Optimizing 3R-based waste management education for the Gunung Gondang village community

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Abstract
Waste management is a major issue in Indonesia, including in Gunung Gondang Village, Pengasih Subdistrict, Kulon Progo Regency, where the community's awareness and understanding of waste management remain minimal. This Community Service Program (KKN) aims to enhance community understanding and awareness regarding the importance of waste management focusing on the 3R (Reduce, Reuse, Recycle) principles. The implementation method included a presentation using PowerPoint media and the installation of a waste education sign as a sustainable visual learning tool. The activity took place at Posyandu Dahlia, Gunung Gondang Hamlet, involving local residents. The results indicated an increase in the community's knowledge of the 3R principles and an awareness of the importance of segregating organic and inorganic waste. Furthermore, the presence of the educational sign provides an efficient visual reminder for the community to apply waste management in their daily lives. Thus, this KKN program successfully made a tangible contribution to improving the community's insight and awareness regarding waste management, while supporting waste reduction efforts at the village level.

Keywords: 3R; community education; waste management.

1. Introduction

Waste is the residue of human activities or processes in solid form, whether organic or inorganic, decomposable or non-decomposable, which is considered no longer useful and is discarded into the environment. Waste has become a significant issue faced by many cities worldwide (Septiani et al., 2021). According to Law Number 18 of 2008 concerning Waste Management, the responsibility for waste management lies not only with local governments but is also the obligation of the community, including business actors. Therefore, village administrators, communities, business actors, and relevant organizations need to improve their perspective on waste management by implementing reduction and handling efforts to decrease the amount of waste, thereby facilitating the process at final disposal sites and executing an efficient waste management program (Umayyah, 2023).

This situation is also prevalent in Kalurahan Margosari, Pengasih Subdistrict, particularly in Padukuhan Gunung Gondang, which still faces various limitations in waste management. Padukuhan Gunung Gondang is one of 8 hamlets in Kalurahan Margosari, located about 3 km east of Wates City. The hamlet has an area of 112.96 Ha and is administratively composed of 2 Community Units (RW) and 4 Neighborhood Units (RT), with a total population of approximately 812 people and ±150 households (KK).

According to data from the National Waste Management Information System (SIPSN, 2024), daily waste generation in Indonesia reaches 95,932.42 tons, with an annual total of 35,015,331.53 tons. In the Special Region of Yogyakarta alone, the annual waste generation is recorded at 702,140.01 tons. Based on observations, the community's awareness of the importance of waste management is still low, and understanding of proper management practices is not yet optimal. A common practice among residents is the burning of household waste, which is caused by the financial constraint of paying collection fees to waste transport officers. This behavior directly causes air pollution, which poses a risk to respiratory health and degrades the quality of environmental hygiene. Many residents who burn their trash are unaware of the dangers of chemical-based waste like styrofoam and plastic, as incineration can produce hazardous gases that damage air quality and threaten health.

Waste management is regulated in Government Regulation Number 27 of 2020 concerning specific waste treatment, which mandates the existence of Waste Processing Sites based on the 3R (reduce, reuse, recycle) principle, or TPS 3R. A TPS 3R serves as a collection and processing location for waste based on reduction, reuse, and recycling. The principle of reduce includes efforts to minimize the use of goods or the generation of waste and to avoid excessive consumption patterns (Fajri Devi Safitri & Puspita Sari, 2021). With proper management, waste does not just end up in landfills but can also provide economic benefits and value in line with the circular economy principle, for instance, through the connection of communities practicing waste sorting with waste banks (Kholili, 2023).

As infrastructure develops and the population increases, waste production continues to rise, and without proper management methods, this condition creates serious problems (Abusamah & Wahjoerini, 2023). Broadly, waste can be classified into two types: domestic waste, originating from residential and non-residential settings, and non-domestic waste, which is generated by the industrial sector. WHO defines waste as any substance that is discarded after primary use, or is worthless, defective, and of no use (Muliadi & Rukhayati, 2022). A crucial step in implementing the 3R principle is the segregation of household waste, both organic and inorganic, to make the management and recycling process more efficient (Putranto, 2023).

In 2021, households in Indonesia produced the largest amount of waste, reaching 1.6 million tons or 40.8%. This indicates that household waste management is crucial, yet in practice, it still faces various obstacles, whether technical, institutional, or financial (Sapanli et al., 2023). Community participation is a key factor in the success of waste management, as research in Kelurahan Baru shows a positive relationship between waste management and citizen involvement (Albertin et al., 2024). In Yogyakarta City, waste management is still carried out using conventional methods, including storage, collection, transfer, processing, and transportation. However, the majority of the community (87%) has not yet practiced waste sorting, while only 13% have sorted their waste and directed it to a waste bank (Hidayatullah et al., 2024).

Waste itself can be grouped into two types: organic and inorganic. Organic waste originates from humans, animals, and plants and is easily decomposed by bacteria, making it more environmentally friendly, whereas inorganic waste is difficult to decompose and takes a long time, potentially polluting the environment if not managed properly (Sulistianto, 2020). Furthermore, many community members continue to burn waste, often unaware of the dangers posed by synthetic chemical materials like styrofoam and plastic. This practice is concerning, as the incineration process can generate hazardous gases that degrade air quality and pose a threat to public health (Priyadi et al., 2023).

Overall, waste management aims to improve public health, maintain environmental quality, and utilize waste as a resource. Proper management is achieved when waste does not become a breeding ground for diseases, does not act as a vector for disease transmission, does not pollute the air, water, or soil, and does not cause odors, aesthetic disturbances, or fire hazards (Rozi et al., 2021).

2. Methods

The methods used for this community service activity were an interactive lecture supported by visual media, reinforced by the installation of a physical educational medium as a follow-up. The objective of this activity was to increase the community's knowledge of waste management and to determine a more effective educational medium. The installation of the educational sign was carried out independently

by the students, with the goal of providing a visual learning medium that can be viewed continuously. This combination of methods was chosen to ensure that the community gained understanding through direct explanation while also having a visual reminder to foster awareness in managing waste within their environment.

2.1. Location and Time of Implementation

This community service activity was located at Posyandu Dahlia, Gunung Gondang Hamlet, Kulon Progo Regency. The activity took place on Wednesday, August 20, 2025. The education and discussion session with residents began at 3:30 PM and concluded at 5:30 PM WIB.

3. Results and Discussion

The 3R-based (Reduce, Reuse, Recycle) waste management education community service activity was successfully implemented and attended by 17 residents of Gunung Gondang Hamlet. The event was held at Posyandu Dahlia in the residence of Mr. Salimin, the Head of the Hamlet, which demonstrated full support from the village officials (Figure 1).

The observed result of this activity was the high enthusiasm of the participants during the educational session. This was evidenced by the numerous questions asked regarding waste sorting methods and the mechanics of a Waste Bank. This indicates an initial improvement in understanding from the previous condition where awareness of waste management was still low. Another tangible result of this program was the installation of an educational waste sign in a strategic location (Figure 2), which serves as a reminder or illustration for all residents.

The discussion of these results indicates that the interactive lecture method is effective for increasing the audience's knowledge in a short period, especially when the topic is relevant to their daily problems (e.g., burning trash). The high level of participation in the discussion also signifies that the residents have a genuine desire to learn but require a catalyst and facilitator. Meanwhile, the installation of the educational sign is a strategic step for the program's sustainability. This sign functions not only as a passive information medium but also as an affirmation of a collective commitment to maintaining environmental cleanliness. It is hoped that the combination of direct education and a visual reminder will not only provide momentary knowledge but will also encourage long-term behavioral change in the community's waste management practices.

Figure 1. The atmosphere of the educational session and discussion with the Gunung Gondang community, attended by the mothers of Posyandu Dahlia.

Figure 2. Community service (KKN) students painting the waste education sign that will be used as an educational medium.

4. Conclusion

The 3R-based waste management education in Gunung Gondang Hamlet successfully enhanced community knowledge and awareness, as evidenced by high enthusiasm during discussions. The interactive lecture method proved effective for knowledge transfer, while the installation of an educational sign supports the program's sustainability.

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