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SOLID WASTE MANAGEMENT AWARENESS AND PRACTICES OF TEACHERS AND STUDENTS

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ABSTRACT : Rapid urbanization and increasing consumption patterns have led to a growing global challenge of solid waste management. This study investigated the level of awareness and implementation of solid waste management practices among teachers and students at Bagacay National High School during the 2023-2024 school year. Results indicated a statistically significant difference in solid waste management awareness between teachers and students. While teachers demonstrated higher overall awareness, younger teachers surprisingly exhibited greater knowledge than their more experienced colleagues, and a strong positive correlation was found between teachers' attitudes and their awareness levels. For students, younger age and lower grade level were associated with higher awareness, and, similar to teachers, a positive attitude strongly correlated with awareness. Furthermore, the study found significant differences between teacher and student perceptions of solid waste management implementation ($p < 0.000$). A strong positive relationship was observed between teachers' awareness and their perceived implementation of practices, and also a strong positive relationship was found between student awareness and reported implementation. Based on these findings, the study recommends targeted professional development for teachers, enhanced and consistent solid waste management education for students, promotion of practical application and active participation, addressing the perception gap between teachers and students, leveraging online platforms for student education, and further research on barriers to implementation.

KEYWORDS - *Solid waste management, Awareness, Implementation, Segregation, Reduction, Reuse, Disposal, Professional development*

I. INTRODUCTION

Waste accumulation and disposal in rural and urban settings became a major problem in all parts of the country. An urgent response from every individual on the call to conserve the environment was highly needed. Schools, as an avenue of learning, took their part by educating learners on proper solid waste management; the right practices in dealing with waste had to be done. Hence, there were students who littered. They threw their garbage anywhere and exhibited poor proper waste management. Some schools did not have proper waste disposal areas. The waste generated by the school was being burned, which they thought was the best solution to avoid it. Basically, burning waste caused air pollution and added to the depletion of the ozone layer, which was the main cause of global warming. This had to be avoided; teachers and students, as the main front-row individuals that dealt with solid waste, had to work together for a cleaner and safer school environment. If students applied proper solid waste management in their houses and in the community, they could create change and save nature.

The Republic Act 9003 section 55-56 or The Ecological Solid Waste Management Act stipulates that the Philippine National Government in coordination with the Department of Education (DepEd) and other educational institutions should conduct a continuing education and information campaign on solid waste management and practices and strengthen the integration of environmental concerns in school curricula at all extents, with emphasis on the theories and practices of waste management principles like segregation, reduction, recycling, reuse, and composting, in order to promote environmental awareness and action among the populace. This in turn promotes growing awareness of solid waste management practices by that of the general public.

Based on Nanda and Berruti's [26] review, municipal solid waste management encompasses the crucial processes of collection, treatment, and disposal of solid waste originating from urban and rural residential, commercial, and institutional areas, as well as street sweepings. Their analysis underscores the significance of these processes in mitigating the adverse environmental and health consequences associated with waste accumulation, particularly concerning landfilling technologies.

Complementing this, Das et al. [10] define solid waste management as a multifaceted endeavor that extends beyond mere handling to include the vital aspects of waste prevention and minimization, aiming for overall sustainability. Their perspective broadens the scope, emphasizing strategies to reduce waste generation at its source and promote valuable resource recovery. The detrimental effects of improper solid waste management and the potential for garbage crises can be mitigated through the adoption of practices such as waste characterization and segregation at the source, proper collection and transfer mechanisms, recycling initiatives, and composting, as legally mandated [6].

Indeed, awareness of solid waste management (SWM) serves as the fundamental cornerstone for cultivating effective and sustainable waste handling practices across all levels of society, from individual households to expansive communities and institutions. The findings from Sultana et al. [36] and Bautista [8] compellingly illustrate the critical connection between knowledge and action concerning solid waste. Their research indicates a direct correlation between a heightened understanding of SWM principles, its environmental and health impacts, and proper waste management techniques, and the adoption of more responsible waste management behaviors.

Moreover, the significance of SWM awareness extends beyond individual actions, playing a crucial role at the community level. A well-informed populace is more likely to lend its support and actively participate in local government initiatives aimed at improving waste management, such as recycling programs, composting endeavors, and efficient waste collection systems. When citizens comprehend the underlying rationale and the associated benefits of these programs, they are more inclined to cooperate and contribute to their successful implementation. This collective awareness can lead to the development of more effective and sustainable waste management.

Furthermore, awareness is indispensable for the successful implementation and enforcement of policies and regulations pertaining to solid waste management. When individuals and institutions possess a clear understanding of the relevant legal frameworks, the reasoning behind them, and the potential consequences of non-compliance, adherence to these regulations is likely to be significantly higher. Therefore, well-designed educational campaigns aimed at raising awareness about these regulations are essential for ensuring their effectiveness and achieving the desired outcomes in waste management practices.

The escalating solid waste crisis, particularly evident in rural areas like Daram, Samar, urgently demands innovative and sustainable solutions. Bagacay National High School, as a central institution within the community, is strategically positioned to spearhead a comprehensive solid waste management program through its Youth for Environment in Schools Organization (YES-O). Mandated by Republic Act No. 9512, the National Environmental Awareness and Education Act of 2008, YES-O provides a vital and structured co-curricular platform for students to actively participate in environmental advocacy, conservation initiatives, and the adoption of sustainable practices both within the school and in the wider community. However, the effectiveness and impact of YES-O are intrinsically linked to factors such as consistent school support, robust student engagement, and the seamless integration of its activities into the overall educational framework.

Additionally, a primary strength of YES-O implementation lies in its significant potential to cultivate profound environmental awareness and a strong sense of responsibility among students. Through active participation in YES-O initiatives, learners gain invaluable firsthand experience in identifying pertinent environmental challenges, collaboratively proposing viable solutions, and effectively implementing actionable plans. Activities encompassing tree planting drives, comprehensive waste management campaigns, energy conservation projects, and impactful environmental awareness seminars contribute significantly to their understanding of fundamental ecological principles and the critical importance of environmental stewardship. Moreover, YES-O serves as a crucial avenue for the development of essential leadership skills, fostering teamwork and collaboration, and promoting active civic engagement as students assume various roles in the planning, organization, and execution of environmental projects [12].

By empowering students to become proactive environmental stewards, the YES-O program directly addresses the pressing issues of improper waste disposal, pervasive environmental degradation, and significant public health concerns prevalent in the locality. The school's unique dual role as a center for knowledge dissemination and a vital community hub renders it an ideal platform to effectively educate and mobilize the youth, thereby fostering a deeply ingrained culture of environmental responsibility.

Successfully implementing YES-O will necessitate the strategic integration of environmental education into the existing curriculum, the establishment of efficient recycling and composting systems within the school premises, the regular conduct of comprehensive clean-up drives, and the development of strong collaborative partnerships with local government units and relevant community organizations. Through these concerted efforts, Bagacay National High School has the potential to significantly contribute to a cleaner, healthier, and more sustainable future for Daram.

In the same manner, it is necessary for the learners to be highly aware and to properly implement solid waste management and practices as future citizens as well as actively participate in solving environmental-related problems as this is regarded as a global concern. They foster potential roles in addressing environmental problems as agents of change, future custodians, managers, and developers of the environment [27].

The consistent participation of 35 teachers, representing one per school from the 35 schools in the District of Daram I, in various solid waste management trainings between 2017 and 2025 [13], covering topics from waste segregation in 2017 and the Communication Education and Public Awareness Campaign on Republic Act 9003 in 2022-2023, to the crafting of Barangay Solid Waste Management Plans in 2023-2024 and Ordinances in 2024-2025, signifies a proactive district-wide effort to build capacity in this crucial area, with the LGU's involvement in the ordinance training further highlighting inter-agency collaboration.

However, the complete absence of any such training specifically within Bagacay National High School, one of the secondary schools in the District of Daram I with an increasing student population drawn from nearby barangays lacking secondary education, presents a significant concern. This lack of training likely contributes to the observed issues within the school, despite the presence of properly labeled trash bins inside and outside classrooms, where students and even teachers fail to segregate waste and recycling is not practiced. Compounding this problem is the absence of a designated waste disposal area, leading to the harmful practice of burning waste by utility workers, some students, and teachers as a means of elimination. This situation underscores the urgent need for targeted solid waste management training at Bagacay National High School to address these detrimental practices and foster a culture of proper waste management, especially given its role as a central secondary education provider in the area. The lack of training directly hinders the school's ability to implement effective waste management strategies and educate its growing student population on environmentally sound practices, creating a disparity within the district that necessitates immediate attention and the prioritization of dedicated training initiatives for Bagacay National High School to ensure a more equitable and comprehensive approach to ecological solid waste management.

In this connection, the researcher pursued this study, which determined the level of respondents' awareness and the extent of implementation of solid waste management practices among teachers and students at Bagacay National High School, Bagacay, Daram, Samar. Furthermore, this study aimed to improve the solid waste management awareness and practices of teachers and students.

II. RESEARCH QUESTIONS

This study determined the level of awareness and extent of implementation on solid waste management among teachers and students in Bagacay National High School, District of Daram I, during the School Year 2023 – 2024. Specifically, this study sought answer to the following questions:

1. What is the profile of the teacher-respondents in terms of the following variables:
    - 1.1 age and sex;
    - 1.2 civil status;
    - 1.3 highest educational attainment;
    - 1.4 gross monthly family income;
    - 1.5 number of years in teaching;
    - 1.6 relevant in-service training;
    - 1.7 latest performance based on IPCRF; and
    - 1.8 attitude toward solid waste management?
2. What is the profile of the student-respondents in terms of:
    - 2.1 age and sex;
    - 2.2 grade level;
    - 2.3 parents' highest educational attainment;
    - 2.4 parents' occupation;
    - 2.5 gross monthly family income;
    - 2.6 number of activities in solid waste management attended/ participated; and
    - 2.7 attitude toward solid waste management?
3. What is the level of solid waste management awareness of the two groups of respondents in terms of the following indicators:
    - 3.1 solid waste definition;
    - 3.2 effects of solid waste if improperly disposed;
    - 3.3 relevant laws;
    - 3.4 prohibited activities;
    - 3.5 school/ community intervention;
    - 3.6 importance of solid waste management;
    - 3.7 role and responsibilities; and

3.8 sources of awareness?

4. Is there a significant difference between the awareness of the two groups of respondents as regard to solid waste management in terms of the aforementioned indicators?

5. What is the extent of implementation of solid waste management practices as perceived by the two groups of respondents in terms of:

5.1 segregation;
5.2 reduction;
5.3 reuse; and
5.4 disposal?

6. Is there a significant difference between the perceptions of the two groups of respondents on the extent of implementation of solid waste management in terms of the foregoing areas?

7. Is there a significant relationship between the level of awareness on solid waste management and the following:

7.1 teacher-related variates;
7.2 student-related variates; and
7.3 perceived implementation of solid waste management?

8. What intervention program may be evolved based on the findings of the study?

III. CONCEPTUAL FRAMEWORK

Figure 1 showed the conceptual framework of the study, elucidating the working process that was undertaken.

The base reflected the research environment, which was Bagacay National High School, Bagacay, District of Daram I, involving the junior high school teachers and students as respondents. The one-way headed arrow connecting the base and the next frame signified the progress of the study.

The next bigger frame, enclosing the two boxes, reflected the independent and dependent variables of the study. The left frame was the independent variable that reflected the profiles and attitude toward solid waste management of the teacher and student respondents, as well as their level of solid waste management awareness across various indicators (solid waste definition, effects of improper disposal, relevant laws, prohibited activities, school/community intervention, importance of SWM, roles and responsibilities, and sources of awareness). The right frame was the dependent variable that showed the extent of implementation of solid waste management practices by the two groups of respondents in terms of segregation, reduction, reuse, and disposal. The potential significant influence between these independent variables (profiles, attitude, and awareness) and the dependent variable (extent of implementation) was shown by the vertical two-headed arrow in between.

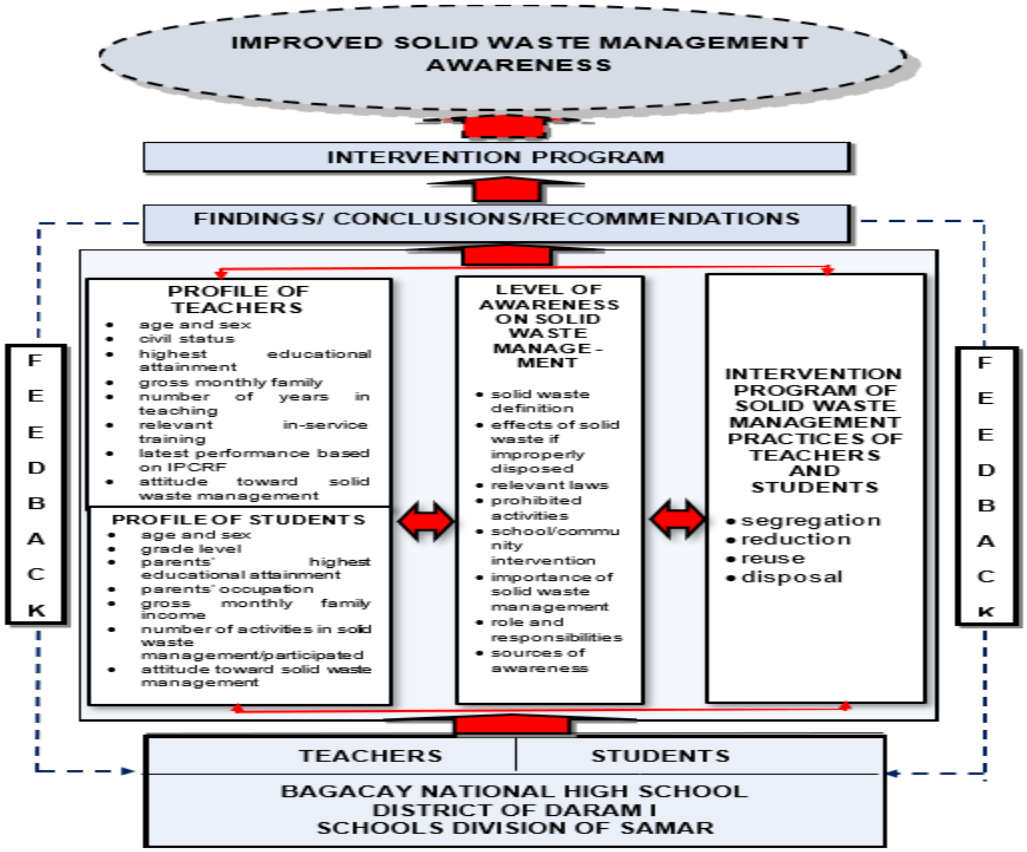

Figure 1. the paradigm of the study

Moreover, problems encountered were elicited, and suggested solutions to address the problems encountered were also gathered. After going through the aforesaid processes, findings and implications were drawn, which provided a feedback mechanism to the respondents of the study. The same findings and implications of the study led to the ultimate aim of the study: to improve the solid waste management practices in Bagacay National High School.

IV. METHODOLOGY

Research Design

This study employed a descriptive-correlational and comparative design, utilizing a questionnaire to gather data on the level of awareness and extent of implementation of solid waste management (SWM) practices among teachers and students at Bagacay National High School, District of Daram I, during the School Year 2023-2024.

The descriptive aspect of the study aimed to profile both teacher and student respondents based on their personal characteristics. For teachers, this included age, sex, civil status, highest educational attainment, gross monthly family income, years of teaching experience, relevant in-service training, latest IPCRF performance, and attitude toward SWM. For students, the profile encompassed age, sex, grade level, parents' highest educational attainment, parents' occupation, gross monthly family income, number of SWM activities attended/participated in, and attitude toward SWM. Furthermore, the descriptive component also determined the level of awareness of both groups regarding various indicators of SWM, such as the definition of solid waste, consequences of improper disposal, relevant laws, prohibited activities, school/community interventions, importance of SWM, roles and responsibilities, and sources of awareness. Finally, it described the perceived extent of implementation of SWM practices in terms of segregation, reduction, reuse, and disposal.

The study also determined if there was a significant difference between the level of solid waste management awareness of the teacher and student respondents across the identified indicators (solid waste definition, effects of improper disposal, relevant laws, prohibited activities, school/community intervention, importance of SWM, roles and responsibilities, and sources of awareness). This comparison aimed to identify any disparities in understanding and knowledge of SWM principles between the two groups within Bagacay National High School.

The correlational aspect of the study investigated the relationships between: (1) the respondents' level of awareness of SWM and their profile variables (for both teachers and students); and (2) the respondents' level of awareness of SWM and the perceived extent of SWM implementation.

Data gathered were treated statistically using descriptive statistics such as frequency counts, percentages, mean, median, weighted mean, and mean absolute deviation to characterize the respondents and the levels of awareness and implementation. Inferential statistics, including the t-test for independent samples and Chi-square test (with Cramer's V and Fisher's exact test for effect size where appropriate), were used to determine significant differences in awareness and implementation perceptions between the teacher and student groups. Additionally, the Spearman Rank Correlation Coefficient was employed to examine the relationships between the variables of interest.

Locale of the Study

Figure 2 shows the vicinity map of Brgy. Bagacay, Daram, Samar, highlighting the location of Bagacay National High School.

This study was conducted at Brgy. Bagacay, Daram, Samar. Bagacay is a barangay in the municipality of Daram, in the province of Samar. Its population as determined by the 2020 Census was 2,114. This represented 5.08% of the total population of Daram (Philippine Statistics Authority, n.d.).

The school is situated in the western part of Brgy. Bagacay, Daram, Samar. It offers a complete Junior High School Program from Grade 7 to 10 and an Academic Track with the General Academic Strand (GAS), headed by Lito O. Carausos. Under his supervision were 13 regular-permanent junior high school teachers, four senior high school teachers, one administrative assistant officer, one watchman, and two utility workers. During this school year, enrolments in the junior and senior high schools were 245 and 112, respectively. The school catered not only to Brgy. Bagacay but also to nearby barangays such as Cabac and Real.

The name Daram originated from a type of bird, called Darangsiyao, that guided the initial settlers to the island. Sometime later, a Spaniard inquiring about the name of the island, mistook the name for "Daramsiyao". This was further shortened to the current name of Daram. The original name of Daramsiyao is still in use as the name of the annual festival held in Poblacion 1 on January 15. The Island was originally part of the municipality of Zumarraga, Samar. Daram lies within the western part of Samar Sea and the Zumarraga Channel. The north and western boundary is the Samar Sea; the eastern boundary is the Zumarraga Channel; the southern boundary is Daram Channel. It can be reached by a 60-minute boat ride from the provincial capital of Catbalogan City and Northern Leyte (Office of the MPDC of Daram, 2021).

Figure 2. the map showing the locale of the study

Instrumentation

To gather the specific data required for this investigation, the researcher meticulously designed and developed two distinct sets of questionnaires. These instruments were intentionally crafted to elicit relevant information from the two groups of respondents under study – teachers and students – ensuring that the questions were appropriate and targeted to their respective experiences and perspectives.

Validation of Instrument

The researcher-developed questionnaire underwent a rigorous process of expert validation. Identified research experts, typically including the Senior Vice President for Academic Programs, the Dean of the College of Graduate Studies, the Research Director, research professors, and other specialists in research, reviewed the instrument. These experts validated the questionnaire in terms of face, content, and construct validity.

Furthermore, to ascertain its reliability, the validated questionnaire was pilot-tested with teachers and students at Baclayan National High School, Daram, Samar. For the pilot testing, 20 percent of the student population formed one group, and all the teachers comprised the second group. The reliability coefficient obtained through this pilot testing was 0.83, indicating a high level of internal consistency. As a result, the questionnaire was reproduced and distributed for data collection. To interpret the reliability coefficient of the instrument, the guidelines provided in the Table of Reliability by George and Mallery (2003:25) were utilized.

Data Gathering Procedure

Prior to the commencement of the study, the researcher diligently sought and obtained formal permission from the relevant authorities. Specifically, a written request was submitted to and approved by the school head of Bagacay National High School, the primary locale for the main investigation. Similarly, permission was secured from the head teacher of Baclayan National High School, the site where the pilot testing for instrument validation was conducted. These approved permission letters served as official documentation and were subsequently utilized as references when seeking informed consent from the participating teachers and students within both educational institutions.

To ensure the integrity and quality of the collected data, the researcher personally undertook the data gathering process. This direct involvement allowed for immediate clarification of any queries from the respondents, ensured a high rate of questionnaire return, and facilitated the verification of completeness, consistency, and accuracy of the information provided. Following the collection of the completed questionnaires, the researcher engaged in meticulous manual editing. This involved reviewing each response for clarity, completeness, and any potential inconsistencies. Subsequently, a coding system was developed and applied to the data to facilitate systematic analysis.

In preparation for statistical analysis, the manually edited and coded data underwent machine processing. This stage involved the encoding of the collected information into a suitable statistical software program. Once encoded, the software was utilized to generate statistical information, which was then organized and presented in tabular form. This systematic approach to data processing ensured efficiency and accuracy in the subsequent analysis and interpretation of the findings.

V. SUMMARY OF FINDINGS

This study explored the profiles, solid waste management (SWM) awareness, and implementation practices of teachers and students at Bagacay National High School, as well as the relationships between these factors.

Teacher Profile and SWM: Teachers are primarily married males (average age 35.41), mostly pursuing Master's degrees (76.47%), earning ₱25,000-₱29,999 monthly, and having 6-10 years of teaching experience (64.71%). They generally achieve "Very Satisfactory" IPCRF ratings (70.59%). Teachers consistently attend school-level SWM trainings ("always"), but less frequently participate in higher-level trainings. Overall, teachers hold positive attitudes towards SWM, particularly in avoiding littering, though recycling practices show some inconsistency. Teachers exhibit a high to extremely high level of awareness across all SWM indicators, including definitions, effects of improper disposal, relevant laws (especially R.A. 9003), prohibited activities, school interventions, the importance of SWM (notably health benefits), students' roles, and sources of information (television and radio). They also frequently implement SWM practices in segregation, reduction (e.g., using eco-bags), reuse (e.g., plastic bottles), and proper disposal.

Student Profile and SWM: Students are mostly female, with common ages being 15 and 17, and the majority in Grade 8. Their parents often have elementary or high school education, with fathers predominantly fishermen and mothers largely housewives. Most student families have a gross monthly income between ₱1,000-₱4,999. Student participation in SWM activities is low (97.59% participated in 1-3 activities). Students show an overall uncertain attitude towards SWM, with notable disagreement on maintaining ecological environments. Student SWM awareness varies: slight awareness of SWM definitions and relevant laws (especially R.A. 9003), but high awareness of improper disposal effects (especially infectious diseases) and prohibited SWM activities. They are also highly aware of school/community SWM interventions and the importance of SWM (clean environment). While aware of their roles in segregation and recycling, they are less aware of waste reduction and educating others. Students primarily get SWM information from online platforms (Facebook, Google), with traditional media being less influential. Student implementation of SWM practices is inconsistent; while they often segregate and use proper trash bins, their reduction (e.g., food waste conversion) and reuse (e.g., composting) practices are less frequent.

Differences and Relationships: There is a significant difference in SWM awareness and perceived implementation between teachers and students, with teachers demonstrating higher levels in both. For teachers, fewer years in teaching correlate with higher SWM awareness, and a positive attitude strongly correlates with higher awareness. For students, younger age and lower grade levels correlate with higher SWM awareness, and a positive attitude strongly correlates with higher awareness. A strong positive relationship exists between teachers' SWM awareness and their implementation of practices. Similarly, a moderately strong positive relationship exists between students' SWM awareness and their reported implementation.

VI. CONCLUSION AND RECOMMENDATION

Teacher Profile and Training: The typical teacher is a married male, 37-41 years old, highly educated with a Master's degree in progress, earning ₱25,000-₱29,999 monthly, and with 6-10 years of experience. While teachers consistently attend school-level SWM trainings, participation decreases significantly at higher levels,

highlighting a need for improved accessibility to broader professional development.

Teacher SWM Attitudes and Awareness: Teachers generally hold positive attitudes towards SWM, particularly regarding littering, and demonstrate high to extremely high awareness across all SWM indicators. However, a gap exists between positive attitudes and consistent recycling practices, suggesting a need for interventions that translate awareness into action.

Teacher SWM Implementation: Teachers frequently implement SWM practices like segregation, reduction (especially using eco-bags), reuse (e.g., plastic bottles), and proper disposal. Despite this, challenges remain in consistently separating recyclables and toxic waste, and in adopting less common methods like converting food waste to animal feed or composting.

Student Profile and SWM Engagement: The student population is relatively balanced in age (most common ages 15 and 17), with a slight majority of females. Most student families have low monthly incomes (₱1,000-₱4,999) and parents with elementary or high school education, often working as fishermen or housewives. Student participation in SWM activities is very low, indicating a significant gap between awareness and action.

Student SWM Attitudes and Awareness: Students demonstrate an overall uncertain attitude towards SWM and show limited understanding of SWM definitions and relevant laws. While highly aware of the immediate health effects of improper disposal, their understanding of broader environmental impacts (e.g., biodiversity) is limited. Students primarily rely on online platforms for SWM information, with traditional media being less influential.

Student SWM Implementation: Students inconsistently implement SWM practices; while they often segregate basic waste and use trash bins, they struggle with separating recyclables. Their efforts in waste reduction (e.g., reusable lunch containers) and reuse (e.g., plastic bottles) are present but less consistent for more complex methods like composting.

Differences in Awareness and Implementation: There are significant differences in both SWM awareness and perceived implementation between teachers and students, with teachers demonstrating higher levels in both areas. This indicates a disparity in understanding and practice within the school community.

Correlations and Relationships: For teachers, more positive SWM attitudes strongly correlate with higher awareness, while more years of teaching experience surprisingly correlate with lower awareness. For students, younger age, lower grade levels, and more positive SWM attitudes strongly correlate with higher awareness. Crucially, a strong positive relationship exists between both teachers' and students' SWM awareness and their corresponding implementation of practices.

The paper recommends the following:

1. **Targeted Professional Development for Teachers**. Given the negative correlation between teaching experience and awareness, and the strong positive link between attitude and awareness, professional development should focus on updating experienced teachers' knowledge of solid waste management best practices and fostering more positive attitudes towards it. This training should go beyond basic information and delve into practical strategies for implementation in the classroom and school environment.

2. **Enhanced and Consistent Solid Waste Management Education for Students**. The negative correlation between age/grade level and student awareness suggests a need for consistent and engaging education across all grade levels. Educational programs should be tailored to the developmental level of students while ensuring that older students continue to build upon their existing knowledge. The curriculum should address the knowledge gaps identified, such as the broader environmental impacts of improper disposal and the legal framework surrounding waste management.

3. **Promote Practical Application and Active Participation**. Both teachers and students need opportunities to translate their awareness into action. Schools should implement practical programs that encourage active participation in solid waste management activities. This could include establishing recycling and composting programs, organizing school-wide cleanups, and involving students in developing and implementing waste reduction initiatives. Given the students' lower awareness of the environmental impacts of improper disposal, these programs should emphasize this connection.

4. **Address the Perception Gap**. Since teachers and students have differing perceptions of solid waste management implementation, efforts should be made to bridge this gap. Open communication and collaboration between teachers and students are crucial. This could involve joint workshops, student-teacher committees on environmental issues, or regular feedback sessions to discuss the effectiveness of current waste management practices.

5. **Leverage Online Platforms for Student Education**. Given students' reliance on online platforms for information, these platforms should be utilized to disseminate accurate and engaging content about solid waste management. This could include creating educational videos, interactive quizzes, or online forums for discussion. Social media campaigns could also be used to promote awareness and encourage participation in waste management activities.

6. **Further Research on Implementation Barriers**. While awareness is important, implementation is key. Further research should investigate the specific barriers that hinder both teachers and students from consistently implementing solid waste management practices. Understanding these barriers (e.g., lack of resources, time constraints, lack of support) is essential for developing effective interventions to promote behavior change.

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