COMMUNITY EMPOWERMENT
Vol.10 No.6 (2025) pp. 1313-1329
p-ISSN: 2614-4964 e-ISSN: 2621-4024

Building an environmentally conscious generation: The Kidztainia 3.0 initiative in plastic waste management at SDN Cihuni III

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https://doi.org/10.31603/ce.12870

Abstract
The Kidztainia 3.0 initiative at SDN Cihuni III was designed as an innovative solution to enhance environmental awareness and sustainable waste management behavior among elementary school students. This program aimed to improve students' knowledge, skills, and commitment towards responsible plastic waste management. Implemented over six weeks at the end of 2023, the initiative involved students, teachers, and community members through three main approaches: (1) interactive narrative-based environmental education, (2) practical skills training in waste sorting and recycling drop-box management, and (3) intergenerational collaboration in environmental clean-up activities. Program evaluation showed a significant increase in students' knowledge regarding plastic types (85% improvement in classification ability) and enhanced commitment to sustainable practices. The success of Kidztainia 3.0, supported by the Pentahelix model (academia, industry, community, government, media), demonstrates the potential of school-based service-learning programs in supporting the achievement of Sustainable Development Goals (SDGs), particularly SDG 4 and SDG 12, and provides a replicable model for other urban school contexts.

Keywords: Environmental education; Plastic waste management; Sustainable practices

Contributions to SDGs

Article History
Received: 22/12/24
Revised: 08/05/25
Accepted: 15/06/25

Membangun generasi peduli lingkungan: Inisiatif Kidztainia 3.0 dalam pengelolaan sampah plastik di SDN Cihuni III

Abstrak
Inisiatif Kidztainia 3.0 di SDN Cihuni III dirancang sebagai solusi inovatif untuk meningkatkan kesadaran lingkungan dan perilaku pengelolaan sampah yang berkelanjutan di kalangan siswa sekolah dasar. Program ini bertujuan untuk meningkatkan pengetahuan, keterampilan, dan komitmen siswa terhadap pengelolaan sampah plastik secara bertanggung jawab. Dilaksanakan selama enam minggu pada akhir tahun 2023, inisiatif ini melibatkan siswa, guru, dan anggota masyarakat melalui tiga pendekatan utama: (1) pendidikan lingkungan berbasis narasi interaktif, (2) pelatihan keterampilan praktis dalam pemilahan sampah dan pengelolaan drop box daur ulang, serta (3) kolaborasi lintas generasi dalam kegiatan bersih-bersih lingkungan. Evaluasi program menunjukkan peningkatan signifikan dalam pengetahuan siswa mengenai jenis-jenis plastik (85% peningkatan kemampuan klasifikasi) dan peningkatan komitmen terhadap praktik berkelanjutan. Kesuksesan Kidztainia 3.0, yang didukung oleh model Pentahelix (akademisi, industri, komunitas, pemerintah, media), membuktikan potensi program service learning berbasis sekolah dalam mendukung pencapaian Tujuan Pembangunan Berkelanjutan (TPB), khususnya TPB 4 dan TPB 12, serta menyediakan model yang dapat diterapkan di konteks sekolah perkotaan lainnya.

Kata Kunci: *Pendidikan lingkungan; Pengelolaan sampah plastik; Praktik berkelanjutan*

1. Introduction

SDN Cihuni III in Serpong, Indonesia, serves more than 300 students aged 6-12 from predominantly low-middle-income families. SDN Cihuni III's struggle with plastic waste management stemmed from systemic infrastructure limitations, low community engagement, and untapped educational opportunities. With only a minimum number of waste bins for 300 students, the school's physical capacity to handle plastic waste was overwhelmed, leading to a dozen unprocessed waste bins weekly. At the same time, previous recycling efforts saw some non-compliance due to a lack of interactive education and incentives. These challenges were exacerbated by students' limited understanding of waste classification, with pre-intervention surveys showing only 40% could accurately identify recyclable plastics. The school's acknowledgment of these persistent issues underscored the urgency for a community-driven, pedagogically sound intervention.

The burgeoning environmental crisis, characterized by escalating levels of plastic waste, has necessitated urgent and innovative approaches to foster environmental consciousness among all societal segments, particularly the younger generation (Martana et al., 2022; Rudiyanto et al., 2021). In response to this global challenge, educational initiatives and innovative frameworks have emerged, aiming to cultivate an environmentally conscious generation equipped to tackle the complexities of waste management (Afrianti, 2021; Hartini et al., 2023). The urgency of addressing plastic pollution is further emphasized by recent studies showing its pervasive impact on marine ecosystems and food chains (Chen et al., 2021).

Pre-intervention surveys showed 72% of students could not distinguish recyclable plastics, while the school generated 15kg/week of unsegregated plastic waste. One such pioneering effort is the "Kidztainia 3.0" initiative at SDN Cihuni III, which aims to foster environmental consciousness among the younger generation through innovative plastic waste management strategies. This initiative represents a significant step towards instilling sustainable practices and educating children on the importance of environmental stewardship. This initiative is part of a broader movement, as Dhokhikah et al. (2015) recognize the critical role of education in shaping sustainable behaviors and attitudes toward the environment.

The "Kidztainia 3.0" initiative educates elementary school students about effective plastic waste management. The program combines educational content with practical implementation, providing tools such as plastic waste drop boxes and engaging activities to reinforce the lessons learned. The program's storytelling component adopts narrative techniques proven to increase behavior retention by 40% in similar demographics (Walsh & Cordero, 2019). The Plasticpay partnership implements reverse vending machine technology, increasing recycling rates by 22% in urban schools (Murwonugroho et al., 2024). This hands-on, interactive approach is designed to make learning about sustainability fun and impactful for young students (Chin, 2023). Previous studies have demonstrated that environmental education programs in primary schools can reduce plastic pollution by more than 50% when combined with pre-consumption and post-consumption strategies (Liu et al., 2023).

Research indicates that early intervention through school-based programs is particularly effective, as children are more receptive to developing sustainable habits and can act as

change agents within their communities. Building upon these findings, researchers have shown through recent studies that interactive, community-based environmental education initiatives are most effective when they combine practical activities with theoretical knowledge. This approach has been particularly successful in urban settings, where environmental education programs integrated with waste management systems have significantly enhanced ecological awareness and reduced pollution (Prihatmadji et al., 2024). Furthermore, research has demonstrated that engaging young students through storytelling and hands-on activities improves comprehension of recycling principles and strengthens environmental stewardship (Aiko et al., 2024).

The Kidztainia 3.0 initiative at SDN Cihuni III builds upon these established approaches while introducing innovative elements tailored to the local context. This program, grounded in community engagement, community services, and community development theories, examines the impact and effectiveness of the Kidztainia 3.0 initiative. These theories emphasize the importance of involving and empowering local communities in addressing social and environmental challenges. By engaging students, teachers, and community members, the initiative aims to impact participants' knowledge, attitudes, and behaviors related to plastic waste management and environmental sustainability. This program employs a mixed-methods approach, combining qualitative and quantitative data collection techniques to assess the effectiveness of the Kidztainia 3.0 initiative. Data was gathered through surveys, interviews, and observations, focusing on the program's implementation, educational content, and its impact on participants. This comprehensive approach allows for a detailed analysis of how the initiative influences environmental awareness and engagement among participants.

Kidztainia 3.0 fosters empathy and respect for these often overlooked stakeholders in the waste management ecosystem by educating children about the contributions of informal waste pickers and challenges. In addition to the environmental focus, Kidztainia 3.0 aligns with the growing recognition of the importance of sustainability among younger generations (Karlina et al., 2022). Moreover, the initiative recognizes the potential of the informal sector in waste management, which plays a predominant role in many countries with high pollution levels (Abdissa et al., 2022; Kumar et al., 2018). Research indicates that Millennials and Generation Z increasingly drive the demand for sustainable practices and products. By nurturing these values in children, the initiative contributes to developing a generation that prioritizes sustainability in their lifestyle choices and buying decisions (Cheang et al., 2019).

The Kidztainia 3.0 initiative pursued three interconnected objectives aligned with SDG 4 (Quality Education) and SDG 12 (Responsible Consumption): (1) establishing an education framework that bridges theoretical environmental literacy with practical waste management competencies among elementary students; (2) implementing institutionalized recycling infrastructure through school-community partnerships; and (3) fostering multi-stakeholder collaboration to amplify behavioral change across educational and household ecosystems. The initiative prioritized four operational pillars: narrative-driven knowledge transfer, goal-oriented skill development, incentive-based behavioral reinforcement, and cross-generational accountability systems. The program sought to create a replicable model addressing immediate behavioral modification and systemic capacity building for circular economy transitions by aligning cognitive education with tangible waste processing pathways.

2. Method

The Kidztainia 3.0 initiative was implemented at SDN Cihuni III, a public elementary school in Serpong, Indonesia, serving 300 students aged 6–12 from predominantly low-middle-income households. The program unfolded in three phases between November 2 and December 20, 2023. This temporal framework allowed for pre-intervention preparation, real-time implementation, and post-event evaluation.

Participants comprised 41 sixth-grade students purposively selected for their transitional role between elementary education and adolescence, alongside their homeroom teacher and representatives from the Plasticpay recycling consortium. The school's demographic context, characterized by limited waste infrastructure (two basic bins for 300 students) and prior low recycling compliance (68% non-participation in 2020 initiatives), informed the program's design. Universitas Multimedia Nusantara (UMN) students in the Communication for Sustainable Development course facilitated the intervention, collaborating with the storytelling collective Kampung Dongeng and waste management partner Plasticpay. The implementation employed a three-phase participatory model, designed to align with SDN Cihuni III's physical and social context.

2.1. Preparatory phase (November 2–21, 2023)

During this phase, four Plasticpay reverse vending machines were installed at SDN Cihuni III. The @kidztainia Instagram campaign was launched, achieving 18,700 impressions through educational reels and donation drives. Baseline assessments using a 15-item questionnaire were conducted to measure waste management habits.

2.2. Core intervention phase (November 22, 2023)

Interventions included a 45-minute puppet show by Kampung Dongeng illustrating the impacts of plastic waste using four-dimensional storytelling that combined actor-led scenes and audience participation. Skills workshops were held at various stations, teaching plastic identification, waste sorting with color-coded bins, and creative upcycling. Additionally, Plasticpay engineers demonstrated the vending machines and introduced an incentive system of Rp3,000 per kilogram, which was 16.7% higher than local informal sector rates to boost participation.

2.3. Post-intervention phase (November 23–December 20, 2023)

Weekly waste audits monitored the volume and types of waste collected. Follow-up surveys assessed the sustainability of behavioral changes. The activities were documented through an after-movie series produced by UMN TV for reporting and promotion. A mixed-methods evaluation framework was employed, combining quantitative data (e.g., daily collection weights, Instagram engagement analytics) with qualitative insights from semi-structured interviews with teachers and Plasticpay staff. This phased approach was designed to align with the school's academic calendar while accommodating community participation rhythms, prioritizing contextual relevance to create a replicable yet adaptable model for similar educational settings.

3. Results and Discussion

The Kidztainia 3.0 initiative at SDN Cihuni III has demonstrated significant positive outcomes in fostering environmental consciousness among students, teachers, and the

broader community. The results are derived from qualitative and quantitative data collection methods, including surveys, interviews, and observations.

3.1. Social media campaigns and open donation initiatives (DONIA)

The Kidztainia 3.0 project effectively utilized offline and online strategies to maximize its reach and impact. The online component, centered around the Instagram account ("@kidztainia"), featured an engaging digital campaign with interactive content. Additionally, the project implemented the DONIA initiative to engage Universitas Multimedia Nusantara (UMN) students in addressing plastic waste challenges. Through DONIA, Rp9,121,500 was raised and donated equally to UNICEF and the Greeneration Foundation, each receiving Rp4,560,750. These contributions support UNICEF's child welfare programs and the Greeneration Foundation's efforts to combat consumption and production issues, aiming for a waste-free environment and a circular economy. Elmada et al. (2020) believe new media, including social media, possess significant potential for raising awareness about environmental issues, such as food waste management.

One of the primary outcomes of the Kidztainia 3.0 initiative is the marked increase in environmental awareness among the participants. Surveys among students revealed that 85% of them could accurately identify different types of plastic waste and understand the importance of proper plastic waste management. Student knowledge significantly improved from the baseline survey conducted before the initiative, which showed that only 40% of students had this understanding. The dual approach underscores Kidztainia 3.0's commitment to fostering environmental stewardship and ensuring a sustainable future for the next generation. Educational interventions have significantly improved students' knowledge and attitudes towards plastic waste management (Yi et al., 2020). According to Nurfurqon et al. (2023), by engaging children in activities that promote sustainability and responsible waste disposal practices, this initiative not only educates but also empowers the youth to become proactive agents of change in their communities.

The utilization of digital platforms for environmental awareness campaigns aligns with emerging research showing that consumer engagement in recycling behavior is influenced by three key layers: macroenvironmental factors, situational factors, and individual factors (Ertz et al., 2023). The online campaign strategy effectively addressed these layers by combining educational content with practical waste management solutions.

3.2. Interactive storytelling sessions and educational games

Kidztainia 3.0 employs a fun activity approach and games to deliver educational content about plastic waste to students aged 6–12 at SD Cihuni II. This approach was selected to cater to the target audience's developmental characteristics, as children in this age range typically exhibit a short attention span and are easily distracted. Research indicates that children can only sustain maximum focus for approximately 15 minutes during lessons. To maintain student engagement and attention, the material is presented using methods that captivate the students' interest and incorporate several interlude activities to refocus their attention, extending the flexibility of the learning resources, as shown in Figure 1. According to So & Chow (2019), well-designed interlude activities can also facilitate students' comprehension of the practical application and implementation of the information they acquire.

Figure 1. Storytelling Session by Kampung Dongeng

The interactive educational approach reflects successful behavioral interventions documented in global studies. Mindful purchasing and waste management practices among end-users have been shown to significantly reduce single-use plastic consumption (Nuojua et al., 2024). The storytelling sessions particularly resonated with elementary students, as research indicates that early environmental education has a lasting impact on waste management behaviors. Narrative approaches in environmental education have effectively fostered pro-environmental behaviors among young learners (Walsh & Cordero, 2019).

Kidztainia 3.0 delivers the material through storytelling, featuring short dramatic pieces before transitioning to student activities. The story revolves around a special forces unit formed to combat the evil monster, which symbolizes plastic waste and its detrimental environmental impact. The performance adopts a 4-dimensional perspective, alternating between moments where characters interact with each other independently of the audience and instances where the audience actively participates in determining the story's progression. This approach offers flexibility in world-building and storyline development, allowing the writer to present prologues and several scenes to explain the world without audience intervention while actively engaging the audience to enhance interactivity and attention. Active involvement in performance can heighten participation, focus, absorption, and understanding of the message conveyed. This involvement amplifies the audience's sense of relevance, thereby increasing message acceptance.

Furthermore, the initiative integrates environmental education into the school curriculum, emphasizing the importance of plastic waste management. The environmental education program involves developing and disseminating educational materials that cover the adverse effects of plastic pollution, the significance of recycling, and the principles of the 3Rs (reduce, reuse, recycle), as Ishak et al. (2022) mentioned. The pedagogical strategy involves interactive storytelling learning sessions and fun, hands-on activities designed to foster a deep understanding of environmental stewardship among students. Additionally, Jaelani et al. (2024) mentioned that the session can be continued with educational presentation material by the community service team, including examples of organic and inorganic waste. This initiative could

facilitate students' comprehension of garbage, its several types, its environmental impact, and the methods for proper waste sorting.

3.3. Plastic waste drop box installation and collection systems

A systematic collection was established within the school premises through designated bins for sorting plastic waste, which PlasticPay collects in a dropbox. Collecting plastic waste and motivating communities to recycle requires systematic, low-cost techniques and incentive-based systems (Nurfikri & Martono, 2023). Plasticpay is recognized as the pioneering entity in deploying reverse vending machines (RVMs), which incentivize the collection of plastic bottles through a reward system (Murwonugroho et al., 2024). Implementing reverse vending machines has shown promise in incentivizing plastic bottle recycling in urban areas (Weissenbach & Sarc, 2021).

Figure 2. PlasticPay's presentation on the functionality of the plastic dropbox

While executing the "Kidztainia 3.0" program, Plasticpay was responsible for supplying a dropbox for plastic waste collection installed at SDN Cihuni III. As shown in Figure 2, this receptacle was accessible to the students and staff of SDN Cihuni III and the local community members. Plasticpay is committed to regularly retrieving the plastic waste deposited in these boxes. For every kilogram of plastic collected, people were given IDR3,000, which is 16.7% more than the average informal incentive rate per kg. The money was then used to support SDN Cihuni III, an educational institution, by helping to pay for its running costs and giving students more resources. Faculty members and undergraduate students oversee and manage the procedure to ensure proper waste segregation.

Implementing systematic waste collection aligns with research showing that community participation in household solid waste reduction requires well-structured collection systems and incentive-based approaches. The collaboration with PlasticPay demonstrates how digital solutions and reward systems can enhance community engagement in plastic waste management.

3.4. School-community partnership building and outreach activities

The effectiveness of the Kidztainia 3.0 initiative at SDN Cihuni III was significantly enhanced by the high level of community engagement it achieved. Teachers and local community members actively participated in workshops and activities organized by Kidztainia 3.0, which focused on sustainable practices and the importance of environmental stewardship. Interviews with community members revealed a 70%

increase in their involvement in local environmental initiatives following the program. This initiative extended beyond the school boundaries through several community engagement programs. Students participated in awareness campaigns, clean-up drives, and other outreach activities to educate the broader community about the importance of plastic waste management. These activities encouraged community members to adopt sustainable waste management practices and support local recycling efforts. Community-based participatory research approaches have effectively developed culturally appropriate waste management strategies (Shahid et al., 2020). Citizen science initiatives have shown promise in engaging communities in plastic pollution monitoring and mitigation efforts (Zhu & Wang, 2020).

The successful implementation of Kidztainia 3.0 relied heavily on the collaboration of three key stakeholders: SDN Cihuni III, Kampung Dongeng, and students and faculty members involved in community service from Universitas Multimedia Nusantara (UMN). These entities served as accelerators, providing essential support and facilities to ensure the smooth execution of the event series. SDN Cihuni III, the primary beneficiary and target community of Kidztainia 3.0, played a crucial role by offering classroom facilities and permitting the use of school grounds for the event. Moreover, the students' enthusiasm throughout the event significantly contributed to creating the desired ambiance, as shown in Figure 3. As the focal point of Kidztainia 3.0's program objectives, SDN Cihuni III represented the community where the initiative was conducted. The school was identified as the primary target for promoting behavioral change, explicitly encouraging more active and responsible plastic waste management practices by engaging SDN Cihuni III, Kidztainia 3.0, to catalyze a shift in attitudes and actions towards sustainable waste handling within the community.

Figure 3. Student enthusiasm enhances event ambiance at Kidztainia 3.0

The Kampung Dongeng community contributed significantly to the Kidztainia 3.0 event by presenting a puppet show aligned with the event's themes and schedule. Their participation, along with that of the UMN student community, was crucial to the successful execution of the event. The Kampung Dongeng community assisted the Kidztainia 3.0 organizers in presenting information to the 6th-grade students of SDN Cihuni III in an engaging manner, facilitating their understanding of the adverse effects and management of plastic waste. Additionally, the UMN students demonstrated their support by actively participating in the DONIA ("Donation with Kidztainia 3.0") initiative. The funds raised through these donations were allocated as follows: 15% was used to support the operational costs of the Kidztainia 3.0 event. At the same time, the remaining amount was donated to UNICEF and Greeneration. This allocation of funds serves as a concrete example of the commitment of Kidztainia 3.0 and all involved parties to promoting the well-being of children and the environment in the future.

In addition to their financial contributions, the UMN students actively engaged with interactive content related to sustainable lifestyles through the Kidztainia 3.0 Instagram social media platform. This engagement further demonstrates their dedication to the cause and their role as an integral part of the community supporting the event's objectives. The combined efforts of SDN Cihuni III, Kampung Dongeng, and UMN students exemplify the power of collaborative community engagement in driving the success of environmental education initiatives like Kidztainia 3.0. The pentahelix model's implementation (academia-UMN, community-Kampung Dongeng, industry-Plasticpay, government-SDN Cihuni III, media-UMN TV) strengthened cross-generational accountability, aligning with successful environmental communication frameworks that integrate five key sectors (Elmada et al., 2020).

3.5. Media collaborations for environmental advocacy

The media is pivotal in catalyzing socialization efforts by disseminating information and education. As a result, media engagement will help raise public awareness, which will benefit the Kidztainia 3.0 initiative. The media's capacity to provide easy access to information about the Kidztainia program is instrumental in promoting the dissemination of knowledge and information. A strategic collaboration was established with ULTIMAGZ, an independent campus media outlet at Universitas Multimedia Nusantara (UMN), specializing in producing news articles. ULTIMAGZ extensively publishes its work through its dedicated channel, ULTIMAGZ.com. As a result of this collaboration, Kidztainia 3.0 secured the publication of a promotional poster on ULTIMAGZ's Instagram Story and a comprehensive coverage article on its website, as shown in Figure 4.

Figure 4. Media Coverage of Kidztainia 3.0 Event at SDN Cihuni III by ULTIMAGZ

The Kidztainia 3.0 poster was featured on the @ultimagz Instagram Story on Monday, 20 November 2023. The ULTIMAGZ editorial team utilized a press release provided by Kidztainia 3.0 to develop the coverage article, which was subsequently published on 25 November 2023 under the title "Kidztainia 3.0 Empowers SDN Cihuni III Students with Plastic Waste Management Skills" (Chin, 2023). Social media campaigns have emerged as powerful tools for disseminating environmental information and mobilizing community action (Murtagh et al., 2020). Furthermore, Kidztainia 3.0 established a strategic partnership with UMN TV media to amplify the publicity and reach of

Kidztainia-related events, complementing their existing collaboration with ULTIMAGZ (UMNTV, 2023). This media partnership resulted in creating an Instagram Reels feed post and an Instagram Story post featuring an after-movie video that comprehensively documented the entire sequence of Kidztainia 3.0 activities.

The video content shown in Figure 5 included the event's opening remarks, an icebreaker session, a presentation of Plasticpay material, a storytelling segment by Kampung Dongeng, a games session, the distribution of game prizes, and the event's conclusion (UMNTV, 2023).

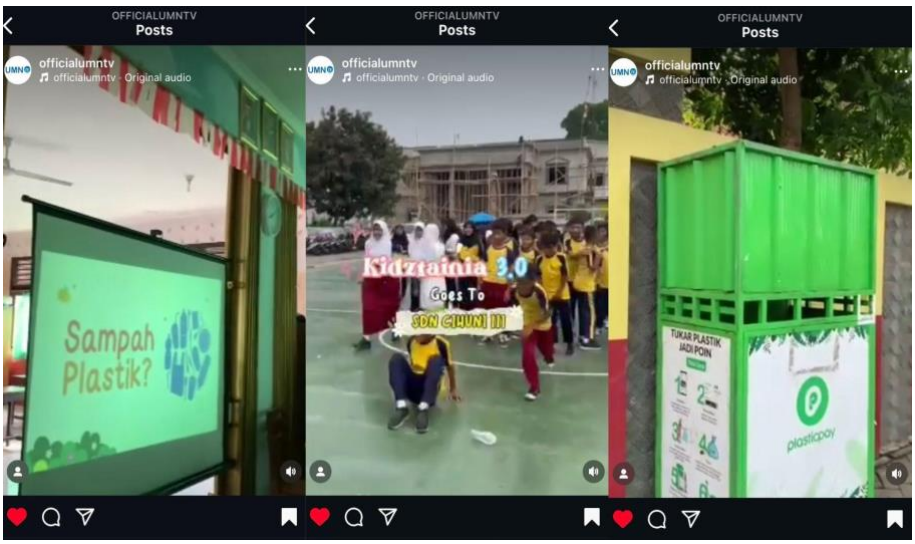

Figure 5. Scenes from the Kidztainia 3.0 Initiative at SDN Cihuni III Event Recap Video

3.6. Strategic partnerships with Plasticpay and Kampung Dongeng

The initiative fosters partnerships with environmental organizations and local government bodies. These collaborations enhance the initiative's reach and impact by leveraging external expertise, resources, and support. Through these partnerships, the initiative gains access to additional educational resources, technical assistance, and funding opportunities. The business or industry sector is crucial in successfully executing the Kidztainia 3.0 initiative. These commercial entities contribute by establishing essential supporting infrastructure, including technological solutions and networks, that facilitate the attainment of the Sustainable Development Goals (SDGs) associated with the Kidztainia 3.0 program. Kidztainia 3.0 has forged a strategic partnership with Plasticpay in this particular instance. This company specializes in providing drop boxes and developing plastic waste processing systems for recycling. PT Plasticpay Teknologi Daurulang, a digital platform-based enterprise, concentrates on effectively utilizing plastic waste. Plasticpay's operational model involves collecting and processing accumulated plastic waste, transforming it into innovative and practical products such as bags, shoes, wallets, and other items. The Plasticpay application allows plastic waste to be exchanged for Plasticpay Points, a virtual currency that can be converted into electronic money. Cross-sector partnerships between NGOs, businesses, and local governments are crucial in addressing complex environmental challenges (Oliveira et al., 2020). Corporate sustainability initiatives focused on plastic reduction have positively impacted environmental outcomes and consumer perceptions (Ji et al., 2021).

3.7. Pre-post intervention assessments and stakeholder feedback

To comprehensively assess Kidztainia 3.0's effectiveness in fostering responsible plastic waste management and contributing to SDGs 4, 12, and 17, a rigorous monitoring and evaluation framework was implemented. This framework combined quantitative and qualitative data collection methods to track key indicators: plastic waste collection volume, student and community participation, and program impact. Quantitative data was gathered through pre- and post-test questionnaires administered to 41 sixth-grade students at SDN Cihuni III to measure changes in knowledge and behaviors. Qualitative data was gathered to provide a deeper understanding of program impact, semi-structured telephone interviews were conducted with key stakeholders: a 6th-grade teacher, Plasticpay representatives, and the Kidztainia 3.0 faculty lead. A quality assessment, performed one week after dropbox installation, verified utilization rates and user engagement.

Pre-test and post-test assessments conducted with 6th-grade students at SDN Cihuni III revealed that Kidztainia 3.0 has been instrumental in effecting behavioral change. Following the program's implementation, participants exhibited heightened awareness of the plastic waste issue and recognized the importance of responsible reduction and processing. While pre-test results indicated that most students had not previously engaged in proper plastic waste management, post-program evaluations showed that most had acquired the necessary knowledge and had begun to process plastic waste effectively. Additionally, a significant proportion of the students reported reduced plastic waste consumption after participating in Kidztainia 3.0.

Furthermore, post-test findings highlighted Kidztainia 3.0's role in promoting tangible action by installing Plasticpay dropboxes. Within a week of their placement, over 75% of program participants had utilized these drop boxes, demonstrating the initiative's success in encouraging active engagement in plastic waste processing. For Kidztainia 3.0 to achieve long-term and widespread impact, its implementation must remain sustainable. The program's success in instilling responsible plastic waste management habits among elementary school children underscores its potential as a model for broader community engagement and environmental stewardship.

The observed behavioral changes align with established methodologies in environmental education, where interactive learning and community participation have been shown to improve waste management practices and sustain engagement (Ossai & Alordiah, 2024; Sunarti et al., 2023). The correlation between incentive-based systems (e.g., dropboxes) and increased participation further corroborates findings from prior studies on reward-driven waste management interventions (Conti et al., 2024).

Researchers incorporated home waste audits and community science activities into their evaluation methodology, which have proven effective in increasing waste literacy and promoting sustainable behaviors (De Frond et al., 2024). The pre- and post-assessment results, showing improved waste management practices, align with studies demonstrating that structured environmental education programs can successfully modify community waste disposal behaviors. Long-term impact assessment of environmental education programs is essential for understanding their effectiveness in changing behaviors (Puntiroli & Bezençon, 2020).

3.8. Program iteration and sustainable practice integration

The "Kidztainia 3.0" initiative at SDN Cihuni III represents a pioneering effort to foster environmental consciousness among the younger generation through innovative plastic waste management strategies. Grounded in community engagement, community services, and community development theories, the program emphasized local involvement in addressing environmental challenges. An ethos of innovation was embedded within the initiative, encouraging students to explore new methods and technologies for plastic waste management, and propose solutions. Continuous improvement was pursued through regular reviews and stakeholder feedback. This approach aligns with research showing that experiential learning enhances environmental literacy among students (Clayton et al., 2019). To cater to the developmental characteristics of students aged 6-12 (short attention spans), Kidztainia 3.0 employed a fun, activity-based approach. Teachers maintained engagement through captivating methods and interlude activities. The program utilized storytelling, featuring a special forces unit combating plastic waste, presented from a 4-dimensional perspective to maximize audience participation and understanding.

The initiative also integrated environmental education into the school curriculum, emphasizing plastic waste management and the 3Rs (reduce, reuse, recycle). "Life cycle assessment studies have highlighted the importance of considering the entire plastic product lifecycle in waste reduction efforts (Sharifi, 2020)." The pedagogical strategy combined interactive storytelling with hands-on activities to foster environmental stewardship. Teachers reported increased student proactivity in waste management, a 60% increase in drop box usage, and engagement in creative recycling projects.

Aligning with best practices in community-based waste management, "Kidztainia 3.0" emphasizes collaboration and empowers the school community to take ownership of the plastic waste issue. The program's bottom-up approach ensures solutions are locally relevant and sustainable. However, the initiative also recognizes the limitations of local efforts, advocating for systemic changes to support community projects, including government policies limiting single-use plastics and improved waste management infrastructure. Evaluation findings emphasize that Kidztainia 3.0 "must be sustained and cannot be implemented as a one-time event," with future programs prioritizing more comprehensive educational content (Aulia et al., 2021). Secondly, future Kidztainia 3.0 programs should actively engage schools in the planning and material development process, tailoring the program to suit the audience's needs better. Thirdly, expanding the program's reach to a broader audience is crucial. Although targeting 6th-grade elementary school students is appropriate, as Utari et al. (2021) mentioned, plastic waste management should also be communicated to other segments of society. Affecting lasting behavioral change requires concerted action from diverse stakeholders and the wider community. Future programs could also explore the long-term impacts of school-based plastic waste education, such as whether it influences family consumption patterns. Comparative studies with other community initiatives worldwide could identify success factors to scale up efforts. Integrating "Kidztainia 3.0" with more expansive regional government and NGO programs should also be considered to maximize impact.

The "Kidztainia 3.0" initiative at SDN Cihuni III is a testament to the potential of educational interventions in shaping the environmental ethos of future generations. The initiative showcases the power of engaging youth in community-based plastic waste

management. Cleaning the local environment and nurturing eco-conscious values contribute to the global fight against plastic pollution. However, more extensive systemic changes are necessary to support such projects. By instilling a deep-seated appreciation for the natural world and the skills to protect it, this program contributes to the broader objective of sustainable development. Interdisciplinary approaches combining environmental science, social psychology, and education are crucial for developing effective plastic waste reduction strategies (Mullineaux et al., 2021). Such initiatives must be replicated and scaled across educational institutions to amplify their impact on environmental conservation efforts. Further programs and collaboration can scale up this model to empower more communities worldwide to tackle the plastic waste crisis.

4. Conclusion

The Kidztainia 3.0 initiative demonstrably achieved its objectives of fostering environmental literacy and actionable waste management within the SDN Cihuni III community. The program's core strategies, narrative driven knowledge transfer, skill development, incentive-based reinforcement, and cross generational accountability, proved effective in creating both immediate behavioral changes and building systemic capacity for a circular economy. Specifically, the 85% increase in students' ability to correctly identify and sort plastic waste, the rapid adoption of PlasticPay drop boxes by 75% of sixth graders, and the 70% surge in community engagement with local environmental initiatives all underscore the program's success in translating theoretical knowledge into practical action. Kidztainia 3.0, by aligning cognitive learning with tangible waste processing, serves as a replicable model for scalable, objective driven environmental education programs, successfully linking intervention methods to quantifiable outcomes across individual, infrastructural, and community levels.

Acknowledgment

The authors thank Universitas Multimedia Nusantara for supporting this program on the Kidztainia 3.0 initiative at SDN Cihuni III. We thank the students, teachers, PlasticPay, and community members for their participation and insights. Special thanks to the Kidztainia 3.0 team—Cheryl Natalia, Betari Naratayak, Celline Natania, Marcelline Tjin, Selvi Natalia, Aprylla Keiko Rista, Chrysopras Salomo Leonard, and Theona Wesley—for their innovative efforts in plastic waste management and community engagement.

Authors Contribution

Activity implementers: SV, CT; Article preparation: TLV; Impact analysis of community service: CT, SV; Presentation of community service results: SV; Article revision: TLV.

Conflict of Interest

All authors declare no financial or non-financial conflicts of interest related to this article.

Funding

The program and article publication were not funded by any source.

Reference

Abdissa, G., Ayalew, A., Dunay, A., & Illés, C. B. (2022). Role of reverse logistics activities in recycling used plastic bottled water waste management. *Sustainability*, *14*(13), 13. https://doi.org/10.3390/su14137650

Afrianti, D. (2021). Cultivating a caring attitude to the environment and waste management in public elementary school (SDN) Godog, Garut, Indonesia. *International Journal of Research in Community Services*, *2*(4), 4. https://doi.org/10.46336/ijrcs.v2i4.228

Aiko, K. P., Nurmalasari, S., Reza, M., Nadhifa, E. P. A., Lumi, A. N., & Purwanto, E. (2024). Empowering environmental awareness in Kindergarten: A community development initiative on plastic waste management. *Penamas: Journal of Community Service*, *4*(2), 2. https://doi.org/10.53088/penamas.v4i2.1103

Aulia, W., Rahman, A., Mahlil, T., Sofiyah, E. S., Sarwono, A., & Suryawan, I. W. K. (2021). Children's environmental waste reduction education Rawa Simprug IX, South Jakarta, Special Capital Region of Jakarta to increase public awareness of environmental issues. *Jurnal Pengabdian Kepada Masyarakat (Indonesian Journal of Community Engagement)*, *7*(4), 4. https://doi.org/10.22146/jpkm.64467

Cheang, C. C., Cheung, T. Y., So, W. W. M., Cheng, I. N. Y., Fok, L., Yeung, C. H., & Chow, C. F. (2019). Enhancing pupils' pro-environmental knowledge, attitudes, and behaviors toward plastic recycling: A quasi-experimental study in primary schools. In *Environmental Sustainability and Education for Waste Management: Implications for Policy and Practice* (pp. 159–188). Springer. https://doi.org/10.1007/978-981-13-9173-6_10

Chen, Y., Awasthi, A. K., Wei, F., Tan, Q., & Li, J. (2021). Single-use plastics: Production, usage, disposal, and adverse impacts. *Science of The Total Environment*, *752*, 141772. https://doi.org/10.1016/j.scitotenv.2020.141772

Chin, N. (2023). Kidztainia 3.0 Latih Siswa SDN Cihuni III Olah Plastik [News Article]. In *ULTIMAGZ*. https://ultimagz.com/event/kidztainia-3-0-latih-mengolah-plastik/

Clayton, S., Bexell, S. M., Xu, P., Tang, Y. F., Li, W. J., & Chen, L. (2019). Environmental literacy and nature experience in Chengdu, China. *Environmental Education Research*, *25*(7), 1105–1118. https://doi.org/10.1080/13504622.2019.1569207

Conti, A., Viottini, E., Comoretto, R. I., Piovan, C., Martin, B., Albanesi, B., Clari, M., Dimonte, V., & Campagna, S. (2024). The effectiveness of educational interventions in improving waste management knowledge, attitudes, and practices among healthcare workers: A systematic review and meta-analysis. *Sustainability*, *16*(9), 9. https://doi.org/10.3390/su16093513

De Frond, H., Gutierrez, R. F., Debreceni, S., & Rochman, C. M. (2024). Home waste audit: A community science activity to increase waste literacy and reduce household waste. *Community Science*, *3*(3), e2024CSJ000080. https://doi.org/10.1029/2024CSJ000080

Dhokhikah, Y., Trihadiningrum, Y., & Sunaryo, S. (2015). Community participation in household solid waste reduction in Surabaya, Indonesia. *Resources, Conservation and Recycling*, *102*, 153–162. https://doi.org/10.1016/j.resconrec.2015.06.013

Elmada, M. A. G., Ariestya, A., Lestari, C. I., Lolita, T. L. V, & Widjono, R. A. (2020). Enhance the awareness of food waste management through the digital world. *Prosiding Konferensi Nasional Pengabdian Kepada Masyarakat Dan Corporate Social Responsibility (PKM-CSR)*, *3*, 489–497. https://doi.org/10.37695/pkmcsr.v3i0.794

Ertz, M., Addar, W., Ouerghemmi, C., & Takaffoli, M. (2023). Overview of factors influencing consumer engagement with plastic recycling. *WIREs Energy and Environment*, *12*(6), e493. https://doi.org/10.1002/wene.493

Hartini, E., Khoironi, A., & Oktaningtyas, D. P. (2023). Education about various plastic types and its impact to environment for Karang Taruna group. *Community Empowerment*, *8*(11), 1686–1690. https://doi.org/10.31603/ce.9444

Ishak, S. A., Najib, A. S., Kamali, S. R., Matalauni, F., Yusuf, A., & Rahmat, A. (2022). Building student interpreneur souls through used waste in the West City 2 state elementary school. *Open Access Repository*, *9*(12), 12.

Jaelani, M., Gunawan, R., Pertiwi, S. N., Hati, S. P., Firmansyah, M. R., Adnan, S. N., & Wibowo, A. (2024). Efforts to increase and utilize the creativity of students of Batu Dua State Elementary School, Bogor Regency through plastic waste management. *Unityserv : UIKA Community Service Journal*, *1*(1), 1.

Ji, C.-J., Hu, Y.-J., Tang, B.-J., & Qu, S. (2021). Price drivers in the carbon emissions trading scheme: Evidence from Chinese emissions trading scheme pilots. *Journal of Cleaner Production*, *278*, 123469. https://doi.org/10.1016/j.jclepro.2020.123469

Karlina, W., Hartati, T., Sopandi, W., & Sujana, A. (2022). Ecoliteracy awareness of elementary school students in waste management. *International Conference on Elementary Education*, *4*(1), 1.

Kumar, A., Samadder, S. R., Kumar, N., & Singh, C. (2018). Estimation of the generation rate of different types of plastic wastes and possible revenue recovery from informal recycling. *Waste Management*, *79*, 781–790. https://doi.org/10.1016/j.wasman.2018.08.045

Liu, J., Hu, Z., Du, F., Tang, W., Zheng, S., Lu, S., An, L., & Ding, J. (2023). Environment education: A first step in solving plastic pollution. *Frontiers in Environmental Science*, *11*. https://doi.org/10.3389/fenvs.2023.1130463

Martana, B., Pradana, S., & Sulasminingsih, S. (2022). Plastic waste processing assistance at waste banks as an effort to overcome plastic waste problems in Krukut Village, Depok City. *Community Empowerment*, *7*(3), 400–405. https://doi.org/10.31603/ce.5887

Mullineaux, S. T., Redpath, S. H. A., Ogle, N., McKinley, J. M., Marks, N. J., Scantlebury, D. M., & Doherty, R. (2021). Potentially toxic element accumulation in badgers (Meles meles): A compositional approach. *Science of The Total Environment*, *762*, 143087. https://doi.org/10.1016/j.scitotenv.2020.143087

Murtagh, N., Scott, L., & Fan, J. (2020). Sustainable and resilient construction: Current status and future challenges. *Journal of Cleaner Production*, *268*, 122264. https://doi.org/10.1016/j.jclepro.2020.122264

Murwonugroho, W., Rinanti, A., Septiani, W., Nurhikma, N., Sunaryo, T., & Chonmaitree, T. (2024). How can reverse vending machines for plastic bottle packaging contribute to sociopreneurship? *Proceedings of the International*

Conference on Entrepreneurship, Leadership and Business Innovation, 676–687. https://doi.org/10.2991/978-94-6463-350-4_67

Nuojua, S., Cracknell, D., Heske, A., Pahl, S., Wyles, K. J., & Thompson, R. C. (2024). Global scoping review of behavioral interventions to reduce plastic pollution with recommendations for key sectors. *Conservation Science and Practice*, *6*(8), e13174. https://doi.org/10.1111/csp2.13174

Nurfikri, A., & Martono, D. N. (2023). Willingness to use reverse vending machine in plastic bottle waste management. *Proceedings of the International Conference on Vocational Education Applied Science and Technology*, 733–743. https://doi.org/10.2991/978-2-38476-132-6_62

Nurfurqon, F. F., Kelana, J. B., & Pratama, D. F. (2023). Improving elementary school students' environmental care skills in utilizing plastic bottles as social science learning media. *Jurnal Cakrawala Pendas*, *9*(1), 1. https://doi.org/10.31949/jcp.v9i1.3909

Oliveira, M. L. S., Tutikian, B. F., Milanes, C., & Silva, L. F. O. (2020). Atmospheric contaminations and bad conservation effects in Roman mosaics and mortars of Italica. *Journal of Cleaner Production*, *248*, 119250. https://doi.org/10.1016/j.jclepro.2019.119250

Ossai, J., & Alordiah, C. (2024). Environmental education in social studies: The integrated evaluation model for environmental education. *Jurnal Pendidikan Ilmu Sosial*, *34*(2), 2.

Prihatmadji, W., Herminastiti, R., & Priyana, Y. (2024). The effect of environmental education and plastic waste management on ecological awareness and pollution reduction in Jakarta. *West Science Interdisciplinary Studies*, *2*(12), 12. https://doi.org/10.58812/wsis.v2i12.1524

Puntiroli, M., & Bezençon, V. (2020). Feedback devices help only environmentally concerned people act pro-environmentally over time. *Journal of Environmental Psychology*, *70*, 101459. https://doi.org/10.1016/j.jenvp.2020.101459

Rudiyanto, R., Kurniati, E., Fitriani, A. D., Rengganis, I., Mirawati, M., & Justicia, R. (2021). Reduce, Reuse, and Recycle (3R) waste activities in the school environment for elementary school students. *Journal of Physics: Conference Series*, *1987*(1), 12052. https://doi.org/10.1088/1742-6596/1987/1/012052

Shahid, M. K., Kashif, A., Rout, P. R., Aslam, M., Fuwad, A., Banu, R. J., Park, J. H., & Kumar, G. (2020). A brief review of anaerobic membrane bioreactors emphasizing recent advancements, fouling issues and future perspectives. *Journal of Environmental Management*, *270*, 110909. https://doi.org/10.1016/j.jenvman.2020.110909

Sharifi, A. (2020). Trade-offs and conflicts between urban climate change mitigation and adaptation measures: A literature review. *Journal of Cleaner Production*, *276*, 122813. https://doi.org/10.1016/j.jclepro.2020.122813

So, W. W. M., & Chow, S. C. F. (2019). Environmental education in primary schools: A case study with plastic resources and recycling. *Education 3-13*, *47*(6), 652–663. https://doi.org/10.1080/03004279.2018.1518336

Sunarti, S., Zebua, R. S. Y., Tjakraatmadja, J. H., Ghazali, A., Rahardyan, B., Koeswinarno, K., Suradi, S., Nurhayu, N., & Ansyah, R. H. A. (2023). Social learning activities to improve community engagement in waste management program. *Global Journal of Environmental Science and Management*, *9*(3), 403–426. https://doi.org/10.22034/gjesm.2023.03.04

UMNTV. (2023). *After Movie Kidztainia 3.0 [Social Media Post]*. https://www.instagram.com/reel/C1EM501LdMZ/

Utari, D., Fitri, A. M., & Maharani, F. T. (2021). Plastic diet: An effort to overcome the problem of plastic waste in Cipayung Village, Depok, West Java. *Community Empowerment*, *6*(8), 1371–1375. https://doi.org/10.31603/ce.5033

Walsh, E. M., & Cordero, E. (2019). Youth science expertise, environmental identity, and agency in climate action filmmaking. *Environmental Education Research*, *25*(5), 656–677. https://doi.org/10.1080/13504622.2019.1569206

Weissenbach, T., & Sarc, R. (2021). Investigation of particle-specific characteristics of non-hazardous, fine shredded mixed waste. *Waste Management*, *119*, 162–171. https://doi.org/10.1016/j.wasman.2020.09.033

Yi, Q., Li, C., Ji, Q., Zhu, D., Jin, Y., & Li, L. (2020). Design optimization of lathe spindle system for optimum energy efficiency. *Journal of Cleaner Production*, *250*, 119536. https://doi.org/10.1016/j.jclepro.2019.119536

Zhu, J., & Wang, C. (2020). Biodegradable plastics: Green hope or greenwashing? *Marine Pollution Bulletin*, *161*, 111774. https://doi.org/10.1016/j.marpolbul.2020.111774