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Developing Early Childhood Ecoliteracy Skills Through The School Waste Bank Program

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Abstract

The number of natural disasters is one of the lessons that fostering awareness of protecting the environment needs to be done from an early age, so that children have awareness of the importance of protecting the environment and its impact in the future. The purpose of this study is to describe and analyze how to develop early childhood electroliteracy skills through the waste bank program. This research is a field research using a qualitative descriptive approach. Data collection was carried out by means of interviews, observations, and documentation. Data analysis is carried out by data reduction techniques, data presentation, verification and conclusion drawn. The results of this research show that the implementation of waste banks is carried out with 3Rs (Reduce, Reuse, Recycle) where children are actively involved in collecting, weighing, sorting, and processing used goods into learning media. The skills formed in children are the skills to distinguish inorganic waste, resource management, environmental care actions, and socio-ecological collaboration. Based on the waste bank activities carried out at PAUD Prima Sakinah Islamic School Bekasi City, it can be concluded that these activities can develop early childhood ecoliteracy skills. This research is focused on waste bank activities and in one school so the results cannot be generalized. In addition, the method used is qualitative so that the effectiveness of the program cannot be known for sure.

Keywords: *Ecoliteracy, Early Childhood, Waste Bank.*

INTRODUCTION

Based on 2025 BNPB data, various natural disasters were recorded that struck several regions in Indonesia, dominated by floods, followed by extreme weather and landslides. Floods occurred in almost all provinces, from North Sumatra, Aceh, West Sumatra, to West Nusa Tenggara and Sulawesi, with very diverse impacts: thousands of houses were damaged or submerged, public facilities were affected, and there were fatalities, missing persons, and injuries. Several major incidents were recorded as causing significant casualties, such as the floods in Serdang Bedagai with more than 16,000 affected residents, in Deli Serdang with more than 53,000 victims, and in Langkat where hundreds of thousands of houses were submerged (Bencana, 2025).

Besides unavoidable natural factors, one of the main causes of natural disasters in Indonesia is a lack of human awareness of environmental protection (Setiyawan et al., 2023). Activities such as illegal logging, land conversion without regard for ecosystem carrying capacity, indiscriminate waste disposal, and environmentally unfriendly development exacerbate regional vulnerability to flooding, landslides, and pollution (Indah Purwoningsih, Lulu Rintan Apriliyani, Nadia Sabila, Siti Musaroh Maydiana Alpa, Abdul Halim, 2025; Juita et al., 2025). This lack of awareness leads to environmental degradation, which reduces nature's ability to absorb and withstand extreme impacts, making disasters more likely to occur and causing significant losses (Sinyo et al., 2025; Sutrisna et al., 2025).

Based on these issues, it is crucial to cultivate ecoliteracy skills from an early age as a way to prevent future natural disasters. Ecoliteracy not only teaches children about environmental knowledge, but also forms ecological awareness, critical thinking skills on environmental issues, and practical skills in managing resources wisely (Panca Dewi Purwati, Cut Dinna Puspa Kartikasari, Davi Hidayat, Diah Ayu Safitri, Diajeng Ayu Septiani, Dian Putri Mufaida, 2024; Setyaningrum, 2020). Through programs such as school waste banks, school gardens or green labs, environmental-based projects (project-based learning), energy and water saving campaigns, and the integration of ecology-based curriculum (Afiyah Nur Kayati, Ira Fatmawati, 2025; Permata & Wibowo, 2023). Through these programs, students not only gain knowledge about ecosystems, but also develop ecological awareness, critical thinking skills, environmental care actions, and social collaboration skills as provisions for facing future sustainability challenges (Irfan Hilman, Rudi Akmal, 2023; Izzul Maghfiroh, 2025).

Research conducted by Dhias Cahya Hakika et al., on Plastic Waste Processing and Sorting Education to Improve Ecoliteracy among Parents of Cahya Mentari Kindergarten Students, showed that the education successfully improved parents' understanding of waste management, increasing parents' understanding and knowledge from 53% to 91.33% (Dhias Cahya Hakika, Hayati Mukti Asih, Muhammad Kunta Biddinika & Yuwantina, Anggi Safitri, 2024). Another study by Muntia Sari et al., entitled "Implementation of Ecoliteracy Through Project-Based Learning in Early Childhood Education," showed that ecoliteracy was implemented through project-based learning, including ecobrick and ecoenzyme projects (Sari & Effendie, 2025).

Furthermore, a related study was also conducted by Shilfa Sukma Salsabila and Masyunita Siregar with the title Analysis of the Implementation of Ecoliteracy in Early Childhood in the Alambarajo Environment, Jambi City. The results showed that the implementation of ecoliteracy in the Alambarajo environment had been running well, seen from the Head (knowledge) and Heart (Attitude) in early childhood (Shilfa Sukma Salsabila, 2025). Research conducted by Linda Eka Pradita, et al. with the title Environmentally Insightful Digital Books as an Effort to Grow Children's Ecoliteracy. The results of their research showed that environmental insight-based learning media encourages students to become individuals who care and are cultured towards the environment so as to increase ecoliteracy (Pradita et al., 2023). Furthermore, research by Masyunita Siregar et al., entitled "Introducing Ecoliteracy to Early Childhood through Storytelling," showed that stories can be used to introduce ecoliteracy through storylines, moral messages, and emotions conveyed by the stories told to children (Siregar et al., 2021).

This contrasts with previous research, which focused more on parent education, project-based learning, digital media, and storytelling methods. Therefore, the researchers chose the title "Developing Ecoliteracy Skills in Early Childhood Through the

School Waste Bank Program." This study specifically emphasizes the school waste bank program as a means of developing ecoliteracy skills in early childhood. This research is expected to provide practical solutions that can be immediately implemented to foster an environmentally conscious generation from an early age.

An ecoliteracy approach in early childhood is crucial because Indonesia is a country with a high rate of natural disasters, caused by both natural and human factors. Therefore, instilling ecoliteracy skills from an early age not only equips children with knowledge about ecosystems but also fosters an environmentally conscious character, a critical attitude towards ecological issues, and practical skills in wisely managing resources. Developing ecoliteracy skills in children from an early age is expected to be a strategic step in preventing environmental degradation and reducing the risk of disasters in the future.

METHODS

This research is a descriptive qualitative field study (Sugiyono, 2022). This research focuses on how the waste bank process can develop ecoliteracy skills in early childhood. The subjects in this study were the principal, teachers, and students at the Prima Sakinah Islamic School PAUD in Bekasi City. This research was conducted from August to October 2024. Data were collected through participant observation conducted directly by observing the implementation of the waste bank program. Activity documentation such as learning notes, photos of daily activities, reports on waste collection and sorting results, and creative products made by children recycled served as supporting data sources to strengthen this research. To gain a broader perspective, informal interviews were also conducted with several stakeholders, particularly class teachers, the principal, and students to determine the extent of the development of children's ecoliteracy skills.

The instrument in this study was a Participatory Observation Guideline, which was used to systematically record children's activities in the waste bank activities, such as the process of sorting, collecting, and processing waste. Informal interview guidelines were conducted with the principal, class teachers, and several students to determine the program's perceptions, experiences, and impact on children's ecoliteracy skills. Questions were directed at children's understanding of the environment, caring attitudes, and the practical skills they developed. Documentation instruments included learning notes, photos of daily activities, reports on waste collection and sorting, and creative products from children's recycling. Analysis was conducted using the Creswell approach, employing data reduction, data presentation, verification, and conclusion drawing techniques (Creswell, 2018).

RESULTS AND DISCUSSION

Results

The waste bank program at the Prima Sakinah Islamic School Early Childhood Education Center (PAUD) in Bekasi City is implemented systematically and integrated into thematic learning. This program is designed not simply as a supplementary activity, but as an integral part of the character education and environmental literacy process for early childhood. Its implementation is carried out as follows:

1. Waste Collection Schedule

   One of the core activities of this program is the collection of used items by students in rotation according to the established class schedule: Monday for KB Langit and TK B3, Tuesday for KB Bumi and TK A1, Wednesday for TK A2 and TK B1, and Thursday for TK B2 and TK A3. This schedule is used to ensure the collection

process is orderly and that each child has a fair opportunity to actively participate, fostering a sense of responsibility and discipline. Children bring various used items from home, such as plastic bottles, cardboard, paper, cans, and other inorganic materials, which are then made an integral part of the learning process at school. The students' waste collection schedule can be seen in Table 1 below:

Table 1: Student Waste Collection Schedule

Days			
Monday	Tuesday	Wednesday	Thursday
KB Langit	KB Bumi	TK A2	TK B2
TK B3	TK A1	TK B1	TK A3

(Source: Prima Sakinah Kindergarten, 2024).

2. Weighing, Sorting, and Recording Activities

After bringing trash to school, children are instructed to weigh, sort, and record the type and weight of the waste on the provided waste bank cards. This activity not only assists the school in data collection but also serves as a learning tool for simple numeracy and science for children. The waste sorting process is carried out by teachers to introduce children to environmental concepts such as the difference between organic and inorganic waste, as well as to understand the utility of items previously considered useless.

3. Creating Artwork

The next step after children bring, collect, and sort the waste they brought from home is processing or creating art. Children are encouraged to utilize plastic, paper, cardboard, and other materials to create objects such as plant pots, puppet stages, collage artwork, toy vehicles, and tissue boxes. This creative activity not only hones fine motor skills and creativity but also instills the value of environmental protection through simple actions like recycling.

Children's involvement in the waste bank program at the Prima Sakinah Islamic School PAUD in Bekasi City is active, comprehensive, and centered on hands-on experience. Children are not merely observed objects, but become key actors in the entire series of activities. The involvement process begins at home, where children, along with their parents, select and prepare inorganic waste to be brought to school according to the class schedule. This activity fosters a sense of responsibility and strengthens collaboration between school and family in building a culture of environmental stewardship.

At school, children are directly involved in weighing waste using simple scales appropriate for their age. Teachers guide children to observe the numbers on the scales and then record the results on their respective waste bank cards. This activity develops basic numeracy skills such as recognizing numbers, comparing quantities, and understanding the concepts of weight and measure. After weighing, children sort waste by type, such as paper, plastic, bottles, and cardboard. This process teaches children critical thinking, recognizing the different characteristics of objects, and understanding the relationship between human behavior and its impact on the environment. They also gain a basic understanding of which types of waste are recyclable and which are not, allowing ecological learning to occur naturally and contextually. Children become more aware of the cleanliness of the classroom and school environment and are even able to reprimand peers who litter.

Children's involvement is increasingly evident in creative activities that transform waste into works of art and learning media. Children are encouraged to create various works of art, such as plant pots from used bottles, paper collages,

cardboard puppet stages, tissue holders, toys, and more. In this process, children learn to recycle waste into usable items. Teachers also explain that recycling into usable objects can prevent flooding.

Our findings also highlight the development of early childhood ecoliteracy skills through the waste bank program, demonstrated by several forms of ecoliteracy skills that emerged and developed in early childhood, including:

1. Distinguishing between types of inorganic waste One of the key skills observed is children's ability to differentiate between types of waste, such as plastic, paper, cardboard, bottles, and cans. Children not only recognize the types of waste but are also able to explain the reasons for this separation and determine which types can be recycled. This identification skill is the foundation of strong ecoliteracy, as it helps children understand the basic structure of environmental management.
2. Waste Recycling Skills. The next ecoliteracy skill emerging is creative recycling activities, where children transform used items into works of art or learning media. In this process, children learn to process, cut, glue, arrange, and modify used items into new, more useful objects. This activity fosters the understanding that waste is not simply waste but has the potential to be reused, an important message in fostering environmental awareness from an early age.
3. Socio-ecological Skills. The socio-ecological skills that emerge in children include empathy, responsibility, and collaboration. Children recognize that their actions impact the environment and others. They learn to cooperate with friends in sorting activities, help each other when weighing waste, and share ideas when creating recycled works. Children also understand that proceeds from the sale of waste can be used to help others, thus developing philanthropic values, an important part of social ecoliteracy. These socio-ecological skills reinforce environmental awareness and social awareness as part of everyday behavior.
4. Environmental Awareness. The development of environmental awareness skills begins with simple, routine activities such as bringing in trash from home on schedule, weighing, sorting, and recording the results. Teachers teach children that waste must be managed properly and not disposed of carelessly to prevent natural disasters. Furthermore, recycling activities, such as creating artwork from used materials, reinforce children's understanding that waste can be transformed into something useful. Through this hands-on experience, children learn the simple meaning of resource conservation: reducing, reusing, and recycling are all part of caring for the environment.

This program also develops environmental skills through social and emotional aspects. Children understand that their small actions, such as collecting and sorting waste, can bring significant benefits to the environment. Changes in children's behavior at school include disposing of waste properly, keeping the classroom clean, and reminding friends who litter. This behavior demonstrates the success of the habits developed through this program. Children not only follow instructions but also begin to demonstrate personal initiative and awareness for environmental protection.

Thus, through a series of waste bank activities, children not only gain environmental knowledge but also demonstrate various forms of ecoliteracy skills encompassing cognitive, affective, psychomotor, and social aspects. This program successfully establishes a strong foundation for children to understand, love, and protect the environment consistently and sustainably. Optimizing the waste bank program at the Prima Sakinah Islamic School PAUD in Bekasi City demonstrates the

institution's commitment to instilling environmental stewardship in children from an early age. This program is not implemented incidentally or simply as an additional activity, but is designed systematically and structured with full integration into the thematic learning curriculum.

Discussion

The research findings above indicate that the waste bank program at the Prima Sakinah Islamic School PAUD in Bekasi City is able to develop early childhood ecoliteracy skills through structured, hands-on experiences, from collecting, weighing, sorting, and processing waste. The active involvement of children at every stage of the activity confirms that the most effective ecological learning for early childhood is concrete, contextual, and action-oriented. This aligns with Piaget's constructivist learning theory, which emphasizes that young children understand concepts through direct interaction with objects and their environment. Weighing and recording waste, for example, helps children develop numeracy and logical reasoning skills naturally, while sorting waste develops classification skills, recognizing the properties of objects, and developing an initial understanding of environmental issues (Hafizah et al., 2025).

The waste bank implementation is carried out using the 3Rs (Reduce, Reuse, Recycle), where children are actively involved in collecting, weighing, sorting, and processing used materials into learning materials. The skills developed in children include ecological goals, understanding environmental issues, critical thinking skills, resource management, environmentally conscious actions, and simple social collaboration. Based on the waste bank activities conducted at the Prima Sakinah Islamic School PAUD in Bekasi City, it can be concluded that these activities can develop ecoliteracy skills in early childhood. This research focused on waste bank activities at a single school, so the results cannot be generalized. Furthermore, the method used was qualitative, so the program's effectiveness cannot be definitively determined.

The ecoliteracy skills developed in children are evident in four main aspects: the ability to differentiate types of inorganic waste, recycling skills, socio-ecological skills, and environmental awareness. These findings reinforce Setyaningrum's view that ecoliteracy in children encompasses cognitive, affective, and psychomotor dimensions, developed through habits and direct experience. Creative activities transforming waste into works of art, such as plant pots or puppet shows, also demonstrate that children have grasped the concepts of reuse and recycling, which are core to ecoliteracy education (Setyaningrum, 2020). This aligns with research by Sari and Effendie, who found that project-based learning, such as making ecobricks and eco-enzymes, can improve children's critical thinking and creativity in understanding environmental issues (Sari & Effendie, 2025).

Other skills developed besides ecoliteracy include social-ecological skills such as cooperation, empathy, and responsibility, reinforcing the research findings of Irfan Hilman and Akmal, who stated that ecoliteracy learning not only impacts environmental knowledge but also increases children's empathy for humans and their surroundings (Irfan Hilman, Rudi Akmal, 2023). Children at Prima Sakinah Preschool even demonstrate initiative in keeping the classroom clean and admonishing peers who litter, behaviors that demonstrate the ongoing internalization of ecoliteracy values.

Factors contributing to the development of children's ecoliteracy skills, such as teacher involvement as facilitators, consistent weekly practice sessions, parental support, and a learning environment rich in ecological stimulation, align with various early childhood education theories that emphasize the importance of meaningful experiences and social support. Vygotsky's theory of the zone of proximal development

(ZPD) explains that the teacher's role as a facilitator or scaffolder is crucial in helping children understand concepts they cannot yet master independently. This is reflected in teacher-guided waste sorting, weighing, and processing activities (Aji & Ma, 2024).

Consistent weekly practice sessions align with Thorndike's behaviorist theory, which states that behavior is formed through repeated practice until it becomes a habit. Therefore, it is natural for children to show increased environmental awareness after participating in the waste bank program routine (Abidin, 2022). Parental support in providing waste from home also aligns with Bronfenbrenner's ecological theory, which states that child development is influenced by the interaction between home and school. This collaboration strengthens children's understanding because ecological values are practiced in two environments simultaneously. Meanwhile, a learning environment rich in ecological stimulation supports Montessori's theory, which emphasizes that a well-organized environment rich in manipulative materials will facilitate children's independence and natural exploration (Ayomi & Shofwan, 2025).

Field findings indicate that the waste bank program is not merely waste management but also an effective ecological education tool for shaping the knowledge, attitudes, and skills of early childhood. This research also broadens the perspective that effective environmental education needs to be implemented through direct experience, habituation, and action-based activities that enable children to experience, understand, and feel the impact of their ecological behavior.

CONCLUSION

Based on the research results, the implementation of the waste bank program at the Prima Sakinah Islamic School PAUD in Bekasi City was carried out through structured activities that included collecting waste according to the class schedule, weighing, sorting, recording, and processing used goods into various creative works of value. The implementation, which integrates the 3R principle (Reduce, Reuse, Recycle), not only involves children as participants, but makes them the main actors in every process so that learning takes place meaningfully and contextually. Through this series of activities, various ecoliteracy skills are formed in children, such as the ability to distinguish types of inorganic waste, recycling skills, awareness in managing resources, and socio-ecological skills in the form of empathy, collaboration, and responsibility for the environment. Children also demonstrate environmental awareness through real behavioral changes such as disposing of waste in the right place, keeping the classroom clean, and reminding friends who are negligent. Thus, the implementation of the waste bank program has proven effective in developing environmental care skills in early childhood through direct experience, continuous habituation, and the integration of ecological values in daily activities.

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