

Solid Waste Management Practices and Environmental Awareness of Senior High school Students

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Abstract. This study examined the relationship between the Solid Waste Management (SWM) practices and Environmental Awareness of Senior High School students. Anchored on Environmental Education Theory, the study emphasized that environmental knowledge and awareness influence students' ecological attitudes and behaviors. It specifically explored how environmental education integrated into the Araling Panlipunan curriculum contributes to students' waste management practices and environmental responsibility. A descriptive-correlational research design was employed involving 305 respondents from three public secondary schools in the District of Maasim II, Sarangani Province. Data were collected using a validated and reliability-tested survey questionnaire. Mean, standard deviation, Pearson r , and Kruskal–Wallis tests were used to analyze the data. Findings revealed that students generally demonstrated high levels of Solid Waste Management practices, particularly in waste segregation, waste reduction, and recycling and reuse, while participation in environmental activities was only moderate. Students also exhibited high environmental awareness in terms of knowledge, attitudes, and basic environmental practices, although involvement in environmental programs and advocacy remained moderate. A strong positive correlation was found between Solid Waste Management practices and environmental awareness ($r = 0.78$, $p = 0.001$), indicating that higher awareness is associated with better waste management practices. The study recommends strengthening experiential learning and school-based environmental programs to further promote environmental stewardship among students.

Keywords: Environmental Awareness; Participation, Programs; Solid Waste Management; Senior High School Students

Introduction

Environmental problems such as improper waste disposal, pollution, and depletion of natural resources continue to threaten sustainable development worldwide. Solid waste management remains a major concern due to rapid urbanization, population growth, and changing lifestyles. According to Uzorka and Olaniyan (2025), environmental education and awareness programs help improve students' environmental attitudes and behaviors, leading to better waste segregation, recycling, and responsible consumption practices. This highlights the important role of schools in promoting environmental responsibility among learners.

In the Philippines, improper solid waste management continues to cause pollution, flooding, and health risks as large amounts of waste are generated daily and only a portion is properly managed (National SWM Commission, 2020). Although the Ecological Solid Waste Management Act of 2000 (Republic Act No. 9003) was enacted to address these concerns, implementation in many schools and communities remains inconsistent (DENR, 2019). The Department of Education also promotes environmental education integration across the K–12 curriculum to strengthen ecological literacy and responsible citizenship (DepEd, 2016). In particular, Araling Panlipunan serves as a platform for connecting environmental issues with students' social and community experiences (Valle, 2018).

However, previous studies revealed a gap between environmental awareness and actual student practices. Garcia and Cruz (2017) and Santos et al. (2020) found that although students are aware of environmental issues, many still fail to consistently practice proper waste management behaviors. Despite growing environmental awareness, limited participation in environmental programs and weak implementation of school-based initiatives remain concerns. Thus, this study examined the relationship between Solid Waste Management practices and environmental awareness among HUMSS students and explored how environmental education in Araling Panlipunan may promote sustainable environmental behavior and responsible waste management practices among students.

Research Questions

This study aimed to examine the relationship between the Solid Waste Management practices and environmental awareness among Senior High School students. It answered the following questions:

1. What is the level of Solid Waste Management practices among Senior High School students in terms of:
 - 1.1 waste segregation;
 - 1.2 waste reduction;
 - 1.3 recycling and reuse;
 - 1.4 proper waste disposal; and
 - 1.5 participation in environmental activities?
2. What is the extent of environmental awareness of Solid Waste Management practices among HUMSS students?
 - 2.1 knowledge of environmental issues;
 - 2.2 attitude towards environmental protection;
 - 2.3 environmental practices;
 - 2.4 participation in environmental programs; and
 - 2.5 advocacy and communication?
3. Is there a significant relationship between the Solid Waste Management practices and the environmental awareness of Senior High School HUMSS students?
4. Is there a significant difference in the Solid Waste Management practices of HUMSS students when grouped by school?
5. Is there a significant difference in the Solid Waste awareness of HUMSS students when grouped by school?

Scope and Delimitation of the Study

This study examined the solid waste management practices and the level of environmental awareness of the Senior High School students in School Year 2025-2026. The research specifically investigated students' practices in waste segregation, reduction, recycling, proper disposal, and participation in environmental activities. Additionally, it explored students' knowledge of environmental issues, attitudes toward environmental protection, environmentally responsible behaviors, participation in programs, and advocacy efforts. The study was limited to Senior High School Social Studies students in Maasim II District, which consists of three schools with a total of 305 students, and did not include students from other strands or grade levels. Data collection was confined to self-reported surveys and/or interviews, relying on students' honesty and perception of their practices and awareness. The research did not cover external factors such as the school's waste management policies, local government programs, or parental influence, although these may indirectly affect students' behaviors. The findings were intended to reflect the situation within the study's sample and may not be generalized to all Senior High School students.

Literature Review

Solid Waste Management

Recent studies emphasize that education plays an important role in improving Solid Waste Management (SWM) practices among students. In the Philippines, school-based environmental programs and interventions enhanced students' environmental knowledge and waste management behaviors (Timbangan et al., 2025; Biol et al., 2025). However, studies also revealed inconsistencies in recycling, waste segregation, and proper disposal practices despite increased awareness (Abdon & Farin, 2022), suggesting that knowledge alone does not always result in consistent environmental action. Institutional challenges, including inadequate facilities and weak implementation systems, further affect the effectiveness of SWM practices in schools (Pitong & Secondes, 2025). Globally, Solid Waste Management practices are influenced by behavioral, social, and institutional factors (Amir et al., 2025). Although innovations such as AI-based waste management systems improve efficiency (Nafiz et al., 2023), Espiritu (2024) argued that technology and policies are ineffective without active participation and consistent implementation. These studies highlight the need to connect environmental awareness with actual waste management practices among students.

Waste Segregation

Waste segregation is widely recognized as a fundamental strategy for reducing pollution and promoting sustainable waste management. Studies in the Philippines showed that school-based segregation programs improved students' disposal practices and encouraged environmentally responsible behavior (De Guzman & Almazan, 2024). However, researchers consistently argue that awareness alone is insufficient if

schools and communities lack adequate segregation facilities and waste collection systems (Rahman et al., 2023). Similarly, Patel and Kumar (2025) emphasized that limited infrastructure and weak enforcement reduce compliance with segregation policies despite existing environmental campaigns. Other studies highlighted that strong institutional policies, community participation, and continuous environmental education significantly improve segregation practices and environmental outcomes (Chen & Wang, 2023; Osei & Boateng, 2024). These findings imply that successful waste segregation depends on the interaction of awareness, policy enforcement, and accessible facilities.

Waste Reduction

Waste reduction is considered an essential component of sustainable environmental management because it minimizes resource consumption and environmental impact. Studies revealed that educational interventions and behavioral campaigns effectively encourage eco-friendly habits such as reducing plastic use and minimizing household waste (Abdullah & Hassan, 2024; Santos & Dela Cruz, 2023). Research on circular economy practices also found that households and communities adopting reuse and reduction strategies generated less waste and demonstrated greater environmental responsibility (Müller & Schneider, 2025). However, scholars emphasized that individual efforts alone are insufficient without institutional support and community-based initiatives. Government programs, awareness campaigns, and collaborative environmental activities were found to significantly strengthen participation in waste reduction practices (Kim & Lee, 2023; Adeyemi & Okafor, 2024). These studies collectively suggest that waste reduction is most effective when supported by both personal responsibility and institutional action.

Recycling and Reuse

Recycling and reuse remain important strategies for promoting resource conservation and sustainable waste management. Studies found that access to recycling facilities, community-based programs, and public awareness campaigns significantly improve recycling participation and reduce waste generation (Sharma & Patel, 2024; Cruz & Villanueva, 2023). Research further showed that policy support and environmental education strengthen public willingness to participate in reuse initiatives and sustainable consumption practices (Fischer & Wagner, 2025). However, inconsistent participation and lack of proper facilities continue to limit the effectiveness of recycling programs in many communities. Other studies highlighted that technological innovations, incentives, and school-based environmental programs increase engagement and improve recycling accuracy among students and households (Tan & Goh, 2023; Osei & Mensah, 2024). Overall, the literature suggests that successful recycling and reuse practices depend on the combined influence of awareness, accessibility, incentives, and institutional support.

Proper Waste Disposal

Proper waste disposal plays a critical role in protecting public health and environmental sustainability. Studies in the Philippines found that community participation in proper waste disposal programs contributed to cleaner surroundings, reduced flooding, and improved environmental conditions (Dela Cruz & Ramos, 2023). Research also indicated that access to disposal facilities and environmental awareness campaigns positively influence responsible disposal behaviors among households and students (Singh & Mehta, 2024; Adeyemi & Yusuf, 2025). However, several studies argued that improper disposal practices persist because of weak policy enforcement, inadequate monitoring, and limited environmental education. Effective implementation of disposal policies and continuous environmental education were identified as essential factors in promoting long-term behavioral change and compliance with proper disposal practices (Wu & Zhang, 2023; García & Torres, 2024). These findings indicate that sustainable waste disposal requires both environmental awareness and strong institutional implementation.

Participation in Environmental Activities

Participation in environmental activities is important in developing environmental responsibility, civic engagement, and sustainable behavior among students. Studies showed that activities such as clean-up drives, tree planting, and conservation projects strengthen environmental identity and encourage pro-environmental practices (Santos & Lopez, 2023; Kim & Park, 2024). Community-based initiatives were also found to improve awareness and increase public participation in environmental protection programs (Mwangi & Otieno, 2025; Hernández & Cruz, 2024). However, researchers noted that participation levels often remain inconsistent because of limited opportunities, weak motivation, and lack of institutional support. Experiential learning and volunteerism were identified as effective approaches in improving environmental knowledge and sustaining environmentally responsible habits among students (Johnson & Miller, 2023). These studies suggest that active participation and practical engagement are necessary to translate environmental awareness into consistent environmental action.

Environmental Awareness

Environmental awareness refers to individuals' understanding of environmental issues, including pollution, waste management, and resource conservation (Kollmuss & Agyeman, 2002). Previous studies consistently found that environmental awareness positively influences pro-environmental attitudes and behaviors (Monroe, 2003). In the Philippine context, students generally demonstrate awareness of environmental concerns but often struggle to consistently apply environmentally responsible practices in daily life (Cruz & Tantengco, 2025; Punzalan et al., 2019). Scholars argue that environmental education becomes more effective when it is participatory, experiential, and integrated into school curricula such as Araling Panlipunan (Hungerford & Volk, 1990; Stevenson, 2007). The literature therefore highlights a continuing gap between awareness and actual practice, suggesting that environmental knowledge alone may not guarantee sustainable behavior without meaningful engagement and application.

Knowledge of Environmental Issues

Environmental knowledge is considered a key factor influencing environmental attitudes and sustainable behavior. Studies revealed that environmental literacy among adolescents varies according to educational exposure, access to information, and social experiences (Martha, 2025; Quijano et al., 2023). Research also showed that environmental knowledge is often measured objectively, with limited attention given to students' deeper understanding and practical application of environmental concepts (Lubej et al., 2025). Sources such as formal education, media exposure, and personal experiences significantly shape environmental awareness and behavior (Pathak et al., 2025). Furthermore, stronger environmental knowledge was associated with more positive attitudes and greater participation in sustainable practices (Burgos-Espinoza et al., 2024). These findings indicate that environmental knowledge is important but must be accompanied by opportunities for application and participation.

Attitudes toward environmental protection

Environmental attitudes are influenced by educational, cultural, and social factors that shape individuals' willingness to engage in sustainable behavior. Studies consistently found that students with stronger pro-environmental attitudes are more likely to participate in environmental protection activities and sustainable practices (Burgos-Espinoza et al., 2024). Educational experiences, environmental campaigns, and media exposure were also identified as important influences in strengthening positive environmental attitudes (Pathak et al., 2025). Globally, increasing public concern for environmental protection reflects the growing recognition of sustainability issues (Green Economy Coalition, 2024). Researchers further emphasized that experiential learning and academic engagement significantly improve favorable attitudes toward environmental conservation and responsibility (Incesu et al., 2023; Quijano et al., 2023). These studies suggest that positive environmental attitudes develop through continuous education and meaningful environmental experiences.

Environmental practices

Environmental practices are essential in promoting sustainability and environmental responsibility across sectors. Studies highlighted that environmental practices increasingly rely on collaborative approaches, technological innovation, and policy support to address sustainability challenges (Islam, 2024). Research in agriculture demonstrated that sustainable diversification practices improve biodiversity and economic outcomes (Raveloaritiana & Wanger, 2024), while studies in other sectors such as tourism and fashion emphasized the need for stronger adoption of environmentally sustainable alternatives (Collective Fashion Justice, 2025; Serio et al., 2025). Although environmental awareness has improved globally, several studies noted that actual environmental practices remain inconsistent because of economic, institutional, and behavioral barriers. These findings reinforce the importance of integrating sustainability into everyday practices through education, policy, and community participation.

Participation in Environmental Programs

Participation in environmental programs is considered essential in promoting ecological literacy, environmental responsibility, and sustainable community practices. Studies found that active community involvement strengthens conservation efforts and improves environmental governance (Marzo et al., 2023; Antwi, 2024). Policies and institutional frameworks also emphasize meaningful public participation in environmental decision-making and sustainability initiatives (EPA, 2024). Youth-focused environmental programs were shown to enhance leadership skills, ecological awareness, and environmental responsibility among students (Life STEPS, 2025; YEP!, 2025). However, researchers noted that participation levels among students often remain moderate because of limited engagement opportunities and inconsistent program implementation. These studies indicate that continuous participation in environmental programs is necessary to sustain environmental awareness and strengthen long-term environmental behavior.

Advocacy and Communication

Environmental advocacy and communication play a significant role in strengthening environmental awareness and encouraging public participation in sustainability efforts. Studies revealed that social media platforms effectively increase youth engagement in environmental campaigns and environmental movements (Ahmed & Ariffin, 2024). Community-based communication strategies also improve participation in waste management and environmental protection activities (Lee & Martínez, 2023). Researchers further argued that integrating advocacy and communication into educational programs strengthens students' ability to promote sustainability and influence environmental behavior (Jensen & Holten, 2025). In addition, local storytelling, mobile communication, and community-centered campaigns were found to encourage collective environmental action and responsible environmental practices (Rahman & Choudhury, 2024; Smith & Osei, 2025). These findings suggest that effective advocacy and communication strategies are important in transforming environmental awareness into active participation and behavioral change.

Methodology

Research Design

This study utilized a descriptive-correlational research design to examine the level of solid waste management (SWM) practices and environmental awareness among senior high school students, as well as the relationship between these variables. The descriptive aspect assessed students' practices in waste segregation, waste reduction, recycling and reuse, proper waste disposal, and participation in environmental activities, together with their environmental knowledge, attitudes, practices, and advocacy efforts (Creswell, 2014). The correlational component determined whether a significant relationship existed between Solid Waste Management practices and environmental awareness (Gay, Mills, & Airasian, 2012). Data were collected through structured questionnaires and analyzed using mean and standard deviation, while regression analysis measured the strength and direction of the relationship. The Kruskal–Wallis test was also applied to identify significant differences in Solid Waste Management practices and environmental awareness when grouped according to school. This design was appropriate for assessing levels, relationships, and group differences among the variables.

Sampling Design

The study employed complete enumeration, also known as census sampling, by including the entire population of eligible Senior High School students from the selected schools. This strategy was adopted because the population size was relatively small and manageable, allowing for the elimination of sampling error and providing the most accurate representation of the data (Creswell & Creswell, 2022). Utilizing a census approach ensures high statistical power and precision, which is essential for evaluating curriculum effectiveness across different sites (Simkus, 2024). By involving every eligible student, the research captures the diverse perspectives of the localized group without marginalizing any subgroups, ensuring the findings are truly reflective of the entire student body (Parker, 2023; Borg & Gall, 2023).populations.

Research Locale

This study was conducted in three schools, Kablacan Integrated School, Happy Valley Integrated School and Colon National High School, Maasim II District, Sarangani Division, located at Municipality of Maasim, Sarangani Province, where solid waste management remains a persistent concern. Despite national efforts to strengthen compliance with the Ecological Solid Waste Management Act (RA 9003), including the implementation of 10-year solid waste management plans with high national compliance, challenges remain at the local level, particularly in rural and resource-limited areas (Moaji, 2025). In Sarangani Province, local government units still face gaps in infrastructure, funding, and technical capacity to fully comply with RA 9003 requirements (Arancon, 2018). These issues are further worsened by improper waste disposal practices affecting coastal ecosystems, including Sarangani Bay, which contribute to pollution and environmental risks (Philippine News Agency, 2019).

Research Participants

This study included all Senior High School students enrolled in Social Studies from three public secondary schools in the District of Maasim II, Sarangani Province: Colon National High School, Kablacan Integrated School, and Happy Valley Integrated School. The total population of student-respondents was 305. The largest number of respondents (215) came from Colon National High School, while the smallest number (30) came from Happy Valley Integrated School. Kablacan Integrated School contributed 60 respondents

Research Instrument

The researcher employed a self-made survey questionnaire for students, comprising two parts. Part I of the questionnaire gathered the respondents' profile, including their school affiliation and relevant background information. Parts II and III used a five-point Likert scale to measure the level of Solid Waste Management practices and environmental awareness among senior high school students. For SWM practices, the scale was interpreted as 5 = Very High (Highly Practiced), 4 = High (Highly Practiced), 3 = Moderate (Moderately Practiced), 2 = Low (Slightly Practiced), and 1 = Very Low (Never Practiced). For environmental awareness, the same scale was used with corresponding interpretations of 5 = Very High (Highly Aware), 4 = High (Highly Aware), 3 = Moderate (Moderately Aware), 2 = Low (Slightly Aware), and 1 = Very Low (Not Aware). This survey was administered with the permission of school authorities and in accordance with ethical research standards and the Data Privacy Act of 2012 of the Republic of the Philippines.

Data Gathering Procedure

The researcher first secured an approved letter from the Research Adviser, which served as authorization to conduct the study. This was then submitted to the Administrative Officer to request an Endorsement Letter from the Division Office, which was required to conduct research within the school district. After obtaining the endorsement, permission was sought from the school principals of the three participating schools in the District of Maasim II: Colon National High School, Kablacan Integrated School, and Happy Valley Integrated School. Once approval was granted, all necessary documents, including the endorsement letter, principal's approval, consent forms, and the survey questionnaire, were submitted to the respective school coordinators. Student respondents were then recruited through face-to-face visits to the schools. Only students who were available and willing to participate were included in the study. The questionnaire was administered during class hours or free time, with clear and simple instructions provided prior to answering. Questions and clarifications were addressed immediately to ensure understanding and accuracy of responses. Informed consent was obtained from all participants, emphasizing voluntary participation, confidentiality, and adherence to ethical standards and the Data Privacy Act of 2012..

Results and Discussions

Problem 1: What is the level of Solid Waste Management practices among Senior High School students in terms of waste segregation, waste reduction, recycling and reuse, proper waste disposal, and participation in environmental activities?

Table 1. Solid Waste Management practices among Senior High Schools in terms of Waste Segregation

	Statements	M	SD	Verbal Description	Interpretation
1.	I separate biodegradable and non-biodegradable waste before disposal.	3.94	0.86	High	High Practiced
2.	I use designated bins for recyclables, compostable, and general waste.	3.79	1.08	High	High Practiced
3.	I ensure hazardous waste (like batteries or chemicals) is disposed of properly.	3.83	0.82	High	High Practiced
4.	I encourage my peers to segregate waste at home or school.	3.78	1.16	High	High Practiced
5.	I avoid mixing different types of waste when discarding them.	3.57	1.04	High	High Practiced
	Mean	3.78	0.99	High	High Practiced

The data in Table 1 show that the overall level of waste segregation practices among Senior High School students was high ($M = 3.78$, $SD = 0.99$), indicating that respondents generally practiced proper waste segregation both at school and at home. The highest mean score was obtained for separating biodegradable and non-biodegradable waste before disposal ($M = 3.94$, $SD = 0.86$), suggesting that students were most consistent in this practice, possibly due to school programs and environmental education initiatives that promote proper waste management. This finding supports Timbangan et al. (2025), who emphasized the effectiveness of educational interventions in improving waste segregation practices. In contrast, the lowest mean score was recorded for avoiding the mixing of different types of waste when discarding them ($M = 3.57$, $SD = 1.04$), although it still fell within the high descriptive level, indicating that students were relatively less consistent in this practice. This suggests a possible gap between awareness and actual behavior, which may be influenced by limited facilities, inconvenience, or lack of monitoring, supporting the findings of Biol et al. (2025) that awareness alone does not always lead to consistent environmental behavior. Overall, the findings are consistent with Molina and Catan (2020) and Abdon and

Farin (2022), who reported that students generally demonstrate high waste segregation practices, although consistency in proper implementation still requires improvement; thus, continuous reinforcement, monitoring, and adequate waste segregation facilities are necessary to strengthen sustainable solid waste management practices among students.

Table 2. Solid Waste Management practices among Senior High Schools in terms of Waste Reduction

	Statements	M	SD	Verbal Description	Interpretation
1.	I minimize the use of single-use plastics like straws and plastic bags.	3.62	1.01	High	High Practiced
2.	I choose products with minimal or recyclable packaging.	3.63	1.12	High	High Practiced
3.	I reuse materials such as paper, containers, or old clothes whenever possible.	3.40	0.91	High	High Practiced
4.	I avoid generating unnecessary waste in school and at home.	3.47	0.89	High	High Practiced
5.	I actively look for ways to reduce my daily waste output.	3.61	0.85	High	High Practiced
	Mean	3.55	0.96	High	High Practiced

The data in Table 2 show that the overall level of waste reduction practices among Senior High School students was high ($M = 3.55$, $SD = 0.96$), indicating that respondents generally engaged in strategies to reduce waste in their daily lives. The highest mean score was obtained for choosing products with minimal or recyclable packaging ($M = 3.63$, $SD = 1.12$), suggesting that students were more inclined to reduce waste through conscious purchasing decisions. This reflects growing environmental awareness and supports the findings of De Guzman and Almazan (2024) and Rahman et al. (2023), who emphasized that awareness and school-based initiatives promote waste reduction behaviors among students. In contrast, the lowest mean score was recorded for reusing materials such as paper, containers, or old clothes ($M = 3.40$, $SD = 0.91$), although the result still fell within the high descriptive level, indicating that students were relatively less consistent in practicing reuse. This finding aligns with Patel and Kumar (2025), who noted that although waste reduction is recognized as important, practical implementation challenges remain. Similarly, Chen and Wang (2023) highlighted that consistent waste reduction behaviors require accessible systems and reinforcement, while Osei and Boateng (2024) emphasized the importance of active participation and support mechanisms. Overall, the findings imply that although students demonstrated a high level of engagement in waste reduction practices, greater emphasis on promoting reuse behaviors and providing supportive environmental programs is necessary to strengthen sustainable waste management practices among students.

Table 3. Solid Waste Management practices among Senior High Schools in terms of Recycling and Reuse

	Statements	M	SD	Verbal Description	Interpretation
1.	I participate in recycling programs or initiatives in school or community.	3.40	1.08	High	High Practiced
2.	I repurpose materials instead of throwing them away.	3.61	1.03	High	High Practiced
3.	I collect recyclable materials (plastics, paper, metals) for proper disposal.	3.28	1.10	Moderate	Moderately Practiced
4.	I educate friends or family about the importance of recycling.	3.58	0.93	High	High Practiced
5.	I properly clean and sort recyclables before giving them to collection points.	3.49	1.17	High	High Practiced
	Mean	3.47	1.06	High	High Practiced

The data in Table 3 show that the overall level of recycling and reuse practices among Senior High School students was high ($M = 3.47$, $SD = 1.06$), indicating that respondents generally engaged in recycling and reuse activities. The highest mean score was obtained for repurposing materials instead of throwing them away ($M = 3.61$, $SD = 1.03$), suggesting that students were more engaged in simple and accessible recycling behaviors. This reflects their ability to apply practical and convenient strategies in daily life and supports the findings of Cruz and Villanueva (2023) and Sharma and Patel (2024), who emphasized that access to facilities and organized programs significantly influence participation in recycling practices. In contrast, the lowest mean score was recorded for collecting recyclable materials for proper disposal ($M = 3.28$, $SD = 1.10$), which was interpreted as moderate, indicating that students were less consistent in actively collecting recyclables, possibly due to the time, effort, or limited access to proper collection systems. This finding aligns with Fischer and Wagner (2025), Tan and Goh (2023), and Osei and Mensah (2024), who

emphasized that consistent recycling behavior depends on external support such as education, infrastructure, and incentives. Overall, the findings imply that although students demonstrated a high level of engagement in recycling and reuse practices, greater emphasis on encouraging active participation in recyclable collection and improving accessible recycling facilities is necessary to strengthen sustainable waste management practices among students.

Table 4. Solid Waste Management practices among Senior High Schools in terms of Proper Waste Disposal

	Statements	M	SD	Verbal Description	Interpretation
1.	I dispose of waste only in appropriate trash bins or designated areas.	3.28	1.20	Moderate	Moderately Practiced
2.	I avoid littering inside or outside the school premises.	3.58	1.29	High	High Practiced
3.	I report overflowing or misplaced trash bins to authorities or school personnel.	3.08	1.12	Moderate	Moderately Practiced
4.	I follow school policies on proper waste disposal.	3.51	1.24	High	High Practiced
5.	I ensure that hazardous or electronic waste is disposed of safely.	3.20	0.99	Moderate	Moderately Practiced
	Mean	3.33	1.17	Moderate	Moderately Practice

The data in Table 4 show that the overall level of proper waste disposal practices among Senior High School students was moderate ($M = 3.33$, $SD = 1.17$), indicating that respondents demonstrated general but inconsistent compliance with proper waste disposal practices. The highest mean score was obtained for avoiding littering inside or outside the school premises ($M = 3.58$, $SD = 1.29$), suggesting that students were more likely to follow visible and immediate waste disposal behaviors. This reflects their adherence to basic environmental practices and supports the findings of Dela Cruz and Ramos (2023) and Singh and Mehta (2024), who emphasized that access to facilities and community-based programs significantly influence proper waste disposal behaviors. In contrast, the lowest mean score was recorded for reporting overflowing or misplaced trash bins to authorities or school personnel ($M = 3.08$, $SD = 1.12$), which was interpreted as moderate, indicating that students were less engaged in proactive behaviors requiring initiative and responsibility beyond personal habits. This finding aligns with Adeyemi and Yusuf (2025), who highlighted the importance of awareness campaigns in encouraging responsible waste practices. Similarly, Wu and Zhang (2023) and García and Torres (2024) emphasized that consistent environmental behavior is strengthened through proper infrastructure, education, and policy enforcement. Overall, the findings imply that while students demonstrated moderate adherence to proper waste disposal practices, greater encouragement for active participation and responsibility, particularly in reporting and addressing waste-related concerns, is necessary to improve overall compliance and sustainability.

Table 5. Solid Waste Management practices among Senior High Schools in terms of Participation in Environmental Activities

	Statements	M	SD	Verbal Description	Interpretation
1.	I join clean-up drives in school or the community.	3.49	1.21	High	High Practiced
2.	I participate in seminars or workshops on solid waste management.	3.05	1.26	Moderate	Moderately Practiced
3.	I take part in school projects that promote sustainable waste practices.	3.58	1.07	High	High Practiced
4.	I encourage classmates to be involved in waste management initiatives.	3.35	0.99	Moderate	Moderately Practiced
5.	I volunteer for campaigns that raise awareness about solid waste management.	3.13	1.05	Moderate	Moderately Practiced
	Mean	3.32	1.11	Moderate	Moderately Practiced

The data in Table 5 show that the overall level of students' participation in environmental activities was moderate ($M = 3.32$, $SD = 1.11$), indicating general but inconsistent involvement in environmental initiatives. The highest mean score was obtained for taking part in school projects that promote sustainable waste practices ($M = 3.58$, $SD = 1.07$), suggesting that students were more involved in hands-on and school-based activities. This reflects the accessibility and engaging nature of such initiatives and supports the findings of Santos and Lopez (2023) and Kim and Park (2024), who emphasized that school-based programs play a significant role in promoting environmental responsibility and student engagement. In contrast, the lowest mean score was recorded for participating in seminars or workshops on solid waste management ($M = 3.05$, $SD = 1.26$), which was interpreted as moderate, indicating that students were less likely to engage in knowledge-based activities, possibly due to limited interest, availability, or the perception that such activities

are less interactive. This finding aligns with Mwangi and Otieno (2025), Hernández and Cruz (2024), and Johnson and Miller (2023), who noted that while experiential activities effectively promote environmental awareness, structured learning opportunities such as seminars require stronger motivation and institutional support to encourage participation. Overall, the findings imply that although students demonstrated moderate engagement in environmental activities, increasing participation in seminars and awareness programs through more interactive and accessible approaches may further strengthen their involvement in sustainable environmental practices.

Table 6. Summary Table of Solid Waste Management practices among Senior High School students

Dimensions	Mean	SD	Verbal Description	Interpretation
Waste Segregation	3.78	0.99	High	High Practiced
Waste Reduction	3.55	0.96	High	High Practiced
Recycling and Reuse	3.47	1.06	High	High Practiced
Proper Waste Disposal	3.33	1.17	Moderate	Moderately Practiced
Participation in Environmental Activities	3.32	1.11	Moderate	Moderately Practiced
Overall Mean	3.49	1.06	High	High Practiced

Table 6 summarizes the overall level of solid waste management practices among Senior High School students. The results reveal that respondents generally demonstrate a high level of solid waste management practices ($M = 3.49$, $SD = 1.06$), particularly in waste segregation, waste reduction, and recycling and reuse. This indicates that students possess adequate awareness and understanding of proper waste management practices and are able to apply them in their daily activities at school and at home. However, participation in environmental activities and proper waste disposal obtained moderate ratings, suggesting that students are less consistent in actively engaging in environmental programs and proactive waste management behaviors. This implies that while students have developed basic environmental habits, there is still a need to strengthen their active involvement and responsibility in sustainable environmental practices. These findings are supported by studies showing that environmental awareness and school-based initiatives positively influence students' waste management behaviors, although continuous reinforcement and practical engagement are necessary to sustain consistent practices (Molina & Catan, 2020; Abdon & Farin, 2022; Timbangan et al., 2025).

Problem 2: What is the extent of environmental awareness of Solid Waste Management practices among HUMSS students in terms of knowledge of environmental issues, attitude towards environmental protection, environmental practices, participation in environmental programs, and advocacy and communication?

Table 7. Environmental Awareness of Senior High School in terms of Knowledge of Environmental Issues

Statements	M	SD	Verbal Description	Interpretation
1. I am aware of the causes and effects of climate change.	4.10	0.83	High	High Awareness
2. I understand the impact of pollution on health and the environment.	3.89	1.11	High	High Awareness
3. I know the importance of conserving natural resources like water and energy.	4.00	1.05	High	High Awareness
4. I am aware of local environmental problems in my community.	3.73	1.03	High	High Awareness
5. I understand the consequences of deforestation and habitat destruction.	3.70	1.02	High	High Awareness
Mean	3.88	1.01	High	High Awareness

Table 7 presents the level of environmental awareness among Senior High School students in terms of knowledge of environmental issues. The findings reveal that respondents have a high level of environmental awareness, with an overall mean of 3.88 ($SD = 1.01$), indicating that students are generally knowledgeable about climate change, pollution, and the conservation of natural resources. The highest mean score was obtained for awareness of the causes and effects of climate change ($M = 4.10$, $SD = 0.83$), suggesting that students are most familiar with global environmental concerns. This reflects strong cognitive awareness and exposure to environmental education, supporting the findings of Kollmuss and Agyeman (2002) and Monroe (2003), who emphasized the importance of environmental knowledge in promoting responsible behavior. In contrast, the lowest mean score was recorded for understanding the consequences of

deforestation and habitat destruction ($M = 3.70$, $SD = 1.02$), although still interpreted as high. This suggests that students are relatively less aware of specific or localized environmental issues. The findings support Cruz and Tantengco (2025), Hungerford and Volk (1990), and Stevenson (2007), who highlighted the importance of experiential and participatory environmental education in strengthening environmental responsibility and meaningful environmental action.

Table 8. Environmental Awareness of Senior High School in terms of Knowledge and Attitudes towards Environmental Protection

	Statements	M	SD	Verbal Description	Interpretation
1.	I believe it is important to protect the environment for future generations.	3.79	1.03	High	High Awareness
2.	I feel responsible for taking care of my surroundings.	3.95	0.94	High	High Awareness
3.	I value sustainable practices even if they require extra effort.	3.45	0.84	High	High Awareness
4.	I am concerned when I see others harming the environment.	3.49	0.81	High	High Awareness
5.	I support laws and policies that promote environmental protection.	3.76	1.00	High	High Awareness
	Mean	3.69	0.93	High	High Awareness

Table 8 presents the level of environmental awareness among Senior High School students in terms of attitudes toward environmental protection. The findings show that respondents generally exhibit positive environmental attitudes, with an overall mean of 3.69 ($SD = 0.93$), verbally described as high. This indicates that students possess a strong sense of environmental concern and responsibility toward protecting their surroundings. The highest mean score was obtained for feeling responsible for taking care of the environment ($M = 3.95$, $SD = 0.94$), suggesting that students demonstrate strong personal responsibility and environmental stewardship. This finding supports Burgos-Espinoza, López-García, and Ramírez-Pérez (2024), who emphasized that education, environmental experiences, and exposure to environmental risks help strengthen pro-environmental attitudes. In contrast, the lowest mean score was recorded for valuing sustainable practices even if they require extra effort ($M = 3.45$, $SD = 0.84$), although still interpreted as high. This suggests that students may be less consistent in practicing environmentally friendly behaviors when these demand additional time or effort, indicating a gap between environmental awareness and actual behavior. This finding aligns with Pathak, Shrestha, and Thapa (2025), who noted that positive environmental attitudes require continuous engagement and reinforcement to develop into sustained environmental practices. Overall, the results imply that incorporating experiential learning, participatory activities, and practical environmental programs can further strengthen students' environmental responsibility and encourage more consistent adoption of sustainable practices.

Table 9. Environmental Awareness of Senior High School in terms of Knowledge of Environmental Practices

	Statements	M	SD	Verbal Description	Interpretation
1.	I turn off lights and electronic devices when not in use to save energy.	3.87	1.22	High	High Awareness
2.	I reduce, reuse, and recycle materials whenever possible.	3.44	1.10	High	High Awareness
3.	I participate in tree planting or clean-up activities.	3.15	1.07	Moderate	Moderately Aware
4.	I avoid littering and properly dispose of waste.	3.39	0.96	Moderate	Moderately Aware
5.	I use environmentally friendly products and materials whenever I can.	3.57	1.22	High	High Awareness
	Mean	3.48	1.11	High	High Awareness

Table 9 presents the level of environmental awareness among Senior High School students in terms of environmental practices. The findings show that respondents generally practice environmentally responsible behaviors, with an overall mean of 3.48 ($SD = 1.11$), verbally described as high. This indicates that students are generally aware of and able to apply environmentally friendly practices in their daily activities. The highest mean score was obtained for turning off lights and electronic devices when not in use to save energy ($M = 3.87$, $SD = 1.22$), suggesting that students are most consistent in simple and habitual energy-saving behaviors. This reflects practical daily actions that contribute to environmental conservation and supports Islam (2024), who emphasized the importance of consistent eco-friendly practices in promoting sustainability. In contrast, the lowest mean score was recorded for participating in tree planting or clean-up activities ($M = 3.15$, $SD = 1.07$), which was interpreted as moderate. This suggests that students

are less involved in hands-on environmental initiatives, indicating a gap between environmental awareness and active participation. This finding aligns with Raveloaritiana and Wanger (2024), who noted that sustained environmental conservation requires stronger engagement in organized and community-based environmental activities. Overall, the findings imply that while students demonstrate high environmental awareness in daily practices, increased participation in experiential environmental programs is necessary to strengthen active environmental responsibility and sustainable behavior.

Table 10. Environmental Awareness of Senior High School in terms of Knowledge of Participation in Environmental Programs

	Statements	M	SD	Verbal Description	Interpretation
1.	I attend seminars, workshops, or campaigns about environmental conservation.	3.07	1.26	Moderate	Moderately Aware
2.	I join school or community programs that promote environmental awareness.	3.44	1.28	High	High Awareness
3.	I volunteer for initiatives that focus on protecting nature and wildlife.	3.15	1.16	Moderate	Moderately Aware
4.	I encourage peers to participate in environmental activities.	3.26	1.15	Moderate	Moderately Aware
5.	I actively contribute ideas for projects that improve environmental conditions.	3.06	1.08	Moderate	Moderately Aware
	Mean	3.19	1.19	Moderate	Moderately Aware

Table 10 presents the level of environmental awareness among Senior High School students in terms of participation in environmental programs. The findings show a moderate level of involvement, with an overall mean of 3.19 (SD = 1.19), indicating that students participate in environmental activities to some extent. The highest mean score was obtained for joining school or community environmental programs (M = 3.44, SD = 1.28), suggesting active participation in organized initiatives. In contrast, the lowest mean score was recorded for contributing ideas for environmental projects (M = 3.06, SD = 1.08), indicating lower involvement in leadership and initiative-taking. Overall, the findings imply that students demonstrate moderate participation in environmental programs, but greater opportunities for leadership and active engagement are needed to strengthen their commitment to sustainability (Life STEPS, 2025; YEP!, 2025).

Table 11. Environmental Awareness of Senior High School in terms of Knowledge of Advocacy and Communications

	Statements	M	SD	Verbal Description	Interpretation
1.	I educate friends or family about environmental issues.	3.38	1.08	Moderate	Moderately Aware
2.	I share information on social media about environmental protection.	3.17	1.20	Moderate	Moderately Aware
3.	I encourage others to adopt eco-friendly habits.	3.29	1.30	Moderate	Moderately Aware
4.	I discuss environmental topics in class or community settings.	3.13	1.14	Moderate	Moderately Aware
5.	I raise awareness about the consequences of harmful environmental practices.	3.43	1.17	High	High Awareness
	Mean	3.28	1.24	Moderate	Moderately Aware

Table 11 presents the level of environmental awareness among Senior High School students in terms of advocacy and communication. The findings show a moderate level of engagement in promoting and communicating environmental awareness, with an overall mean of 3.28 (SD = 1.24). The highest mean score was obtained for raising awareness about the consequences of harmful environmental practices (M = 3.43, SD = 1.17), suggesting that students are more active in informing others about negative environmental impacts. This was followed by educating friends or family about environmental issues (M = 3.38, SD = 1.08), reflecting students' participation in spreading environmental awareness through personal interactions. In contrast, the lowest mean score was recorded for discussing environmental topics in class or community settings (M = 3.13, SD = 1.14), indicating limited participation in structured environmental discussions. Overall, the findings imply that students demonstrate moderate involvement in environmental advocacy and communication, but additional opportunities for discussion, collaboration, and awareness activities may help strengthen their advocacy skills and environmental engagement.

Table 12. Summary of Environmental Awareness on the Solid Waste Management of Senior High School Students

Dimensions	Means	SD	Verbal Description	Interpretation
Knowledge of Environmental Issues	3.88	1.01	High	High Awareness
Attitude towards environmental protection	3.69	0.93	High	High Awareness
Environmental Practices	3.48	1.11	High	High Awareness
Participation in environmental programs	3.19	1.19	Moderate	Moderately Aware
Advocacy and Communication	3.28	1.21	Moderate	Moderately Aware
Overall Mean	3.51	1.09	High	High Awareness

The summary of Senior High School students' environmental awareness regarding the solid waste management practices shows that respondents demonstrate a high level of awareness ($M = 3.51$, $SD = 1.09$; High). The highest mean is in knowledge of environmental issues ($M = 3.88$, $SD = 1.01$; High), indicating that students are well-informed about key environmental concerns such as pollution, climate change, and conservation of natural resources. This suggests that they have a strong cognitive understanding of environmental problems, which serves as a foundation for responsible environmental behavior and decision-making. In contrast, the lowest mean is in participation in environmental programs ($M = 3.19$, $SD = 1.19$; Moderate), showing that students are less consistently involved in organized environmental activities such as school or community programs, clean-up drives, and environmental campaigns. This implies that while students are knowledgeable about environmental issues, their actual engagement in structured initiatives remains limited, possibly due to lack of time, opportunity, or motivation to participate in such programs.

Problem 3: Is there a significant relationship between the Solid Waste Management practices and the environmental awareness of Senior High School HUMSS students?

Table 13. Correlational Analysis between Implementation of Solid Waste Management and Environmental Awareness

Variables	R	P-value	Decision	Interpretation
Solid Waste Management practices and the Environmental Awareness	0.78	0.001	Rejected	Significant

Table 13 presents the relationship between the implementation of solid waste management practices and environmental awareness among senior high school students. The results show a correlation coefficient (r) of 0.78 and a p-value of 0.001, which is below the 0.05 level of significance. This leads to the rejection of the null hypothesis. The findings indicate a strong and significant relationship between the solid waste management practices and environmental awareness. This implies that as students' environmental awareness increases, their solid waste management practices improve. Overall, the results suggest that environmental awareness plays a significant role in promoting proper solid waste management practices among senior high school students.

Problem 4: Is there a significant difference in the Solid Waste Management practices of HUMSS students when grouped by school?

Table 14. Results of Kruskal-Wallis Test of Senior High School Students' Solid Waste Management (SWM) Practices when Grouped by School

Schools	n	M	χ^2	Df	p	ϵ^2
Colon National High School	215	3.48	1.118	2	0.572	0.0037
Happy Valley Integrated School	30	3.53				
Kablacan Integrated School	60	3.51				

Table 14 shows that there was no significant difference in Senior High School students' solid waste management practices when grouped according to school, with Colon National High School obtaining a mean of 3.48, Happy Valley Integrated School 3.53, and Kablacan Integrated School 3.51, $H(2) = 1.118$, $p = .572$. Since the obtained p-value was greater than the .05 level of significance, the null hypothesis was

retained. This indicates that students from the three schools demonstrated comparable levels of solid waste management practices regardless of school affiliation. The effect size was very small ($\epsilon^2 = .0037$), indicating that school grouping accounted for only 0.37% of the variation in students' solid waste management practices. This finding suggests that environmental awareness and school-based waste management programs may have a greater influence on students' practices than school affiliation alone (Lalamonan & Comighud, 2020).

Problem 5: Is there a significant difference in the Solid Waste awareness of HUMSS students when grouped by school?

Table 15: Results of Kruskal-Wallis Test of Senior High School Students' Solid Waste Management (SWM) Awareness when Grouped by School

Schools	n	M	χ^2	Df	P	ϵ^2
Colon National High School	215	3.49	0.329	2	0.848	0.0011
Happy Valley Integrated School	30	3.58				
Kablacan Integrated School	60	3.52				

As indicated, the three school groups were Colon National High School ($n = 215$, $M = 3.49$), Happy Valley Integrated School ($n = 30$, $M = 3.58$), and Kablacan Integrated School ($n = 60$, $M = 3.52$). Descriptively, Happy Valley Integrated School obtained the highest mean, followed by Kablacan Integrated School and Colon National High School; however, the differences were minimal, indicating comparable levels of solid waste management awareness across schools. The Kruskal-Wallis test confirmed that there was no statistically significant difference in students' solid waste management awareness across the three schools, $H(2) = 0.329$, $p = .848$. Since the p -value exceeded the .05 level of significance, the null hypothesis was retained, indicating that school affiliation did not significantly influence students' awareness. The effect size was negligible ($\epsilon^2 = .0011$), meaning that only about 0.11% of the variation in awareness was explained by school grouping. This confirms that differences across schools are practically insignificant, and post hoc analysis was no longer necessary. Overall, the findings suggest that students across the three schools have similar exposure to environmental education and solid waste management programs, resulting in comparable levels of awareness.

Ethical Considerations

This study followed ethical standards in educational research to protect the rights and welfare of the participants. Permission to conduct the study was obtained from the Department of Education Division Office and the school principals of the participating schools. Informed consent was secured from all participants after explaining the purpose of the study, procedures involved, and their right to voluntary participation or withdrawal at any time without consequences. For minor participants, parental consent and student assent were also obtained. Confidentiality and anonymity were strictly observed. Participants' identities were protected through the use of codes, and no personal information was disclosed in the analysis or report. All data were used solely for research purposes and stored securely in accordance with the Data Privacy Act of 2012 (Republic Act No. 10173). The study ensured that participants were not exposed to physical, psychological, or emotional harm. Survey questions were non-intrusive, and data collection was conducted during students' free time to avoid disruption and coercion. Ethical principles of fairness, objectivity, beneficence, and academic integrity were upheld throughout the research process.

Conclusion

The study concluded that Senior High School students demonstrated generally positive Solid Waste Management practices and high environmental awareness. Students were most consistent in waste segregation, while participation in environmental activities was only moderate, indicating limited involvement in hands-on programs. They showed strong knowledge and positive attitudes toward environmental protection but lower engagement in advocacy and environmental programs. A significant positive relationship was found between Solid Waste Management practices and environmental awareness, while no significant differences were observed across schools. Overall, the study emphasizes the need to strengthen experiential learning, environmental programs, and advocacy to translate awareness into consistent sustainable practices.

Recommendations

Based on the findings, the study recommends that Department of Education officials develop and strengthen policies that support effective Solid Waste Management practices and environmental education in

schools, ensuring adequate resources and facilities for proper waste disposal and environmental programs. School heads are encouraged to assess the effectiveness of their Solid Waste Management programs and improve infrastructure such as properly labeled waste bins, monitoring systems, and school-wide environmental initiatives. Teachers are advised to integrate more experiential and activity-based learning such as clean-up drives, recycling projects, seminars, and eco-campaigns to strengthen students' environmental engagement. Students are encouraged to actively participate in environmental programs and develop leadership roles in advocacy activities to enhance their environmental responsibility. Overall, these recommendations aim to strengthen school-based environmental practices and promote sustainable behavior among students.

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