

# Implementing Waste Sorting as a Sustainable Environmental Awareness Practice for Early Childhood Education

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## ABSTRACT

### **Keywords:**

Environmental Awareness, Early Childhood Education, Waste Sorting, Environmental Education

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This research aims to assess the effectiveness of environmental awareness programs in fostering waste sorting habits among young children at early childhood education. Early childhood education plays a crucial role in instilling sustainable habits, yet there is limited research on how interactive and hands-on learning methods influence environmental consciousness at this stage. The study utilized a qualitative approach with naturalistic observation, supplemented by interviews and direct community partnership program. Data were gathered from both children and teachers through observations, feedback sessions, and participation in waste sorting activities. The findings revealed that children actively engaged in sorting wet and dry waste, demonstrating improved understanding of waste management practices. Teachers reported that the children retained the concepts, showing enthusiasm and applying them outside the classroom. Additionally, parental involvement reinforced the learning, helping to maintain consistent practice at home. The results highlighted the importance of creative, hands-on methods, and teacher involvement in ensuring the sustainability of environmental habits. The study contributes valuable insights into designing future environmental education programs for young children, suggesting that long-term success relies on collaborative efforts from teachers, parents, and the community. Future programs should prioritize interactive, participatory approaches and continuous follow-up to ensure lasting impact.

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## INTRODUCTION

The waste problem is complex and ongoing, as it is a major source of environmental pollution, which can pose health hazards to the community (Chazanah & Nandiyanto, 2022; Rahman et al., 2022). Despite the Indonesian government's efforts through the National Policy and Strategy for Household and Similar Waste Management, outlined in Presidential Regulation No. 97 of 2017, the waste problem persists (Kurniawan et al., 2022). This is primarily due to the widespread practice of improper waste disposal by the community, a concerning situation, especially considering that children often imitate adult behavior (Debrah et al., 2021; Wilson, 2023).

It is important to educate children about proper waste disposal from an early age. This education should include gradual development of knowledge about organic and inorganic waste management (Anthony, 2021; Liu et al., 2021; Xia et al., 2022). However, low public awareness of waste management practices remains a major cause of improper waste disposal, further exacerbating environmental problems (Aryal et al., 2021; Yu et al., 2024). Therefore, educational efforts aimed at increasing waste management awareness are necessary for all age groups, from children to adults.

Environmentally-based learning in elementary schools can foster an early awareness of environmental issues, especially when combined with hands-on activities such as waste sorting or composting (Mandpe et al., 2023; Manea et al., 2024). Parental and community involvement plays a crucial role in reinforcing children's environmentally friendly behaviors at home (Santos et al., 2022). Changing waste management behavior depends not only on knowledge but also on establishing consistent social habits through role models and environmental support (Osman et al., 2024; Prodyanatasari et al., 2024; Xia et al., 2022). Effective waste management education requires the synergistic involvement of all elements of society, both at school and at home.

Initial observations at Azzainiyah Preschool revealed that a large number of students lack a basic understanding of the various types of waste. Children tend to mix various waste materials, such as plastic, paper, and food scraps, into one container (see Figure 1). This indicates a gap in their awareness and knowledge about the importance of waste separation from an early age. This lack

of understanding opens up opportunities for intervention through educational programs that introduce proper waste management practices.



**Figure 1. Dirty Classroom with Paper Waste**

Furthermore, Azzainiyah Preschool faces several other challenges related to environmental education. One such challenge is the lack of practice in separating wet and dry waste among children. Children are not yet accustomed to distinguishing between different types of waste, both at school and at home. Furthermore, the teaching methods currently used by educators are not yet optimal, and there is a lack of engaging and age-appropriate approaches to teaching children about waste separation. Another problem is the limited availability of educational media that support environmental education. The lack of collaboration between schools and homes contributes to the limited effectiveness of existing environmental education efforts.

To address this challenge, ongoing training and support are needed to introduce environmental values to children from an early age. The goal of this program is to instill the habit of separating wet and dry waste in a fun and developmentally appropriate way. By gradually educating children about the importance of waste sorting, Azzainiyah Early Childhood Education (PAUD) can contribute to the formation of an environmentally responsible generation, equipped with the knowledge and habits to support a cleaner and healthier environment.

## **METHOD**

The implementation of the Community Partnership Program (PKM) follows an educative-participatory approach, where partners are actively involved in every stage of the training, from planning to evaluation. The research method applied is a qualitative research approach, with the primary aim of understanding the comprehensive picture of the implementation process of the environmental awareness program for children. The chosen qualitative design is naturalistic observation, where the researcher conducts thorough observation within a specific setting without altering it in any way (Matos et al., 2023). This

method is used to capture the natural behaviors and interactions of the participants within their real environment.

The activities are implemented in the form of training and mentoring, tailored to the characteristics of early childhood children and the environment of PAUD Azzainiyah, located in the coastal area. The methods employed include demonstrations, educational games, the creation of learning media, and simulations on how to sort wet and dry waste. The data collection approach uses triangulation, involving in-depth interviews, participatory observation, and documentation studies. Interviews are conducted with teachers and parents, while observations are made during training sessions and activities. Documentation such as photos and records of children's progress is also analyzed. The instruments for data collection include interview guidelines, observation protocols, and documentation.

**Table 1. Matrix Data Collection**

Activity Phase	Involved Parties	Achievement Indicators	Timeframe
Coordination and initial observation	PKM Team, Head of PAUD, Teachers	Agreement on the program; data on partner needs gathered	Week 1
Teacher training on concepts and methods	PKM Team, PAUD Teachers	Teachers understand and can apply waste sorting habits	Week 1
Learning activities with children (practical)	PKM Team, Teachers, Students	Children can recognize and sort wet and dry waste simply	Week 3–4
Parental involvement through socialization	PKM Team, PAUD Teachers, Parents	Parents understand and are willing to apply habits at home	Week 5
Evaluation and follow-up	PKM Team, Head of PAUD, Teachers	Activity report; plan for sustainability at the school	Week 6

Data analysis is performed through several stages, including reduction, presentation, and verification of data. During the reduction phase, irrelevant data are eliminated, and key information is extracted to focus on the core findings (Maxwell, 2020). In the presentation phase, the collected data are structured in a meaningful way to provide insights and facilitate comparison between different data sources. Finally, verification is conducted to confirm the accuracy and consistency of the findings. The analysis is based on qualitative content analysis, where patterns and themes are identified in the data. Through this process, the program's effectiveness in fostering environmental awareness among children and its impact on their behavior are evaluated, ensuring that the training methods align with the desired outcomes.

## FINDING AND DISCUSSION

### Environmental Awareness Training

The research focused on the implementation of a community service program aimed at raising environmental awareness among early childhood students at PAUD Azzainiyah through waste sorting training. The program was designed to engage both teachers and children in environmental education,

promoting the habit of distinguishing between wet and dry waste. This initiative used a participatory approach, where the teachers and children were actively involved in all stages of the program, from planning and training to follow-up activities. The method was designed to enhance children's understanding of environmental issues while making the learning process enjoyable through interactive and educational activities.

The implementation of the program involved several crucial stages. Initially, there was coordination with the PAUD Azzainiyah staff (the principal and teachers), followed by an initial survey to assess the understanding of both children and teachers regarding waste sorting. Next, a training module was prepared, accompanied by educational media such as posters, songs, hand puppets, and waste sorting bins. A schedule for the activities was established, ensuring that all logistics and materials were in place. The outcome of this phase included the completion of training materials and the agreement on the program's implementation timeline with PAUD Azzainiyah.

The training was conducted over four days, with a playful and educational approach aimed at helping children recognize and sort wet and dry waste. On Day 1, the children were introduced to the concepts of wet and dry waste using visual aids and songs. Interactive hand puppet storytelling was used to engage the children and make the material more relatable. Day 2 involved simulating waste sorting using color-coded bins and waste images, complemented by the educational game "Find the Pair," where children matched waste types with their correct bins. Day 3 focused on creative activities like coloring and creating collages from clean dry waste, reinforcing the recycling concept. An optional Day 4 involved mini presentations by the children and the distribution of participation certificates (see Tabel 2).

**Table 2. Training Implementation**

Day	Activity	Methodology	Expected Outcome
1	Introduction to wet and dry waste	Visual aids, songs, hand puppet storytelling	Children can identify wet and dry waste types
2	Waste sorting simulation	Color-coded bins, waste images, educational games	Children practice sorting waste into appropriate categories
3	Creative activities (coloring and collage)	Waste recycling project	Children learn about recycling through hands-on activities
4	Optional: Mini presentation and certificates	Child presentations	Children gain confidence and feel motivated through recognition

The program shifted to a phase of continuous support and habit formation after the training sessions. Educational tools and labeled waste bins were handed over to PAUD Azzainiyah for use in everyday activities. Teachers were mentored to assist children with regular waste sorting during daily routines. Teachers were also given observation sheets to monitor the consistency of children's

participation in the new waste sorting habits. The goal was to establish a sustainable routine where children would regularly practice sorting waste in their classroom and home environments, ensuring that the lessons learned during the training were reinforced over time.

The program was carried out with a clear structure, beginning with the preparation of materials and scheduling, followed by engaging and interactive training activities for both the children and teachers. By the end of the training, the children had successfully learned how to sort waste, and teachers were equipped with the necessary tools and methods to continue the practice. The program also aimed to involve parents by educating them about the importance of continuing these habits at home. The final stage of the program included follow-up visits to ensure the sustainability of the practice and the success of the program in instilling environmental awareness.

The results of the program indicated a positive impact on the children's understanding of environmental issues, particularly in recognizing and sorting different types of waste. The children actively participated in all activities and showed enthusiasm during the interactive games and creative exercises. Teachers reported a significant improvement in the children's ability to differentiate between wet and dry waste and observed that the children were beginning to adopt these behaviors outside of the training sessions. The program also helped strengthen the relationship between teachers, children, and parents in terms of environmental education.

### **Program Evaluation and Habituation**

The program training for early childhood through waste sorting habits was successfully implemented, as evidenced by the enthusiastic participation of educators, children, and parents. The overall process ran smoothly, following the plans set at the beginning of the program. The use of interactive training, visual learning media, and hands-on practice with waste sorting helped engage the children effectively. The evaluation of the program indicated that children were not only receptive to the environmental messages but also active participants in waste sorting activities, demonstrating their enthusiasm through questions and hands-on sorting.

The evaluation of the program took place in multiple stages. Initially, an assessment of the children's and teachers' understanding of waste sorting was conducted to determine the baseline knowledge. Afterward, the program was monitored through direct observation of the children's participation and their ability to sort organic and non-organic waste correctly. Regular follow-up meetings with the teachers and parents were held to discuss the progress and challenges observed during the training. Feedback from the teachers indicated a positive response, as they saw the value in the program and expressed their commitment to continue these environmental practices within their classrooms.

The data from observations showed that the children were highly engaged in the activities. They eagerly participated in the sorting exercises, using color-coded bins to distinguish between organic and non-organic waste. During the practical sessions, children displayed a good understanding of the task, sorting waste correctly. Teachers reported an increase in the children's environmental awareness and noticed that many children continued to practice waste sorting at home, which they learned during the program. Additionally, children frequently expressed excitement when asked to sort waste, showing how much they enjoyed the activity.



**Figure 2. The Habit of Throwing Garbage in its Place**

Figure 2 illustrate student of the training sessions captured the moment when the children actively sorted waste into color-coded bins, one for organic waste and the other for non-organic waste. The children were seen focusing on the task, carefully placing each item into its correct bin. The use of visual tools and interactive methods helped children internalize these concepts in a fun and engaging way.

The habit formation aspect of the program was central to its success. Teachers observed that children who actively participated in the training were able to incorporate the habit of sorting waste into their daily routines. The repetition of the waste sorting activity, combined with the use of visual aids and hands-on methods, created a strong foundation for environmental consciousness among the children. However, the sustainability of these habits outside of the training environment depended heavily on continued teacher involvement and support from parents. Teachers and parents were encouraged to reinforce the practice of waste sorting in daily life to ensure that the behavior would stick.

The program, which ran over the course of several weeks, consisted of a variety of interactive and engaging activities designed to teach young children about waste sorting and environmental care. The children participated in songs, visual lessons, hands-on waste sorting, and recycling projects like creating collages from clean dry waste. Teachers were given training on how to continue the practice after the program ended, and parents were also engaged to ensure the sustainability of the habits learned. The overall goal was to integrate

environmental consciousness into the children's daily lives, reinforcing the importance of keeping their environment clean.

The children's understanding of waste sorting improved significantly during the program. Not only did they learn the differences between organic and non-organic waste, but they also started practicing these habits outside of the training. The feedback from teachers highlighted the positive effects of the program, as the children became more environmentally conscious, even showing interest in teaching their peers. Parents' involvement played a key role in ensuring that these habits were maintained at home, thus reinforcing the learning experience. The program achieved its goal of instilling a sense of environmental responsibility in young children.

## Discussion

The program was effective in achieving its objectives of fostering environmental awareness and waste sorting habits among young children. The playful and interactive nature of the activities kept the children engaged, while the involvement of teachers and parents ensured the sustainability of the practice (Kushendar et al., 2023; Syahmani et al., 2021). The positive feedback from the teachers and the observable changes in the children's behavior suggest that the program's design was well-suited to the target group and the learning environment (Marešová et al., 2023). The program succeeded in creating a foundation for long-term environmental consciousness.

The use of naturalistic observation in educational programs helps capture the authenticity of children's behavior (Shinta, 2024), which aligns with the observational approach taken in this study. Involving teachers as active participants in the learning process increases the chances of sustaining educational outcomes over time. The educational games and hands-on activities significantly enhance children's understanding of abstract concepts like waste sorting (Cheng et al., 2022), which was clearly observed in the program's activities.

The programs that incorporate participatory methods not only engage children but also empower teachers to become active contributors to the learning process (Hu et al., 2021), leading to more sustainable outcomes. The practical and creative activities are key to making environmental education accessible to young children (Sari et al., 2021; Setiawan et al., 2021). These findings highlight the importance of designing future programs that integrate both active teacher involvement and hands-on learning methods, ensuring that environmental awareness is instilled in a way that resonates with young minds and their everyday lives.

The results from the activities indicates that the program was highly successful in engaging young children and fostering a long-lasting understanding of waste sorting. By integrating fun and interactive learning methods, such as games and creative activities, children were able to easily grasp

environmental concepts. The involvement of teachers and parents helped create a supportive learning environment, which allowed the practice of waste sorting to extend beyond the classroom (Sari et al., 2021). While the program showed strong results, its long-term effectiveness will depend on continuous reinforcement and regular follow-up.

The educational programs that engage children through hands-on activities and teacher involvement lead to more sustainable learning outcomes (Budihardjo et al., 2021; Yusuf et al., 2022). This approach mirrors the interactive and participatory methods used in this study. The importance of using creative activities in environmental education to help children retain and apply the knowledge gained (Bela & Santosa, 2023; Poudel et al., 2024; Subhan et al., 2025). The successful implementation of waste sorting activities in this study can be attributed to the combination of interactive teaching and creative, hands-on experiences that reinforced the environmental lessons.

The programs habituation incorporating teacher engagement and hands-on learning are more effective in fostering long-term behavioral changes (Widat & Wulandari, 2023). Incorporating creative, interactive methods is crucial for keeping children engaged and helping them retain complex concepts like waste sorting (Fitri, 2022). These findings suggest that future programs should prioritize interactive and creative teaching methods, with a strong focus on teacher involvement and follow-up support to ensure the sustainability of the habits taught.

The integration of interactive, hands-on learning with consistent teacher involvement is essential for embedding long-term behavioral changes in young children at PAUD Azzainiyah. By using creative methods such as games, stories, and visual aids, environmental education becomes not only more accessible but also more enjoyable, enhancing children's ability to grasp complex concepts like waste sorting. Furthermore, the active participation of teachers and parents ensures that these habits are reinforced both inside and outside the classroom. Moving forward, educational programs should prioritize continuous support and periodic evaluations to track progress and ensure the long-term success of such initiatives, ultimately contributing to the broader goal of instilling environmental consciousness in future generations.

## CONCLUSION

The program successfully achieved its objectives of fostering environmental awareness and waste sorting habits among young children at PAUD Azzainiyah. Through engaging and interactive activities, children were able to learn about environmental issues in a fun and effective way, while the active involvement of teachers and parents ensured the sustainability of these habits. The program's design, which combined participatory methods, hands-on learning, and creative approaches, proved to be highly effective in embedding long-term environmental consciousness in the children. The positive feedback

from teachers and observable changes in the children's behavior indicate that the program had a lasting impact. The program serves as a valuable model for future educational initiatives, demonstrating the importance of collaboration and continuous reinforcement in fostering lasting behavioral change towards environmental care.

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