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Analysis of Eco-Friendly and Superior-Growing Paper to Address Environmental Issues in Kindergartens

Dayati Erni Cahyaningrum, Arini Inayatul Fajriyah, Achmad Buchori

^{1,2}PGRI Semarang University

³PGRI Semarang University

1cahyaaya735@gmail.com, ariniinayatulf@gmail.com achmadbuchori@upgris.ac.id

ABSTRACT

The purpose of this research is to address the environmental issue of used paper from various games and activities in several kindergartens, which is often discarded, burned, sold by weight, or taken home by children without introducing alternative, meaningful solutions for educational purposes. This includes teaching the concept of recycling by utilizing waste materials as learning tools to promote environmentally friendly behavior and awareness of protecting the surrounding environment. This research uses a qualitative approach with student participants and is conducted in the first semester at a kindergarten in Slawi. The data analysis technique primarily follows the Miles and Huberman method, which involves activities such as data collection, data display, and conclusion drawing. Additionally, data collection activities include documentation, observation, and interviews with relevant sources for comprehensive data analysis and collection.

The research results indicate that using eco-friendly paper at the kindergarten in the study provided an unforgettable experience and was a gradual process in building children's awareness of the importance of environmental protection. Through the activity of making plant cards from recycled paper, children were directly involved in recycling and learned about the negative impacts of burning, selling, or discarding paper, which pollutes the environment. Instead, they discovered that burying the paper allows it to decompose, and after being recycled into beneficial plant cards, it can even grow into vegetable plants. The KARTU program was designed to instill eco-friendly values in children through activities involving recycling, planting, selling, and maintenance as an educational initiative. This program has proven successful, though it still needs refinement, as it was the first enjoyable recycling experience for both teachers and students.

Keywords: Kartu; paper; recycling

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INTRODUCTION

Early childhood education, particularly in kindergartens, faces challenges in integrating environmental values into the learning process. This is partly due to the frequent use of paper as a learning medium to create various toys in centers, groups, areas, and classroom activities. This highlights the need to address paper usage and introduce the concept of recycling to encourage reuse in a creative and purposeful way. Creative and engaging learning approaches are essential to help children grasp abstract concepts such as recycling, plant growth, and sustainability through hands-on practice, so they can not only understand the theory but also apply it. An approach that combines motor, cognitive, and socio-emotional aspects is crucial for children to go beyond theoretical understanding and become actively involved in educational and enjoyable activities, including addressing environmental issues related to paper waste.

The increasingly complex environmental issues, such as the growing volume of waste, pose a significant challenge. One type of waste that continues to rise is paper waste, including at kindergartens, where paper is often simply burned or discarded without purpose. Therefore, introducing the concept of recycling to young children is important; not only is it enjoyable, but it also teaches them to protect and preserve the environment from an early age. Used paper frequently ends up as waste that accumulates, negatively impacting the environment by taking up space, creating dirt, and becoming breeding grounds for mosquitoes and other insects. In this context, it is essential to teach children about recycling and waste management from an early age so they grow up with greater awareness of the intelligence and communication skills needed to preserve the environment.

Based on observations at a kindergarten in the Slawi area, paper is widely used as a learning medium because it is easily accessible, affordable, and familiar to children. However, to manage the significant paper waste generated, it is often sold by weight, discarded, or even burned. In fact, this paper waste could be repurposed into an engaging educational program to introduce environmental awareness through "KARTU". This special paper is combined with vegetable seeds or other plant seeds according to children's interests.

The KARTU program, or eco-friendly and superior-growing paper, addresses two main issues: the high volume of underutilized paper waste and the need for engaging and meaningful learning methods in early childhood education. Through this program, used paper is recycled into planting media, creating a unique product known as "planting cards." These cards serve as an educational tool for teaching children about recycling and plant growth. They also act as an eco-friendly product that introduces children to early entrepreneurship by allowing them to market the products they create with the guidance of their teachers.

Cards were chosen as the main medium for several reasons. First, cards are familiar to people and often used for various occasions, such as greeting cards, invitations, or souvenirs. By creating cards embedded with plant seeds, this program transforms an everyday item used in children's play activities into a meaningful and sustainable learning tool. Each card contains seeds that can be directly planted, offering an added benefit: the card recipient not only receives a message but also has the opportunity to plant the seeds and witness their growth. This creates an interactive and positive experience associated with paper use (Norman et al., n.d.).

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Second, using cards as the final product creates economic value from recycling activities. Cards made from recycled paper pulp serve not only as educational tools in schools but also have the potential to be sold (Marisa et al., n.d.). These planting cards can be marketed as eco-friendly greeting cards that convey messages and encourage planting. In this way, the KARTU program also supports the circular economy movement, where products made from recycled materials are reused functionally and commercially.

This activity provides numerous benefits for children. In the process of making the cards, they learn about recycling while developing motor skills through activities like tearing, mixing, and molding paper pulp. Children gain an understanding of the plant life cycle by planting seeds in the cards they make themselves. This reinforces concepts of environmental responsibility and gives them hands-on experience with the importance of sustainability (Nairfana et al., 2023).

By selling the planting card products, children are also introduced to a basic economic cycle, learning how waste can be transformed into something with market value. Additionally, this program aims to create an additional funding source for school learning activities, allowing the school to sustain similar programs in the future.

Research related to planting cards is titled Feasibility Analysis of Paper Products into Planting Paper (Valensia & Pramuditha, n.d.). The distinction of this research is that it is implemented as a project for young children, not only for marketing but also for early education and introducing eco-friendly behaviors. This involves using recycled items to prevent environmental pollution that would result from burning or discarding them. Through this planting card solution, paper waste is reduced and repurposed to improve soil fertility and grow plants, as seeds are already embedded in the paper.

Overall, KARTU offers a creative solution that addresses environmental issues related to paper waste while serving as a holistic learning tool for children. This program teaches the importance of recycling, sustainability, and environmental responsibility, while also fostering entrepreneurial potential through an eco-friendly product that can be sold. Additionally, it highlights how planting cards help address environmental issues within kindergartens. By introducing products like planting cards to the broader community, it is hoped that a collective awareness of the importance of protecting the environment through simple, sustainable steps will emerge.

METHOD

The card research was conducted in the first semester at a kindergarten in the Slawi district, with students as the subjects of the study. The research employed a qualitative approach using observation, both structured and unstructured interviews, and documentation to determine the effectiveness of the card innovation in addressing paper waste issues at the kindergarten and as a recycling learning tool. The analysis method followed the Miles and Huberman technique, which involves data collection, data display, and conclusion drawing (Sri Annisa & Mailani, 2023). Additionally, the research instruments included the researcher as the primary instrument and an interview guide.

RESULTS

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The card project to address paper waste, conducted at a kindergarten in Slawi using documentation, observation, and interviews with student participants, proceeded smoothly and was successful, although not yet fully optimized, as it was still a learning process. The children displayed joyful expressions while engaging in this unique learning activity, expressing that it was their first time participating in a recycling activity—specifically making paper using a recycled paper screen. This project-based learning on planting cards made from recycled paper was carried out over the course of a week. The project had been carefully planned by the teacher in collaboration with the children, who were eager to participate in nature-based, environmentally friendly learning activities.

The first day's planning, which involved introducing recycling through storytelling, concept mapping, and video screening, went smoothly. The children were actively engaged, asking questions about the lesson and sharing their experiences related to planting or observing such activities. They also discussed their preferences, with some children mentioning that they liked vegetables and others saying they didn't. Spinach was chosen as the seed to be embedded in the cards since it is popular and widely liked among children. Each child was given the task of bringing one sheet of used paper from home, while the materials needed for production, such as paint, buckets, and containers, were prepared by the school.

On the second day, the children were invited to collect used paper from their surroundings, both at home and at school. This activity introduced them to the concept of waste sorting, teaching them to differentiate types of paper that can be recycled. Additionally, they began to understand the importance of reducing waste and reusing items when possible. The children were then encouraged to think creatively about designs for their cards, such as hearts and squares, and to decide on what they wanted to create. They sketched their designs in their drawing books, and after a group discussion, spinach was selected as the seed to plant. As preparation for the next day, the children tore the paper into pieces and soaked it in water.

On the third day of implementation, after collecting the used paper, it is soaked in water to soften it and make it easier to process. The children will then help tear and shred the paper into small pieces the day before. This process involves fine motor activities that are important for early childhood development. Once the paper softens, it is blended into pulp using simple tools, including a portable blender that is supervised and used under set rules to ensure safety. At this stage, the children learn about the change in the material's form and gain a deeper understanding of the recycling process. On this third day, the focus is on creating smooth paper pulp, which is then molded using a special rectangular mold called a recycling screen. The children are encouraged to be directly involved in this process, and plant seeds that have been prepared are also mixed in during the activity. After this process is completed, the paper is dried outside, and when it's time to go home, it is collected and stored in the classroom. Documentation during this process was limited because the recording memory was full, and the activity was less conducive due to the children competing to try, as there was only one tool available. Ideally, there should have been at least four tools available, but the situation was managed by dividing tasks into molding, seed placing, drying, and collecting.

On the fourth day, due to limited equipment, the recycled paper had to be shared, so the children shaped it into their preferred forms. The paper was then painted and taught how to be packaged. The children collaborated and actively asked when the planting and selling would take place. Following this, an explanation was given that the planting activity would be conducted the next day, with the children instructed to bring plastic gloves. If unavailable,

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they were advised to wash their hands to maintain hygiene and ensure their clothes stayed clean. The planting process, as shown in the video on the first day, was explained again, including the need for soil, a water bucket, a trowel, and planting cards, along with the planting steps.

On the fifth day, it was concluded that the seed cards would be planted according to the agreement, with only two planted in the school garden while the rest would be sold. The children actively asked when the plants would grow after being watered. To this end, they were reminded to take turns watering and caring for the plants daily, so they could monitor the results through regular checks. Once the plants started to grow, the children asked what would be done with the spinach—whether it could be sold or cooked together as part of their teamwork. The children expressed joy in caring for the plants and making the cards. Even the parents mentioned their happiness, as many children shared their experiences at home.

On the sixth day, the seed cards were offered to the mothers who drop off and pick up their children at school for five thousand rupiahs each. The cards sold well because people appreciated the children's effort in promoting their product, even offering it to their own mothers. Ideally, a market day program should be organized for these cards with other classes involved. However, due to time constraints and upcoming school programs, there has not been alignment to create a market day program in the near future, so the children sold the cards themselves as a learning experience. In the future, a market day program can be organized, and current production is kept minimal as both teachers and students are still learning and refining this program, which is being implemented for the first time.

Thus, the research results are ongoing to observe how the vegetables grow, as it takes time; although sprouts have already appeared, they continue to be monitored. The most important aspect of this program is its positive impact, such as fostering children's independence, creativity, understanding of teamwork, and responsibility for preservation. The children prayed before and after learning sessions and recognized that the seeds were created by the Creator, as were the paper materials. They also developed critical thinking by selling the cards and planning how to process the plants once grow (Pitaloka et al., 2024). Additionally, the children learned noble character traits by sharing responsibilities and fostering environmental awareness through reusing and recycling waste materials. Their growing awareness of environmental conservation was evident, as they gradually understood the importance of reducing paper waste by repurposing it rather than burning it, thus avoiding air pollution. However, the efforts have not yet been fully optimized due to existing shortcomings, such as the need for better preparation of tools to increase production and the establishment of a structured marketing program.

Discussion

The use of eco-friendly paper at the kindergarten studied provided an unforgettable experience and a gradual process of building children's awareness of the importance of protecting the environment. Through the process of creating plant cards from recycled paper, the children were directly involved in the recycling process and came to understand the negative impact of burning paper or simply selling or discarding it, which would pollute the environment. Instead, they learned that burying it allows the paper to decompose naturally and even grow into vegetable plants, as it had been recycled into beneficial planting cards.

This experience not only imparted knowledge about the recycling process but also fostered a sense of responsibility and care for the environment. The children began to

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understand that their actions, such as using paper, have an impact on the environment (Fatimah et al., 2023).

The KARTU program implemented at this kindergarten was designed to instill eco-friendly values in children through various activities such as recycling, planting, marketing sales, and plant care as part of education. Through these educational activities, the children were encouraged to explore environmental issues, such as pollution caused by burning waste, including paper waste, which contributes to environmental contamination due to large amounts of waste. Therefore, they were taught the importance of preserving nature and maintaining soil fertility through the planting card activities (Lifatinanda et al., 2022). The children were trained to sort waste and process it to be reused as planting media and decompose paper waste during planting. Students were also taught about the natural cycle, natural resources, and the negative impacts of environmentally unfriendly behavior (Banina et al., 2024). This activity not only taught waste processing but also fostered the habit of sorting waste from an early age, which had a positive impact on this card program.

The implementation of eco-friendly paper usage and the *Growing Excellence* program had a positive impact on kindergarten children, as they gained a better understanding of the importance of protecting the environment and the negative effects of environmentally unfriendly behavior. The children began to apply eco-friendly practices in their daily lives, such as sorting waste, using recycled paper, and taking care of plants as part of nature-based learning to promote environmental conservation and adapt to eco-friendly practices (Pratiwi et al., 2023). Additionally, the children became more creative in using recycled paper to make cards in various shapes and colors, which were then attractively packaged for sale. However, the research is not yet perfect, as this was the first trial, serving as an initial experience not only for the students but also for the teachers. Therefore, improvements and evaluations are needed to ensure the program can be carried out sustainably.

This study has limitations in terms of scope and research duration. The research was conducted at only one kindergarten and within a specific time frame, so further research is needed to evaluate the program over the long term, including tools and materials. Collaboration among the kindergarten, parents, and the community is necessary to support this program through initiatives like a market day. Additionally, the development of more innovative and engaging programs is required to boost children's motivation to care for the environment.

CONCLUSION

Thus, through the *Kartu* program, which addresses the issue of paper waste that is either burned or sold by weight, another solution has emerged: turning paper waste from student activities into educational activities that do not pollute the environment. This approach integrates waste processing and energy conservation with the use of eco-friendly paper. Children not only gain an understanding of important environmental concepts but are also motivated to adopt eco-friendly behaviors in their daily lives through a week-long project involving planning, implementation, and conclusion activities. These included recycling, planting, and marketing plant seed cards, which continue to be monitored. The most significant aspect of the process is that the children understand eco-friendly behavior, even though the plants have only sprouted since the project has been in progress for just a few weeks. It is essential to recognize that the children comprehend the process, not just the final outcome of the project. The results of this research indicate that a structured program that actively engages children in the learning process can be key in shaping a generation that cares about the environment and is ready to become agents of change in the future. Although

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this activity has been successful, it is not yet perfect and requires further improvements as lessons are learned and future research continues to refine it.

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