Exploring the Influence of Environmental Knowledge on Solid Waste Disposal Practices among College Students at a Community College

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ABSTRACT: In the pursuit of sustainable living and environmental stewardship, educational institutions play a pivotal role in shaping the attitudes and behaviours of the next generation. This research investigates the intricate influence of environmental knowledge on solid waste disposal practices among college students, specifically focusing on Opol Community College. This study aims to shed light on environmental awareness and waste management dynamics within a localized educational setting. Despite global concerns about environmental degradation, literature gaps persist regarding the influence of environmental knowledge on waste disposal practices among college students, particularly in community colleges like Opol. Existing research often overlooks the unique characteristics and challenges faced by such institutions in smaller, close-knit communities.

Employing a comprehensive research design, this study integrates descriptive and causal methodologies. Through purposive random sampling, 300 students were selected to represent a broader student population. Ethical considerations were carefully adhered to throughout the study.

The findings reveal a balanced representation across sex, age groups, and academic profiles. Students demonstrate moderate to high levels of environmental knowledge but show varied engagement in waste management practices. Notably, environmental knowledge significantly influences waste disposal behaviours, emphasizing the importance of bolstering environmental education. These insights highlight the need for tailored educational strategies and community initiatives to enhance waste management practices within community colleges like Opol. Bridging this knowledge gap is vital for developing effective sustainability programs and informing local policies to promote environmental conservation.

KEYWORDS: Environmental knowledge, solid waste disposal practices, college students, community college, sustainability, waste management, educational interventions

I. INTRODUCTION

In the pursuit of sustainable living and environmental stewardship, the role of educational institutions is pivotal in shaping the attitudes and behaviours of the next generation. It has been said that educational institutions play a vital role in fostering environmental stewardship and sustainability by offering students chances to explore environmental topics, participate in valuable conversations, and take part in meaningful activities (Indriani et al., 2019). Equipped with environmental knowledge, students are more equipped to tackle environmental issues and play a part in shaping a sustainable future (Al-Naqbi et al., 2018). This research endeavours to unravel the intricate relationship between environmental knowledge and solid waste disposal practices among college students, with a specific focus on a unique educational setting in Opol Community College. Situated in the heart of a vibrant community, this study aims to shed light on the dynamics of environmental awareness and waste management practices within a localized context.

In line with this, the global concerns surrounding environmental degradation and waste management are well-documented, there is a discernible gap in the literature concerning the specific influence of environmental knowledge on solid waste disposal practices among college students at community colleges, particularly in the case of Opol Community College. Existing research often tends to generalize findings from larger institutions or urban environments, overlooking the distinct characteristics and challenges faced by community colleges in smaller, close-knit communities. The study of Braun et al., (2018) highlighted the importance of incorporating comprehensive environmental education into the curriculum and ensuring the availability of diverse and engaging resources for learning about environmental issues.

Moreover, the unique socio-cultural and environmental context of Opol Community College necessitates a closer examination of how environmental knowledge translates into tangible waste disposal behaviors within this specific community. By pinpointing

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this gap in the literature, our research endeavors to provide tailored insights that can inform local educational strategies, community initiatives, and waste management policies. Bridging this knowledge void is crucial not only for the development of effective sustainability programs within the community college but also for contributing to broader environmental conservation efforts in the Opol community and similar settings.

Furthermore, the study is anchored on Environmental Education Theory by William Stapp in 1969. The theory emphasizes the importance of education in shaping individuals' attitudes and behaviors towards the environment. The study aims to investigate how environmental knowledge, which is a product of education, influences solid waste disposal practices among college students. By focusing on the educational context of a community college, the study aligns with the theory's emphasis on the role of education in fostering environmental awareness and sustainable behaviors..

II. METHODOLOGY

The research endeavor adopts a comprehensive research design incorporating both descriptive and causal methodologies. Employing purposive random sampling techniques, the study carefully selected 300 students from a total population of 2550 enrolled in the Opol Community College. This sampling method enables a targeted yet randomized approach, ensuring representation while allowing for specific criteria-based selection. Moreover, ethical considerations were diligently followed throughout the study, including obtaining proper consent from participants, thereby upholding the principles of research ethics and participant welfare.

III. RESULTS AND DISCUSSION
Profile of the students in terms of:
> **1.1 Sex;**
> **1.2 Age;**
> **1.3 Year level; and**
> **1.4 Course?**

The result illustrates a balanced representation of respondents in terms of sex, with 51.0 percent males and 49.0 percent females, ensuring inclusivity in gender perspectives. This distribution is crucial for concluding applicable across genders, considering potential variations in environmental knowledge and waste disposal practices between male and female students. Similarly, this highlights a predominant concentration of younger individuals aged 18 to 25 years old, emphasizing the importance of age as a variable in understanding environmental attitudes and behaviors. With 85.7 percent falling within this age group, it suggests distinct experiences and attitudes toward environmental concerns compared to older counterparts, as noted by Yusuf & Fajri (2022). Moreover, the distribution of respondents across different year levels enables a detailed analysis of how students at various stages of their college education interact with environmental knowledge and waste disposal practices. This variation implies potential differences in attitudes and behaviors according to educational levels, informing the design of tailored educational programs to enhance waste management practices among distinct student groups, as suggested by Siturang et al. (2019). Lastly, it reveals a majority representation from the Bachelor of Science in Business Administration (BSBA) program, followed by Bachelor of Secondary Education/Bachelor of Elementary Education (BSED/BEED), and Bachelor of Science in Information Technology (BSIT). This diversity in academic programs presents an opportunity for interdisciplinary educational strategies promoting holistic environmental awareness and effective waste management, aligning with the recommendations of Ahamad & Ariffin (2018). These findings collectively underscore the significance of demographic and academic profiles in shaping environmental knowledge and waste disposal practices among college students, highlighting the importance of inclusive and targeted educational interventions.

Level of students' Environmental Knowledge in terms of:
> **2.1 General Environmental Awareness;**
> **2.2 Climate Change Knowledge;**
> **2.3 Waste Management Knowledge; and**
> **2.4 Environmental Education and Sources**

The environmental knowledge of students regarding general environmental awareness and indicates an overall mean score of 3.18, which suggests moderate to high understanding. It's worth noting that students are actively seeking information about environmental concerns in their daily lives, which shows their proactive engagement with environmental issues. However, there is a gap in their awareness of current environmental policies and regulations, indicating a need for increased knowledge. Further, the result examines students' knowledge of climate change and shows an overall mean score of 3.16, reflecting students' basic understanding. Although most students acknowledge the role of human activities in climate change, they show less active involvement in seeking information about sustainable practices to mitigate its effects. explores students' understanding of waste

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management, and the overall mean score is 3.18, which indicates a reasonable level of knowledge. Most students recognize the environmental impact of improper waste disposal, but they show less participation in waste reduction initiatives. Moreover, the result indicates that students exhibit a moderate level of knowledge regarding environmental education and sources, with an overall mean score of 3.10. While students acknowledge the importance of incorporating environmental education into the curriculum, they feel less informed through classroom learning alone.

Table 1 presents the summary of the level of students' environmental knowledge. The data revealed that the overall mean is 3.16 with an SD of 0.63 or "Knowledgeable". This finding suggests that students possess a solid understanding of various environmental concepts, including climate change, waste management, and environmental education. The mean score indicates that, on average, students have a moderate to high level of environmental knowledge. Educational institutions play a vital role in fostering environmental stewardship and sustainability by offering students chances to explore environmental topics, participate in valuable conversations, and take part in meaningful activities (Indriani et al., 2019). Equipped with environmental knowledge, students are more equipped to tackle environmental issues and play a part in shaping a sustainable future (Al-Naqbi et al., 2018).

Table 1: The Summary of the Level of Student's Environmental Knowledge

Items	Mean	Std. Deviation	Description	Interpretation
General Environmental Awareness	3.18	0.62	Agee	Knowledgeable
Climate Change Knowledge	3.16	0.63	Agree	Knowledgeable
Waste Management Knowledge	3.18	0.69	Agee	Knowledgeable
Environmental Education and Sources	3.10	0.58	Agree	Knowledgeable
Overall Mean	**3.16**	**0.63**	**Agree**	**Knowledgeable**
Legend: 1.00-1.75 (Highly Not Knowledgeable), 1.76-2.50 (Not Knowledgeable), 2.51-3.25 (Knowledgeable), 3.26-4.00 (Highly Knowledgeable)				

Moreover, the lowest item for the summary of the level of the students' environmental knowledge is "Environmental education and Sources", with a mean of 3.10 and an SD of 0.58 or "Knowledgeable". This finding suggests that students may have a slightly lower level of understanding regarding environmental education and the sources available for acquiring environmental knowledge. While students exhibit a commendable level of knowledge in other areas, such as general environmental awareness and waste management, there appears to be room for improvement in terms of familiarity with environmental education resources. The study conducted by Helen Kopnina reinforces the significance of enhancing students' understanding of environmental education and available sources. Additionally, the study of Braun et al., (2018) highlighted the importance of incorporating comprehensive environmental education into the curriculum and ensuring the availability of diverse and engaging resources for learning about environmental issues.

To sum up, students have a commendable level of knowledge of general environmental awareness and waste management. However, they could benefit from increased engagement with current environmental policies, climate change mitigation practices, and diverse educational resources. These findings highlight the need to enhance students' environmental education and promote their proactive engagement with environmental issues to foster sustainable behaviors and practices.

The common practices among students for solid waste disposal in terms of:

    3.1 Waste Segregation Practices;

    3.2 Recycling Habits;

    3.3 Proper Disposal Techniques;

    3.4 Awareness of Collection Services; and

    3.5 Education on Waste Reduction

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The study's findings on students' practices regarding waste segregation found that the overall mean indicates a commendable adherence to waste segregation practices, suggesting students' active engagement in proper waste management. Particularly, students demonstrate a strong understanding of the importance of waste segregation, contributing to effective waste management efforts. However, while waste segregation guidelines are perceived as manageable, there's room for improvement in facilitating easier adherence. In addition, the finding delves into students' recycling habits, indicating a moderate to high level of engagement in recycling practices. Most students recognize the crucial role of recycling in reducing environmental impact, yet there's a need to enhance participation in existing recycling programs. Additionally, students exhibit a moderate level of awareness regarding waste collection services, recognizing their importance in maintaining a clean environment. However, there's less inclination to actively seek information on specific waste disposal methods, highlighting a knowledge gap. Nevertheless, the focus on students' education about waste reduction, revealing a moderate level of engagement with educational initiatives. While students are generally aware of waste reduction initiatives, there's less active information-seeking behavior, suggesting a need for targeted educational efforts.

Table 2: The Summary of the Common Practices Among Students for Solid Waste Disposal

Items	Mean	Std. Deviation	Description	Interpretation
Waste Segregation Practices	3.27	0.52	Strongly Agree	Highly Practiced
Recycling Habits	3.22	0.57	Agree	Practiced
Proper Disposal techniques	3.28	0.51	Strongly Agree	Highly Practiced
Awareness of Collection Services	3.18	0.57	Agree	Practiced
Education on Waste Reduction	3.12	0.46	Agree	Practiced
Overall Mean	**3.21**	**0.53**	**Agree**	**Practiced**
Legend: 1.00-1.75 (Highly Not Practiced), 1.76-2.50 (Not Practiced), 2.51-3.25 (Practiced), 3.26-4.00 (Highly Practiced)				

In summary, students demonstrate commendable practices in waste management, particularly in proper disposal techniques, but there's a potential gap in educational initiatives emphasizing waste reduction strategies, highlighting an opportunity for further enhancement in promoting sustainable behaviors.

Is there a significant difference in the Solid Waste Disposal Practices of students when they are grouped according to profile?

Table 2 assesses the significant differences in the solid waste disposal practices of students when they are grouped according to profile variables such as sex, age, year level, and course. For the variable "Sex," there were significant differences in recycling habits (t = -2.21, p = 0.028) and awareness of collection services (t = -3.91, p = 0.000). Male and female students exhibit different recycling habits and awareness of collection services. However, no significant differences were found in waste segregation practices, proper disposal techniques, or education on waste reduction between the sexes. The findings emphasize the need for nuanced and gender-sensitive approaches in promoting sustainable waste disposal practices among student populations. Such approaches can help tailor interventions to effectively address gender-specific patterns while also fostering broader awareness and engagement in sustainable waste management practices (Abubakar et al., 2022).

When grouping by age, significant differences were found only in recycling habits (F = 8.69, p = 0.000), suggesting that students of different ages have different recycling habits. In contrast, no significant differences were observed in other solid waste disposal practices. Younger individuals potentially exhibiting different levels of environmental awareness and engagement compared to older counterparts (Yusug et al., 2022). However, no significant differences were observed in other solid waste

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disposal practices, indicating a relative consistency in waste segregation practices, proper disposal techniques, and education on waste reduction across different age groups.

Grouping by year level revealed significant differences in waste segregation practices (F = 4.622, p = 0.004), recycling habits (F = 11.739, p = 0.000), awareness of collection services (F = 2.964, p = 0.032), and education on waste reduction (F = 9.866, p = 0.000). This indicates that students at different year levels demonstrate distinct behaviors across several solid waste disposal practices. This highlights the importance of considering academic progression in understanding and addressing the diverse needs and preferences of students in waste management education and interventions (Cho, 2019).

When students were grouped by course, significant differences were found in proper disposal techniques (F = 3.155, p = 0.044) and education on waste reduction (F = 5.868, p = 0.003), suggesting that students from different courses vary in their proper disposal techniques and education on waste reduction. This divergence could be attributed to several factors, including the inclusion of waste management topics in the curriculum of certain courses, the emphasis placed on sustainability within specific disciplines, or the influence of career aspirations on students' attitudes towards environmental conservation (Goldman et al, 2018).

In summary, significant differences in solid waste disposal practices were observed across different profiles, particularly when grouped by sex, year level, and course. These results highlight the importance of considering students' profiles in designing targeted waste management education and interventions.

Further the study examines the significant differences in solid waste disposal practices among students based on different profile characteristics. The analysis includes testing differences in practices according to sex, age, year level, and course.

When grouped by sex, the t-test results (t = -1.80, p = 0.14) indicate that there is no significant difference in solid waste disposal practices between male and female students, as the p-value is greater than the significance level of 0.05. Thus, the null hypothesis (Ho) cannot be rejected, suggesting that sex does not play a significant role in influencing solid waste disposal practices. This finding challenges conventional assumptions or stereotypes regarding gender-specific behaviors in waste management and underscores the importance of considering individual differences and factors beyond gender alone. Moving forward, it is essential to explore other demographic and contextual factors that may influence solid waste disposal practices and to develop targeted interventions and educational initiatives that address the specific needs and challenges of diverse student populations (Kopnina, 2018).

For age, the F-test results (F = 3.11, p = 0.188) similarly show no significant difference in solid waste disposal practices across different age groups. The p-value again exceeds 0.05, indicating a failure to reject the null hypothesis and suggesting that age may not significantly impact students' solid waste disposal practices.

Year level also shows no significant difference in solid waste disposal practices, according to the results of the F-test (F = 6.102, p = 0.061). The p-value being greater than 0.05 implies that the null hypothesis is not rejected, indicating that year level is not a determining factor in students' waste disposal behaviors. Lastly, the results for course (F = 2.666, p = 0.207) also fail to show a significant difference in solid waste disposal practices across different academic programs. The p-value of 0.207 suggests that the null hypothesis is retained, indicating that the course of study does not play a significant role in influencing students' waste disposal practices. The findings suggest a degree of uniformity in waste disposal practices among students, regardless of their year level or academic course. However, it is important to note that while statistical significance may not have been reached, there could still be practical implications or trends worth further exploration.

In summary, the result provides an additional overview, with the overall solid waste disposal practices showing no significant differences across the same profile factors. None of the profile factors (sex, age, year level, or course) exhibit significant differences in solid waste disposal practices based on the p-values provided.

Does environmental knowledge influence solid waste disposal practices among students?

The regression analysis presented in Table 2 investigates the influence of environmental knowledge on solid waste disposal practices among students. The model demonstrates a significant relationship between environmental knowledge and solid waste disposal practices, as evidenced by the ANOVA results (F = 238.585, p = 0.000), indicating that the overall regression model is statistically significant. The adjusted R-squared value of 0.761 suggests that approximately 76.1% of the variance in solid waste disposal practices can be explained by the predictor variables included in the model.

Examining the individual predictors, it is evident that each component of environmental knowledge significantly contributes to predicting solid waste disposal practices among students. Specifically, general environmental awareness (β = 0.199, p = 0.000), climate change knowledge (β = 0.081, p = 0.014), waste management knowledge (β = 0.339, p = 0.000), and environmental education and sources (β = 0.306, p = 0.000) all demonstrate statistically significant relationships with solid waste disposal practices. These findings suggest that students with higher levels of environmental knowledge, including awareness of environmental issues, understanding of climate change, knowledge of waste management practices, and exposure to environmental education, tend to exhibit more responsible solid waste disposal practices.

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In summary, the results of the regression analysis provide strong evidence that environmental knowledge significantly influences solid waste disposal practices among students. Enhancing environmental education and promoting awareness of environmental issues and waste management practices could be effective strategies for fostering environmentally sustainable behaviors among students. This aligns with previous research highlighting the importance of environmental education in promoting pro-environmental attitudes and behaviors (Bergquist et al., 2020). Moreover, interventions aimed at enhancing environmental knowledge can empower students to make informed decisions and adopt sustainable practices in their daily lives (Yusuf et al., 2022). Therefore, investing in environmental education initiatives and integrating sustainability principles into curricula can contribute to building a more environmentally conscious student population and fostering a culture of sustainability within educational institutions.

Table 3: The Test for Influence Between Environmental Knowledge and Solid Waste Disposal Practices among Students
Model 1

Predictors	Unstandardized Coefficients		Standardized Coefficients	t-value	p-value	Remarks
	B	S.E.	β			
(Constant)	.218	.102		2.141	.033	S
x_1: General Environmental Awareness	.199	.030	.220	6.557	.000	S
x_2: Climate Change Knowledge	.081	.033	.099	2.478	.014	S
x_3: Waste Management Knowledge	.339	.028	.467	12.129	.000	S
x_4 Environmental Education and Sources	.306	.029	.341	10.399	.000	S
Model 1: Solid Waste Disposal Practices= .218+.199 General Environmental Awareness + .081 Climate Change Knowledge + .339 Waste Management Knowledge + .306 Environmental Education and Sources						

Note: Adjusted R^2=.761 ANOVA for Regression: F=238.585, p=.000
Significant(S) (p<.05) Not Significant(NS) (p>.05)

Model 2

Predictors	Unstandardized Coefficients		Standardized Coefficients	t-value	p-value	Remarks
	B	S.E.	β			
(Constant)	.362	.072		5.023	.000	S
x_1: Environmental Knowledge Overall Measure	.878	.023	.914	38.879	.000	S
Model 2: Solid Waste Disposal Practices = .362 + .878 Environmental Knowledge						

Note: Adjusted R^2=.835 ANOVA for Regression: F=1,511.579, p=.000
Significant(S) (p<.05)   Not Significant(NS) (p>.05)

The regression analysis, Model 2, explores the relationship between the overall measure of environmental knowledge and its influence on the outcome variable. The model demonstrates a highly significant relationship between environmental knowledge

and the outcome variable, as indicated by the ANOVA results (F = 1,511.579, p = 0.000), suggesting that the overall regression model is statistically significant.

The adjusted R-squared value of 0.835 indicates that approximately 83.5 percent of the variance in the outcome variable can be explained by the predictor variable, environmental knowledge.

Analyzing the coefficients, the unstandardized coefficient (B) for environmental knowledge is 0.878, with a standard error of 0.023. This coefficient represents the change in the outcome variable for each unit increase in environmental knowledge. The standardized coefficient (β) of 0.914 reflects the strength and direction of the relationship between environmental knowledge and the outcome variable, demonstrating a strong positive influence.

In summary, the analysis shows that the overall measure of environmental knowledge has a strong and statistically significant influence on solid waste disposal practices among students. This suggests that increasing environmental knowledge among students may lead to better solid waste disposal practices. This implies that by enhancing environmental education and awareness of waste management practices, educational institutions can effectively promote environmentally sustainable behaviors among students (Bergquist & Sjöström, 2020). The results suggest that as students become more informed about environmental issues and solutions, they are more likely to engage in responsible waste disposal practices (Brotosusilo et al., 2020). Therefore, investing in environmental education initiatives and integrating sustainability principles into curricula can serve as effective strategies for fostering a culture of sustainability within educational institutions and beyond.

CONCLUSIONS
Based on the findings of the study, the conclusions are drawn:

The study on college students' solid waste disposal practices and their connection with demographic variables and environmental knowledge provides valuable insights into promoting sustainable behaviors. The balanced representation of respondents across genders and age groups highlights the need for inclusive strategies that acknowledge potential variations in environmental attitudes and behaviors. Furthermore, the distribution of students across different academic years and courses stresses the importance of personalized educational interventions to address the varied needs and preferences of students at different stages of their college education.

Although differences in waste disposal practices were observed across certain demographic and academic profiles, the regression analysis provides compelling evidence of the significant influence of environmental knowledge on waste disposal behaviors. Specifically, students with higher levels of environmental knowledge exhibit more responsible waste disposal practices, emphasizing the importance of bolstering environmental education and promoting awareness of environmental issues and waste management practices.

These findings reinforce the need to incorporate sustainability principles into educational curricula to cultivate a more environmentally conscious student population and foster a culture of sustainability within educational institutions and beyond. Ultimately, investing in environmental education initiatives and targeted interventions personalized to diverse student profiles is crucial for promoting sustainable behaviors and mitigating environmental impact in college communities.

RECOMMENDATIONS
Based on the findings and conclusion of the study, the following recommendations are drawn:

1. Develop waste management initiatives that consider the differences in recycling habits and awareness of collection services between male and female students.

2. Recognizing the distinct experiences and attitudes toward environmental concerns among different age groups, develop age-appropriate environmental education modules to cater to the varying levels of environmental knowledge and engagement. This approach can ensure that students of all ages receive relevant and impactful environmental education.

3. Considering the differences in waste disposal practices across academic years and courses, design tailored waste management interventions that align with students' academic progression. Implementing targeted interventions at specific stages of college education can effectively address the diverse needs and preferences of students.

4. Recognizing the significant influence of environmental knowledge on waste disposal behaviors, invest in diverse educational resources and initiatives to enhance students' understanding of environmental issues, climate change, waste management practices, and environmental education sources.

5. Encourage proactive engagement with waste reduction initiatives by providing students with comprehensive information on current environmental policies, climate change mitigation practices, and waste reduction strategies.

6. Embed sustainability principles into educational curricula across disciplines to instill environmental consciousness and promote sustainable behaviors among students.

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