



Assessing the Effectiveness of the Solid Waste Management Program on the Environmental Attitudes and Behaviors of Grade 9 Students of Cabitan National High School

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ABSTRACT

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This descriptive-comparative study assessed the effectiveness of the Solid Waste Management (SWM) Program at Cabitan National High School. Utilizing a mixed-methods approach, data were gathered from 142 Grade 9 students via a structured survey. Results showed universal awareness (100%) of the program but a significant compliance gap, with only 57.7% ("Always/Often") participating consistently. Students displayed strongly positive environmental attitudes (Mean = 4.39) and reported positive pro-environmental behaviors (Mean = 4.34), with evidence of behavioral spillover into their home practices. A t-test revealed a statistically significant difference ($p < 0.001$) in both attitudes and behaviors between consistent and inconsistent participants, supporting the role of repeated behavior in shaping internalized attitudes (Bamberg & Möser, 2007). Thematic analysis identified key benefits, Public Health and Hygiene, Aesthetic Improvement, and advanced Environmental Protection awareness, indicating the development of ecological literacy (McBride et al., 2013). The central challenge was Dependence on External Monitoring, revealing that the behavior is largely externally regulated (Deci & Ryan, 2000). The study concludes the program is successful in building awareness and positive attitudes but is limited by its reliance on external controls, highlighting a critical gap between intention and habitual action (Kollmuss & Agyeman, 2002).

KEYWORDS:

Solid waste management, Environmental attitudes, Pro-Environmental behavior, Compliance gap, Attitude-Behavior gap, External regulation, Behavioral spillover, Education for Sustainable Development

1. INTRODUCTION

The growing crisis of solid waste pollution has become one of the most pressing environmental issues of the 21st century worldwide. Improper waste disposal and segregation practices have endangered ecosystems, human health, and the global economy. Mismanaged waste contaminates bodies of water, including rivers, seas, and oceans, and the resulting methane emissions accelerate climate change and harm terrestrial and marine wildlife. Addressing this growing concern aligns with the United Nations Sustainable Development Goal (SDG) 12:

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Responsible Consumption and Production, which emphasizes reducing waste generation through prevention, reduction, recycling, and reuse.

Schools play a vital role in shaping young individuals' attitudes and behaviors toward environmental responsibility. As primary institutions for socialization and learning, they provide opportunities to cultivate ecological awareness, discipline, and civic responsibility. Through Education for Sustainable Development (ESD), schools empower learners to make informed decisions, adopt sustainable lifestyles, and actively participate in environmental preservation efforts.

In response to this call for sustainable action, Cabitan National High School has implemented an institutional Solid Waste Management (SWM) Program as part of its environmental initiatives. A central component of this program requires students to segregate waste into biodegradable and non-biodegradable bins placed throughout

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the school premises. The Youth for Environment in Schools Organization (YES-O) officers are tasked with promoting and monitoring compliance with this program, thereby fostering peer accountability and student-led environmental leadership.

While the SWM Program has been in operation, its actual impact on students' environmental awareness, attitudes, and behaviors has not been empirically assessed. It remains uncertain whether the initiative has succeeded in instilling genuine environmental consciousness or if it is perceived merely as a school requirement with limited internalization and long-term behavioral impact. This study, therefore, seeks to evaluate the effectiveness of the Solid Waste Management Program in Cabitan National High School. It aims to determine how the program influences the awareness, participation, attitudes, and behaviors of Grade 9 students. The findings will serve as evidence-based feedback for improving the school's environmental programs and strengthening its role in developing responsible, sustainability-minded learners.

Statement of the Problem

This study seeks to assess the effectiveness of Cabitan National High School's Solid Waste Management Program in shaping the environmental attitudes and behaviors of Grade 9 students. Specifically, it aims to answer the following questions:

1. What is the level of awareness, participation, and perceived effectiveness of the school's Solid Waste Management Program among Grade 9 students?
2. Is there a significant difference in environmental attitudes and waste segregation behaviors between students who consistently follow the segregation rules and those who do not?
3. What are the perceived benefits and challenges encountered by Grade 9 students in implementing the school's Solid Waste Management Program?

II. METHODS

This study utilized a descriptive-comparative research design. The descriptive aspect summarized the students' level of awareness, attitudes, and behaviors toward solid waste management. The comparative aspect analysed whether a significant difference existed between students who consistently practiced solid waste segregation and those who did not. A mixed-methods approach was utilized, and quantitative data were gathered through a structured survey questionnaire, while qualitative insights were obtained from open-ended questions.

Research Local and Participants

The study was conducted among Grade 9 students of Cabitan National High School, with a total population of 220 learners during the School Year 2024–2025. To get a representative sample for data collection, 142 students were selected using Slovin's formula, with a 5% margin of error.

A stratified random sampling technique was used to ensure that each Grade 9 section was fairly represented in the study. This method guaranteed that the diversity of the student population was reflected in the sample, in this manner increasing the reliability and generalizability of the findings.

Research Instrument

The primary tool for data collection was a survey questionnaire adapted from Eagles and Demare's (1999) Environmental Attitudes and Behaviors Scale. It is consisted of three parts:

Part I – Demographic and Participation Profile (4 items)

Part II – Environmental Attitudes and Behaviors (8 Likert-scale items)

Part III – Perceived Benefits and Challenges (2 open-ended questions)

The instrument was content-validated by science teachers, and a pilot test was conducted to assess its reliability using Cronbach's Alpha.

Data Collection Procedure

The data-gathering procedure was initiated by submitting a formal request to the School Principal for approval of the study. Following the granted permission, the questionnaires were administered during scheduled homeroom periods, during which the researcher personally facilitated data collection and provided necessary clarifications to participants. In accordance with ethical standards, all respondents were informed about the purpose of the study, their voluntary participation, and the confidentiality of their responses; no identifying information was collected, and informed consent was implied upon completion of the survey. Also, all questionnaires were retrieved immediately upon completion to ensure the accuracy and integrity of the data collected from the respondents.

Data Analysis

The data were analyzed using frequency distributions, percentages, means, standard deviations, and a t-test for independent samples. Thematic analysis was applied to open-ended responses. A five-point Likert scale guided interpretation:

4.20–5.00 Strongly Agree

3.40–4.19 Agree

2.60–3.39 Neutral

1.80–2.59 Disagree

1.00–1.79 Strongly Disagree

III. RESULTS AND DISCUSSIONS

This section presents the analysis and interpretation of the data gathered from 142 Grade 9 students.

Profile of the Respondents and Participation Level

The respondents of the study are the 142 Grade 9 students, with an equal gender distribution (72 males, 72

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females). The data reveals universal awareness (100%) of the Solid Waste Management Program. Regarding participation:

- Always: 50 students (35.2%)
- Often: 32 students (22.5%)
- Sometimes: 45 students (31.7%)
- Rarely: 15 students (10.6%)

This implies a clear "compliance gap" where a significant portion (42.3%) engages only intermittently, a common challenge where knowledge does not automatically translate to behavior (Kollmuss & Agyeman, 2002).

Level of Environmental Attitudes and Behaviors

Table 1. Summary of Environmental Attitudes and Behaviors

Statement	Mean	Description Level
I believe properly segregating waste is important for protecting the environment.	4.65	Strongly Agree
I feel a personal responsibility to reduce the amount of waste I produce.	4.29	Agree
The school's waste segregation program is an effective way to help our community.	4.39	Agree
I am worried about the problem of solid waste pollution.	4.23	Agree
Overall Attitude	4.39	Agree
I put biodegradable waste (e.g., food scraps, paper) in the correctly designated bin at school.	4.45	Agree
I put recyclable materials (e.g., plastic bottles, cans) in the correctly designated bin at school.	4.23	Agree
I practice waste segregation at home, even if it's not strictly required.	4.31	Agree
Overall Behavior	4.36	Agree

The results showed that students displayed positive environmental attitudes (Overall Mean = 4.39). The high score for the "importance of segregation" is a positive predictor of behavioral intention (Ajzen, 1991). The data also suggest positive behavioral spillover, as students report practicing segregation at home and reminding others. This indicates the school program may be fostering generalized habits, a noted benefit of institutional nudges (Thaler & Sunstein, 2008), and the development of personal norms (Stern, 2000).

Significant Difference Between Consistent and Inconsistent Participants

Table 2. t-Test Analysis on Two Groups

Variable	Group	Mean	t-value	p-value
Overall Attitude	Consistent	4.58	5.42	0.001
	Inconsistent	4.13		
Overall Behavior	Consistent	4.55	6.31	0.001
	Inconsistent	4.13		

The statistically significant difference ($p < 0.001$) reveals a positive feedback loop. Consistent participation is associated with stronger, more internalized pro-environmental attitudes, reinforcing the role of repeated behavior in shaping students attitudes (Bamberg & Möser, 2007). The program is potentially helping to shape the environmental identities of its most compliant participants, moving them from external compliance to internalized motivation (Deci & Ryan, 2000).

Thematic Analysis of Perceived Benefits

Public Health and Hygiene (A disease-free community)

Students directly associated proper waste management to the prevention of disease from flies and mosquitoes, and to the avoidance of foul odors and unpleasant waste. This aligns with the foundational health belief model of Rosenstock (1974), in which perceived susceptibility to threat is a powerful motivator for protective behavior. In this light, the program revealed itself to be a direct contributor to their personal and communal well-being, thereby making the abstract concept of "sustainability" personally relevant.

Aesthetic Improvement (A cleaner and more beautiful school)

Closely related to hygiene, students expressed a request for an orderly and pleasant learning environment. This reflects an understanding of the theory of supportive design, which posits that physical environments can significantly impact psychological states and behaviors (Ulrich, 1991). A clean school is not just a mandate; it is perceived as a more respectable and conducive learning environment, fostering a sense of pride and ownership.

Environmental Protection (It will reduce the greenhouse effect, Give us fresh and clean air)

This theme demonstrates the most significant cognitive leap. Students are connecting a localized, specific behavior (segregating waste in their school) to global environmental mechanisms like the greenhouse effect and atmospheric quality. This indicates a developing ecological literacy, where students can trace the causal pathways between individual action and systemic impact (McBride et al., 2013). This conceptual shift from personal convenience to planetary responsibility is a core objective of Education for Sustainable Development (UNESCO, 2017), suggesting the

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program is succeeding in fostering this broader ecological worldview.

Thematic Analysis of Perceived Challenges

Dependence on External Monitoring (Segregation only happens if there is a checking schedule, Students only throw garbage if their teacher is watching them)

This is the most telling challenge. It reveals that for a significant portion of the student body, the locus of control for the behavior is entirely external. The behavior is performed not out of a personal conviction but to avoid reprimand or to gain approval from an authority figure (the teacher) or a system (the YES-O check). This is a classic manifestation of external regulation, the least autonomous form of motivation in Self-Determination Theory (Deci & Ryan, 2000). The behavior is contingent on the presence of surveillance, indicating it has not yet been integrated into the students' personal value systems. This creates a "revolving door" effect where compliance ceases the moment the external pressure is removed.

Lack of Intrinsic Discipline (The discipline of the learners)

Students themselves identified a deficit in self-regulation and personal responsibility. This goes beyond mere forgetfulness and points to a failure in the transition from compliance to commitment. While the program has successfully established a descriptive norm (what is done), it has been less successful in instilling an injunctive norm (what ought to be done) that is powerful enough to guide behavior in the absence of oversight (Cialdini et al., 1990). This lack of intrinsic discipline is the behavioral manifestation of the attitude-behavior gap, where positive environmental attitudes are overridden by the cognitive ease of inaction or the path of least resistance (Thaler & Sunstein, 2008).

IV. CONCLUSIONS

The Solid Waste Management Program at Cabitan National High School is highly successful in building awareness and fostering positive environmental attitudes. It is moderately successful in translating these attitudes into consistent behaviors, with evidence of positive behavioral spillovers. However, the program's effectiveness is currently limited by a significant reliance on external monitoring and a noticeable gap between positive intentions and habitual actions. The program is effectively laying the foundation for environmental citizenship, but has not yet fully realized its potential to create self-sustaining pro-environmental habits in all students.

V. RECOMMENDATIONS

To translate the study's findings into sustainable improvements, several strategic recommendations are offered to the school administration, teachers, and program implementers. These aim to address the identified reliance on

external monitoring and to narrow the intention-behavior gap among students.

First, it is recommended to strengthen intrinsic motivation by adopting more participatory and empowering approaches within the Solid Waste Management Program. This could include expanding student leadership roles beyond the YES-O officers by forming rotating "Green Brigades" in each class, thereby fostering a sense of collective ownership. Complementing this, regular reflective discussions in homeroom or Science classes could be integrated, allowing students to articulate their experiences and connect their actions to personal and environmental values, which may promote the internalization of pro-environmental norms as outlined by Self-Determination Theory.

Second, to reduce dependence on external monitoring, the program would benefit from the strategic use of behavioral nudges and environmental redesign. Simple, visually engaging signage near waste bins, coupled with feedback mechanisms such as public charts displaying class-level compliance, could make sustainable choices more salient and socially reinforced. Simultaneously, reassessing the placement and accessibility of segregation bins to maximize convenience would help lower the effort required for compliance, making the desired behavior the easiest option.

Third, enhancing ecological literacy and personal relevance through deliberate curriculum integration is essential. Concepts of waste management and sustainability should be woven into subjects beyond Science, such as Social Studies, Values Education, and even Mathematics, using project-based and experiential learning methods. Inviting local environmental practitioners or waste management officers to share real-world insights could further help students appreciate the tangible impact of their actions, supporting the development of the ecological literacy observed in the study's thematic analysis.

Fourth, fostering a whole-school culture of environmental stewardship is crucial for sustaining long-term change. Initiatives such as school-wide "Zero Waste Weeks," inter-class eco-challenges, and recognition programs for consistent participants can help establish positive descriptive and injunctive norms. Extending this culture beyond the school gates through family-inclusive projects and community clean-up activities would also reinforce the behavioral spillover already noted among students, anchoring habits in multiple contexts.

Fifth, institutionalizing continuous evaluation and feedback mechanisms will ensure the program remains adaptive and effective. An annual review process, incorporating student surveys, focus group discussions, and waste audits, should be established to monitor progress and identify emerging challenges. A standing student-teacher committee could be tasked with refining program strategies,

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thereby maintaining responsiveness and collective accountability.

Finally, for the academic community, future research could explore longitudinal designs to track the durability of attitude and behavior changes as students advance in grade levels. Additional studies might also investigate the potential of digital tools or gamified elements to enhance engagement and intrinsic motivation in school-based environmental interventions, offering new pathways to translate awareness into lasting action.

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VII. DISCLOSURE

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