

Optimizing the Environment of SMK N 1 Merek: A Study on the Implementation of Waste Bins and Environmental Education Banners

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<p><i>Abstract:</i> This study aims to optimize the environmental carrying capacity at SMK N 1 Merek through the implementation of waste bins and environmental education banners. The study employs a descriptive approach using observation and interviews to collect data. The findings indicate that the strategic placement of waste bins and informative educational banners significantly enhance students' awareness of environmental cleanliness. Additionally, the behavior of disposing of waste properly has shown a marked improvement. This study concludes that the combination of physical facilities and visual education effectively supports sustainable environmental management within the school environment.</p>	<p>Keywords: Environmental Carrying Capacity; Environmental Awareness; Educational Banners.</p>
<p><i>Abstrak:</i> Penelitian ini bertujuan untuk mengoptimalkan daya dukung lingkungan di SMK N 1 Merek melalui penerapan tempat sampah dan banner edukasi lingkungan. Studi ini menggunakan pendekatan deskriptif dengan metode observasi dan wawancara untuk mengumpulkan data. Hasil penelitian menunjukkan bahwa penerapan tempat sampah yang strategis dan banner edukasi yang informatif secara signifikan meningkatkan kesadaran siswa terhadap kebersihan lingkungan. Selain itu, perilaku membuang sampah pada tempatnya juga meningkat secara signifikan. Penelitian ini menyimpulkan bahwa kombinasi antara fasilitas fisik dan edukasi visual efektif dalam mendukung pengelolaan lingkungan yang berkelanjutan di lingkungan sekolah.</p>	<p>Kata Kunci: Daya Dukung Lingkungan; Kesadaran Lingkungan; Banner Edukasi.</p>
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A. Introduction

Environmental sustainability is an essential issue that has garnered global attention due to its impact on ecosystems and human well-being (United Nations, 2021). Schools, as foundational institutions of education, play a critical role in promoting environmental awareness among students. By integrating environmental education into school policies, these institutions can foster environmentally responsible behaviors. Educational institutions are instrumental in shaping students' attitudes and behaviors

toward environmental sustainability. According to Tilbury (2010), environmental education not only raises awareness but also equips students with the knowledge and skills needed to address ecological challenges.

Despite growing awareness, many schools face challenges in implementing effective environmental initiatives. Limited resources, lack of awareness, and inadequate infrastructure often hinder schools' efforts to promote sustainable practices (Barton & Smith, 2020). Waste management is a critical component of environmental sustainability. Schools generate significant amounts of waste daily, making it imperative to adopt effective waste management systems (Wilson et al., 2012). Proper waste segregation and disposal practices can significantly reduce the environmental footprint of educational institutions.

Visual education tools, such as banners and posters, have proven to be effective in promoting environmental awareness. These tools provide clear, concise messages that encourage positive behavioral changes (Aronson, 2017). Numerous studies have highlighted the effectiveness of combining infrastructure improvements with educational campaigns in schools. For example, a study by Nguyen et al. (2019) found that installing waste bins alongside environmental education materials significantly improved waste disposal habits among students.

In Indonesia, environmental education is increasingly being incorporated into school curricula. The government has launched programs such as “Adiwiyata,” which aims to create environmentally friendly school environments (Ministry of Environment and Forestry, 2020). SMK N 1 Merek, a vocational high school, is located in an area that faces challenges related to waste management and environmental awareness. As a growing institution, it seeks to integrate sustainable practices into its daily operations and teaching methods.

The school has identified the implementation of waste bins and educational banners as key strategies to address its waste management challenges. These interventions aim to encourage students to dispose of waste properly and understand the broader implications of their actions. This study seeks to explore the effectiveness of these interventions in promoting environmental sustainability at SMK N 1 Merek. Understanding the impact of these strategies can provide valuable insights for other schools with similar challenges.

The study is grounded in the Theory of Planned Behavior, which suggests that attitudes, subjective norms, and perceived behavioral control influence individuals' intentions to perform specific actions (Ajzen, 1991). This theory provides a basis for understanding how educational and infrastructural interventions can shape student behaviors. The primary objective of this study is to evaluate the impact of waste bins and educational banners on students' environmental awareness and waste disposal practices. Secondary objectives include identifying challenges in implementing these interventions and proposing recommendations for improvement.

This research contributes to the growing body of literature on school-based environmental education. It highlights the potential of combining physical infrastructure with educational tools to create sustainable school environments. The study focuses on SMK N 1 Merek and examines the implementation of waste bins and educational banners over a six-month period. Data collection methods include observations, interviews, and surveys with students and staff.

Key research questions include: How do waste bins and educational banners influence students' waste disposal behaviors? What challenges are encountered during the implementation of these interventions? What strategies can enhance the effectiveness of these initiatives? The findings of this study have implications for policymakers, educators, and school administrators. By demonstrating the effectiveness of these interventions, the research can inform the development of guidelines for implementing similar initiatives in other schools.

Successful environmental initiatives often require collaboration between stakeholders, including students, teachers, and local communities (Hopkins, 2013). This study emphasizes the importance of engaging all stakeholders in the planning and implementation process. Changing behaviors is often a slow and complex process. However, studies have shown that consistent exposure to educational messages and the availability of supportive infrastructure can accelerate this process (McKenzie-Mohr, 2011).

The use of creative and engaging methods, such as visually appealing banners, can make environmental education more effective. These approaches resonate well with students and leave a lasting impact (Miller & Spoolman, 2017). This study underscores the importance of integrating environmental education with practical interventions in schools. By evaluating the impact of waste bins and educational banners at SMK N 1

Merek, the research aims to provide a replicable model for enhancing environmental sustainability in educational institutions.

B. Method

This study employed a mixed-methods approach, integrating quantitative and qualitative methods to evaluate the implementation of waste bins and educational banners at SMK N 1 Merek. A mixed-methods approach was selected to provide a comprehensive understanding of the interventions' impacts, combining statistical data with contextual insights. According to Creswell (2014), mixed-methods research enhances reliability and validity by triangulating data from diverse sources, which was essential in addressing the multifaceted nature of environmental education and waste management practices.

The research design adopted a descriptive case study framework, enabling an in-depth analysis of specific phenomena within the bounded system of SMK N 1 Merek. This design was chosen because it allowed for detailed exploration of the processes and outcomes associated with the interventions over a six-month period (Yin, 2018). The study monitored the placement of waste bins and the installation of educational banners, documenting their effects on students' waste disposal behaviors and environmental awareness.

The study population consisted of students, teachers, and administrative staff at SMK N 1 Merek. A purposive sampling method was used to ensure that participants directly involved in or impacted by the interventions were included. The sample comprised 50 students from different grade levels, 10 teachers, and 5 administrative staff members. According to Patton (2015), purposive sampling is ideal for studies requiring focused insights from specific groups, making it a suitable choice for this research.

Data collection was conducted using multiple methods, including surveys, interviews, observations, and document analysis. Surveys measured changes in students' awareness and behaviors before and after the interventions, providing quantitative data for statistical analysis. Semi-structured interviews with teachers and staff offered qualitative insights into the challenges and outcomes

of the implementation (Kvale & Brinkmann, 2015). Observations were conducted to assess students' interactions with the waste bins and banners, while document analysis provided additional context regarding school policies on environmental education.

Quantitative data from the surveys were analyzed using descriptive and inferential statistical methods. The Statistical Package for the Social Sciences (SPSS) was utilized to calculate mean scores, frequencies, and percentages, helping identify patterns and trends over time (Pallant, 2020). Qualitative data from interviews and observations were analyzed thematically, following the steps outlined by Braun and Clarke (2006). Recurring themes were identified, categorized, and interpreted to gain a deeper understanding of participants' experiences and the interventions' effectiveness.

Ethical considerations were prioritized throughout the study to ensure the rights and well-being of all participants. Informed consent was obtained from students, teachers, and staff before data collection, with assurances of confidentiality and anonymity. Participants were informed of their right to withdraw from the study at any time without consequences. Ethical approval was sought and obtained from the school administration to maintain compliance with institutional guidelines. Adhering to these principles ensured that the research was conducted responsibly and respectfully (Israel & Hay, 2006).

C. Results and Discussion

Results

The implementation of waste bins and educational banners at SMK N 1 Merek yielded significant improvements in students' waste disposal behaviors and environmental awareness. The analysis of survey data revealed that 85% of students demonstrated a marked improvement in segregating waste correctly by the end of the six-month intervention period. Observations further confirmed that the usage of waste bins increased, with a 70% reduction in

improperly disposed waste around the school premises. These findings align with prior studies emphasizing the importance of accessible infrastructure in promoting sustainable behaviors (Wilson et al., 2012).

Survey responses also indicated a shift in students' attitudes toward environmental responsibility. Prior to the intervention, only 45% of respondents agreed that they felt personally responsible for waste management at school. This figure increased to 78% post-intervention, underscoring the positive impact of educational campaigns on fostering environmental stewardship. According to Tilbury (2010), such shifts in attitudes are critical for long-term behavior change.

Qualitative data from interviews with teachers and staff provided additional insights into the effectiveness of the banners. Many respondents noted that the visually engaging content and strategic placement of banners in high-traffic areas captured students' attention and reinforced key messages. Teachers reported using the banners as supplementary teaching aids, enhancing classroom discussions on environmental topics. This supports Aronson's (2017) assertion that visual tools can significantly influence behavioral outcomes.

Despite the overall success, some challenges were noted. Approximately 20% of students reported occasional confusion regarding waste bin categories, particularly for mixed or non-standard waste items. Interviews with staff highlighted the need for periodic training sessions to address such gaps. Moreover, some banners suffered wear and tear, reducing their visibility and impact over time. These issues align with findings by Nguyen et al. (2019), who emphasized the importance of maintaining infrastructure and continuous education to sustain results.

Discussion

The findings of this study highlight the effectiveness of integrating physical infrastructure with educational campaigns in promoting sustainable practices in schools. The significant reduction in improperly disposed waste and the increase in environmental awareness among students demonstrate the

synergy between accessible waste management systems and targeted educational interventions. As suggested by Ajzen's (1991) Theory of Planned Behavior, the availability of supportive infrastructure, combined with positive attitudes and perceived behavioral control, can drive meaningful behavior change.

The role of educational banners in reinforcing environmental messages cannot be understated. By presenting concise, visually appealing information, the banners complemented the waste bins and created an environment conducive to learning and practice. This aligns with the principles of community-based social marketing, which emphasize the power of visual and contextual cues in shaping behaviors (McKenzie-Mohr, 2011).

One of the key strengths of the intervention was its ability to engage multiple stakeholders. Teachers, students, and staff all played active roles in implementing and monitoring the initiatives, fostering a sense of collective responsibility. According to Hopkins (2013), such collaborative approaches are essential for the success of sustainability programs in educational settings.

However, the study also underscores the challenges of sustaining behavioral change. While initial results were promising, the wear and tear of banners and occasional confusion over waste bin categories indicate the need for ongoing support and reinforcement. Periodic workshops and refresher sessions could address these issues and ensure the longevity of the interventions' impact.

The findings also have implications for scalability. Similar interventions can be implemented in other schools, with modifications tailored to specific contexts. For instance, schools with larger student populations might require additional waste bins or alternative educational materials to ensure broad engagement. The Adiwiyata program, which promotes environmentally friendly schools in Indonesia, could serve as a platform for scaling such initiatives nationwide (Ministry of Environment and Forestry, 2020).

Implications for Policy and Practice

The success of this study highlights the potential for integrating environmental education with practical interventions in school settings. Policymakers should consider mandating waste management systems and visual educational tools as part of national school infrastructure standards. Such policies could significantly contribute to achieving the Sustainable Development Goals, particularly Goal 12 on responsible consumption and production (United Nations, 2021).

Moreover, schools should allocate dedicated budgets for maintaining waste management systems and replacing worn-out educational materials. Teacher training programs should also incorporate modules on environmental education to equip educators with the knowledge and skills needed to sustain such initiatives. According to Barton and Smith (2020), teacher engagement is a critical factor in the success of school-based sustainability programs.

In conclusion, the integration of waste bins and educational banners at SMK N 1 Merek proved effective in promoting environmental awareness and sustainable behaviors among students. While challenges remain, the study demonstrates the potential of such interventions to create lasting impact. Future research should explore the long-term effects of these initiatives and examine their applicability in diverse educational contexts.

D. Conclusion

The implementation of waste bins and educational banners at SMK N 1 Merek successfully enhanced students' waste disposal behaviors and environmental awareness. The study demonstrated that combining accessible infrastructure with visually engaging educational tools creates a supportive environment for fostering sustainable practices. As observed, students became more consistent in segregating waste, and their sense of responsibility toward environmental preservation significantly improved. These findings underscore

the importance of integrating practical interventions with educational efforts to promote environmental sustainability in schools.

Despite the successes, challenges such as occasional confusion over waste categories and the wear and tear of educational banners highlighted the need for continuous reinforcement and maintenance. Regular workshops, updated materials, and consistent engagement with students and staff are essential to sustaining the impact of such initiatives. Furthermore, the study illustrated the value of involving multiple stakeholders, including teachers, students, and administrative staff, in implementing and monitoring environmental programs. Collaborative efforts ensure a broader impact and foster a collective sense of responsibility.

The results of this study have broader implications for other schools and policymakers. By replicating and adapting these interventions, educational institutions can contribute significantly to achieving sustainable development goals. Policymakers should prioritize the integration of waste management systems and environmental education tools into school infrastructure standards. As schools increasingly adopt these strategies, the cumulative impact on environmental awareness and sustainable behavior could extend beyond educational settings, benefiting communities and society at large.

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