurnal Pengabdian Masyarakat PIMAS. https://doi.org/10.35960/pimas.v1i1.736

Syafi'atun, A., Saptono, S., & Putra, N. M. D. (2022). Utilization of household waste media in project-based learning to improve students' eco-literacy and creativity. Journal of Primary Education, 11(1), 64–77.

Wardani, D. K., Wahyono, B., Indira, F. R., Rahmawati, D. R., & Andriyati, R. (2025). Circular economy in education: Determinants of school recycling intentions and behaviors for inorganic waste. Cleaner Waste Systems. https://doi.org/10.1016/j.clwas.2025.100420

Yuningsih, S., & Jaizul, A. (2025). Increasing students' creativity and environmental awareness through recycling craft training at Tanjungjaya Village Elementary School. International Journal of Research in Community Services. https://doi.org/10.46336/ijrcs.v6i2.941