



Education Environment as a Preventive Measure Pollution Plastic waste

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Abstract: Plastic waste pollution is a growing environmental problem, with the consequences of very high plastic use and increasingly severe environmental damage. Public awareness of waste management is also declining. This condition has negative impacts on the environment, such as soil, river, and sea pollution, and threatens human health and ecosystem sustainability. This study aims to analyze the role of environmental education in preventing plastic waste pollution and increasing public awareness of the importance of protecting the environment. This study uses a qualitative approach with a literature review method by collecting data from various scientific journals, books, and research reports. The results of recent studies published in 2020–2024 indicate that environmental education has a significant influence in shaping public knowledge, attitudes, and behavior towards plastic waste management. Education conducted through schools, families, communities, and digital media has been proven to increase public awareness to reduce plastic use, sort waste, and maintain a clean environment. Furthermore, practice-based educational programs are considered more effective in shaping environmentally conscious behavior than purely theoretical approaches. However, the implementation of environmental education still faces various obstacles, such as low community participation, a lack of waste management facilities, and a lack of continuing education programs. Therefore, collaboration between the government, educational institutions, families, and communities is needed to strengthen the educational environment to reduce plastic waste pollution effectively and sustainably.

Keywords: Educational environment; Environmental pollution; Plastic waste; Waste management.

Introduction

The problem of plastic waste has become an increasingly concerning global environmental issue over the past two decades (Macheca et al., 2024; Martono, 2023). Population growth, increased consumer activity, the development of modern industry, and changing lifestyles focused on convenience have led to significant advances in the use of highly useful plastic materials (Abedsoltan, 2024; Mielinger & Weinrich, 2023). Plastic is chosen for its lightweight, inexpensive, durable, and easy-to-manufacture properties in various forms. However, the inherently hard nature of plastic, which decomposes over time, has made this material a major contributor to environmental pollution in various countries, including Indonesia (Ramadan et al., 2026).

This situation poses serious challenges to ecosystem sustainability, human health, and the quality of the environment in general.

Globally, various international reports indicate that plastic waste pollution has reached alarming levels. The United Nations Environment Programme (UNEP) emphasizes that millions of tons of plastic waste enter the environment every year, directly impacting marine ecosystems, biodiversity, and the human food chain (Citaristi, 2022; Islam et al., 2024). Microplastics derived from degraded plastic waste are now commonly found in the ocean, rivers, air, soil, and even in the human body (Dey et al., 2024). This situation demonstrates that plastic pollution is no longer merely an aesthetic environmental issue, but has instead become a multidimensional threat

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impacting health, economic, social, and ecological aspects (Yose et al., 2023).

Indonesia, as one of the most populous countries in the world, faces a highly complex plastic waste problem. Increased economic activity and urbanization have driven high volumes of household and industrial waste, particularly waste made from highly useful plastics such as plastic bags, beverage bottles, straws, food packaging, and other consumer products (Donuma et al., 2024; Gautam et al., 2024). In various urban and rural areas, waste management still faces various obstacles such as low public awareness, limited waste processing facilities, weak implementation of environmental policies, and suboptimal environmental education systems from an early age. As a result, much plastic waste is carelessly dumped into rivers, drains, beaches, and open areas, contributing to increasingly complex environmental pollution.

Plastic waste pollution has a very serious impact on the environment. Plastic waste that accumulates in river and canal drainage systems can cause flooding, degrade water quality, and disrupt the balance of aquatic ecosystems. Furthermore, the indiscriminate burning of plastic waste produces hazardous emissions that can pollute the air and trigger public health problems (Abahussain et al., 2025). In marine ecosystems, animals such as fish, turtles, and seabirds often consume plastic as food, ultimately leading to their deaths and disrupting the food chain (Musa et al., 2025; Soni, 2024). Another significant impact is the emergence of microplastics, which can enter the human body through food and drink, potentially causing long-term health problems.

Various efforts have been made by governments and environmental organizations to address the plastic waste problem, ranging from regulations to reduce plastic use, environmental cleanliness campaigns, the development of recycling technologies, and community-based waste management programs. However, various studies show that regulatory and technical approaches alone are insufficient to comprehensively address the problem of plastic pollution. One of the main factors contributing to the persistence of this problem is low public awareness and behavior regarding the importance of environmental protection. Many people still view waste management as an inadequate solution if it is led solely by the government without a collective awareness to reduce plastic use and dispose of waste responsibly.

In this context, environmental education is a crucial and sustainable strategy for preventing plastic waste pollution (Akande, 2023). Environmental education serves not only as a means of conveying information about the dangers of plastic waste, but also as a means of character building, changing mindsets, and developing environmentally friendly behaviors in everyday life. Through environmental education, it is

hoped that the public will understand the negative impacts of excessive plastic use and be encouraged to adopt a more sustainable lifestyle, such as reducing plastic use, sorting waste, recycling repeatedly, and actively participating in maintaining a clean environment.

The importance of environmental education in addressing the problem of plastic waste is supported by various studies. Recent research Ningsih et al. (2025) showed that school-based environmental education programs can increase students' awareness of plastic waste management and encourage more environmentally conscious behavioral changes. Another study by Prasetyo (2026) found that community-based educational campaigns significantly increased community participation in plastic waste reduction activities at home and in the household. Furthermore, a study by Wulandari et al. (2024) confirmed that integrating environmental education into the formal education curriculum can foster environmentally friendly habits in a more effective and sustainable manner.

Environmental education plays a crucial role not only in formal education but also within the family and community. The family is the first social environment to shape individual habits, including environmental awareness. Children who are accustomed to disposing of waste properly, reducing plastic use, and maintaining a clean environment from an early age tend to have a higher ecological awareness as adults. On the other hand, the community also has a strategic role in building a culture that supports collective plastic waste reduction through mutual cooperation activities, waste banks, repeated recycling training, and environmentally friendly community-based campaigns.

The development of digital technology also opens up new opportunities for implementing environmental education. Social media, digital platforms, and various app-based environments can be utilized as a means of disseminating information and educational campaigns about the dangers of plastic waste. Active young people who use digital media can become agents of change in building environmental awareness through educational content, creative campaigns, and digital-based social movements. Thus, the "No Longer" educational environment is not limited to the classroom but can be implemented broadly and sustainably through various modern communication media.

However, the implementation of environmental education in Indonesia still faces various challenges. One major challenge is the unequal public understanding of the importance of managing plastic waste. Furthermore, limited educational facilities, a lack of collaboration between stakeholders, and a lack of implementable educational programs also hinder building strong environmental awareness. In many cases, educational environments remain theoretical and

unable to encourage real behavioral change in everyday life. Therefore, a more innovative, participatory, and practice-oriented educational approach is needed so that the public not only understands environmental theory but is also able to apply it consistently.

Based on the aforementioned issues, it is clear that plastic waste pollution is not merely a technical issue of waste management, but is also closely linked to aspects of education, culture, social behavior, and public awareness. Efforts to prevent plastic waste pollution require the ongoing involvement of various parties, including the government, educational institutions, families, communities, and the private sector. In this context, environmental education plays a strategic role as a foundation that plays a role in building collective awareness and changing public behavior towards a better, more environmentally friendly lifestyle.

Thus, this article aims to analyze the role of environmental education in preventing plastic waste pollution, identify various forms of environmental education implementation in the community, and evaluate the effectiveness of environmental education in increasing public awareness and participation in reducing plastic waste. This research is expected to provide academic and practical contributions to the development of better, more effective, innovative, and sustainable environmental education strategies to support the creation of a clean, healthy, and plastic waste-free environment.

Method

This research uses a qualitative approach with a literature study method. The qualitative approach was chosen because this research focuses on an in-depth analysis of the role of environmental education as an effort to prevent plastic waste pollution through various sources of relevant scientific research literature (Saribas, 2025). According to Creswell & Creswell (2018), qualitative research aims to understand social phenomena in depth through interpretation of data obtained from various sources.

In the context of this research, a qualitative approach is used to understand the relationship between environmental education, public awareness and plastic waste management behavior. The literature study method is used by collecting, reading, reviewing, and analyzing various scientific references related to environmental education and plastic waste pollution. Data sources in this study consist of national and international journal articles, scientific books, institutional environmental reports, and previous document studies relevant to the research topic. The literature used is prioritized from the latest publications ranging from 2020 to 2026 so that the data and information obtained are in accordance with the latest developments in environmental issues. Data collection

techniques are carried out through a documentation process and digital literature searches.

The selected articles are those that are directly related to the research focus and have been published in reputable scientific journals. The in-depth data analysis technique used in this study is descriptive qualitative analysis. The data obtained were then classified based on certain themes, such as the design of educational environments, factors causing plastic pollution, the impact of rubber plastic on the environment, and educational strategies in increasing public awareness.

The data were analyzed systematically. To find the relationship between concepts and produce a comprehensive understanding of the effectiveness of educational environments in efforts to prevent rubber plastic pollution. In the analysis process, this study also used data reduction, data presentation, and conclusion drawing techniques. Data reduction was carried out by selecting relevant information according to the research focus, while data presentation was carried out in the form of systematic descriptions and structured narratives.

The final stage, namely drawing conclusions, was carried out by interpreting the analysis results based on theory and the results of previous studies to obtain a deep understanding of the importance of educational environments in the form of community behavior that cares about plastic waste management. To maintain data validity, this study used source triangulation techniques by comparing various expert opinions, the results of previous studies, and reports from international and national environmental institutions.

The use of various source references aims to increase data accuracy and strengthen the analysis of research results. Furthermore, a selection of the most recent literature was conducted to ensure the research results accurately reflect the current state and development of the plastic pollution problem. Through this research method, it is hoped that this study will provide a comprehensive overview of the role of environmental education as a preventative strategy in reducing plastic pollution and serve as an academic reference for further research related to environmental education and sustainable ecosystems.

Results and Discussion

The results of various studies show that plastic waste pollution in Indonesia continues to improve due to the high use of plastic, which has seriously damaged public awareness of waste management. Plastic is the most widely used material in everyday life because it is practical, cheap, and easily available. However, excessive use of plastic without proper management often leads to waste accumulation in various environments, such as rivers, beaches, gutters, and other open dumps. According to a UNEP (2021) report, some

large plastic waste takes tens to hundreds of years to decompose, thus having long-term impacts on the environment (Khoaele et al., 2023).

The results of the study indicate that low environmental education is one of the main causes of the increase in plastic waste pollution. Many people do not understand the negative impacts of plastic waste on the environment and human health. According to research by Akintunde & Akintunde (2023); Ningsih et al. (2025), a lack of knowledge about waste management causes people to still frequently litter and use plastic excessively. This condition shows that the problem of plastic pollution is not only caused by the large amount of waste produced, but also influenced by low public awareness and behavior towards the environment.

Plastic waste pollution has a very large impact on the environment. Plastic waste dumped into rivers can clog waterways and cause flooding during the rainy season. Furthermore, plastic carried to the sea can disrupt marine life because it is often consumed by fish, turtles, and other marine animals. In the long term, plastic that breaks down into microplastics can enter the human food chain through consumption of fish and contaminated water. According to Geyer et al. (2017), the increasing number of microplastics in the environment poses a serious threat because it is difficult to control and can impact human health.

Environmental education helps people understand the impact of plastic use on the environment and encourages behavioral changes to be more concerned about cleanliness and environmental sustainability. Widat et al. (2025) explain that environmental education implemented from an early age can foster positive habits, such as disposing of waste properly, sorting waste, and significantly reducing plastic use.

In schools, environmental education can be implemented through learning, practical activities, and environmental awareness programs. Several schools have begun implementing plastic waste reduction programs by bringing their own drink bottles, using eco-friendly bags, and establishing waste banks. These programs have a positive impact on student behavior because they not only understand environmental theory but also practice it directly in their daily lives. According to research by Jose et al. (2017), practical activity-based education is more effective in shaping environmental awareness than learning that is solely theoretical. In addition to schools, families also play an important role in shaping environmental awareness and behavior. Children who are accustomed to maintaining cleanliness from an early age tend to have better environmental awareness as adults.

Parents can provide simple examples, such as reducing the use of plastic bags, disposing of trash properly, and recycling used items. These habits do not directly shape children's character to be more environmentally responsible. Environmental education

can also be carried out through the community and digital media. Currently, social media is an effective means of conveying information about the dangers of plastic and the importance of protecting the environment. Environmental campaigns through educational videos, digital posters, and social movements can raise public awareness, especially the younger generation. The rapid dissemination of information makes it easier for people to understand the impacts of plastic pollution and how to reduce its use. Although environmental education has a positive impact, its implementation still faces several obstacles. Some people still view the use of plastic as something practical and difficult to replace. Furthermore, the lack of waste management facilities and the lack of sustainable education programs mean that public awareness has not developed optimally. In some areas, waste management is still carried out simply, so much plastic waste ends up in the open environment. An educational environment that can increase knowledge, build awareness, and encourage changes in community behavior in maintaining a clean environment. Therefore, good cooperation is needed between the government, schools, families, and the community. To strengthen environmental education programs so that efforts to reduce plastic waste can be carried out effectively and sustainably.

Conclusion

Plastic waste pollution is an increasingly complex environmental problem. Its serious consequences include the high use of plastics, environmental damage, and a lack of public awareness of waste management. Improperly managed plastic waste can pollute soil, rivers, and oceans, negatively impacting ecosystems and human health. This demonstrates that the plastic waste problem is not solely related to waste management but is also influenced by public behavior and awareness of the environment. Research and discussions have shown that environmental education plays a crucial role in preventing plastic waste pollution. Environmental education can increase public knowledge and awareness of the environmental impacts of plastic use and encourage better living habits, a concern for cleanliness, and environmental sustainability. Through ongoing education, communities can understand the importance of reducing plastic use, sorting waste, recycling discarded waste, and maintaining a clean environment. Environmental education can be implemented through various environments, such as schools, families, communities, and digital media. Schools play a role in providing learning and practicing waste management, families play a role in fostering positive habits from an early age, while communities and digital media help expand the dissemination of information about the importance of maintaining a healthy work environment.

Collaboration between the government, educational institutions, and the community is essential for effective and sustainable educational programs. By increasing public awareness and changing behavior, plastic use can be reduced, creating a better, cleaner, healthier, and more sustainable environment for current and future generations.

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