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Key Factors of Sustainable Consumption Behavior Among Junior High School Students

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ABSTRACT

This study examined the key factors predicting sustainable consumption behavior among junior high school students, focusing on teachers' integration of sustainability in Technology and Livelihood Education (TLE) classes, ecological awareness, and student engagement. A quantitative descriptive-correlational research design was employed involving 193 Grade 7–10 students from a public secondary school in the Division of Malaybalay City, Bukidnon, selected through proportionate stratified random sampling. Data were collected using an expert-validated and pilot-tested researcher-developed questionnaire and analyzed through descriptive statistics and multiple regression analysis. Findings revealed that teachers' integration of sustainability in TLE classes was generally moderate, while students demonstrated very high levels of ecological awareness, student engagement, and sustainable consumption behavior. Ecological awareness and student engagement emerged as significant positive predictors of sustainable consumption behavior, whereas teachers' integration of sustainability did not demonstrate a statistically significant independent predictive contribution. These findings indicate that students' environmental understanding and active involvement in learning are important factors associated with their reported waste reduction and energy conservation practices. The study recommends strengthening contextualized, participatory, and application-oriented TLE activities that promote ecological awareness and meaningful student engagement. Its limitations include the single-school setting, reliance on self-reported responses, and nonexperimental design, which restrict causal interpretation and broader generalization. The study contributes localized empirical evidence supporting the development of sustainability-focused instructional practices and school-based initiatives aligned with responsible consumption and environmental stewardship.

Keywords: *Ecological Awareness, Energy Conservation, Junior High School, Student Engagement, Sustainability Education, Sustainable Consumption, Waste Reduction*

1. INTRODUCTION

Sustainable consumption has become an important global concern as increasing resource extraction, waste generation, and energy consumption continue to place pressure on the environment. The United Nations Environment Programme and International Resource Panel (2024) reported that global natural resource extraction has tripled over the past five decades and could increase by approximately 60% from its 2020 level by 2060. Similarly, the United Nations Environment Programme (2024) estimated that approximately 1.05 billion tons of food waste were generated worldwide in 2022. These environmental challenges emphasize the importance of promoting responsible consumption practices, particularly waste reduction and energy conservation, among younger generations.

1.1. Background and Context of the Study

Education plays an essential role in developing environmental awareness, responsible attitudes, and sustainable behaviors among learners. The United Nations Educational, Scientific and Cultural Organization (UNESCO, 2020) emphasized that Education for Sustainable Development (ESD) should equip students with the knowledge, values, and competencies necessary to make informed decisions and participate in sustainable practices. Similarly, van de Wetering et al. (2022) found that environmental education positively influenced children's and adolescents' environmental knowledge, attitudes, intentions, and behaviors, although improvements in knowledge did not always translate into behavioral changes. Denault et al. (2024) further identified individual, family, peer, school, and community factors associated with adolescents' pro-environmental behavior. In the Philippines, Technology and Livelihood Education (TLE) provides opportunities to integrate sustainability principles through practical learning experiences involving household management, resource utilization, waste management, and energy conservation. The Department of Education (DepEd, 2023) maintained TLE as an essential learning area under the MATATAG Curriculum, supporting the development of practical competencies among learners. Within this context, examining teachers' integration of sustainability, ecological awareness, and student engagement is important for understanding sustainable consumption behavior among junior high school students in the Division of Malaybalay City, Bukidnon. UNESCO (2021) also documented gaps in the integration of environmental issues into school curricula, highlighting the importance of strengthening sustainability-related learning opportunities.

1.2. Research Problem

Despite increasing efforts to promote environmental education, the relationship between students' environmental understanding and their actual sustainable consumption practices remains a concern. Although learners may recognize the importance of environmental protection, this awareness does not necessarily translate into consistent waste reduction and energy conservation behaviors. Van de Wetering et al. (2022) demonstrated that environmental education generally produced stronger improvements in knowledge than in actual environmental behavior. Similarly, Phupan et al. (2025) reported that secondary school students exhibited very high environmental awareness but only moderate pro-environmental waste management behavior, suggesting a possible gap between environmental understanding and everyday practices. Within the Philippine educational setting, TLE provides opportunities for students to apply sustainability concepts through classroom instruction and practical activities. However, the extent to which teachers' sustainability integration, students' ecological awareness, and their cognitive, affective, and behavioral engagement contribute to sustainable consumption behavior requires further examination. Toledo and Lingon (2024) also found that relationships between environmental awareness and sustainable practices varied across behavioral dimensions.

Consequently, determining which educational and learner-related factors significantly predict sustainable consumption behavior is necessary to provide evidence that may guide contextualized TLE instruction and school-based sustainability initiatives.

1.3. Research Gap

Existing studies have established relationships among environmental education, ecological awareness, student engagement, and environmentally responsible behavior. Van de Wetering et al. (2022) examined the effects of environmental education on children's and adolescents' environmental outcomes, while Denault et al. (2024) identified multiple individual and contextual factors associated with pro-environmental behavior. However, these investigations did not specifically examine the combined predictive contributions of teachers' sustainability integration, ecological awareness, and student engagement within Philippine Technology and Livelihood Education classes. Furthermore, previous research has often examined environmental knowledge, attitudes, and behavioral intentions without simultaneously considering students' classroom engagement and their reported waste reduction and energy conservation practices. This leaves an empirical and contextual gap regarding which factors independently predict sustainable consumption behavior among junior high school students. The present study addresses this gap by examining these three predictors simultaneously through multiple regression analysis, providing localized evidence from a public secondary school in Malaybalay City, Bukidnon.

1.4. Purpose and Objectives of the Study

This study aimed to determine the key factors predicting sustainable consumption behavior among junior high school students in a public secondary school in the Division of Malaybalay City, Bukidnon. Specifically, it assessed teachers' integration of sustainability in Technology and Livelihood Education classes, students' ecological awareness, and their cognitive, affective, and behavioral engagement in TLE. It also examined students' sustainable consumption behavior in terms of waste reduction and energy conservation. Furthermore, the study determined whether teachers' integration of sustainability, ecological awareness, and overall student engagement significantly predicted sustainable consumption behavior. Using a quantitative descriptive-correlational approach, the investigation sought to identify meaningful statistical relationships without establishing causal effects.

1.5. Significance and Practical Contribution of the Study

The study provides localized empirical evidence concerning educational and learner-related factors associated with sustainable consumption behavior among junior high school students. Its findings may assist TLE teachers in developing contextualized, participatory, and application-oriented learning activities that strengthen ecological awareness and student engagement. School administrators may use the findings to support environmental initiatives, including waste reduction programs and energy conservation activities. Curriculum developers and Department of Education personnel may also consider the results when improving sustainability-related instructional resources and professional development activities. Additionally, parents and guardians may reinforce environmentally responsible practices at home. The study contributes to sustainability education by identifying factors associated with students' reported consumption behaviors within the Philippine TLE context.

1.6. Sustainable Development Goals (SDG) Alignment

This study primarily supports Sustainable Development Goal 12: Responsible Consumption and Production, particularly Targets 12.2, 12.5, and 12.8, which emphasize efficient resource utilization, waste reduction, and public awareness of sustainable lifestyles (United Nations, 2015). By examining students' waste reduction and energy conservation practices, the research

provides evidence relevant to promoting responsible consumption among young learners. It also supports Sustainable Development Goal 4: Quality Education, particularly Target 4.7, which emphasizes acquiring knowledge and skills necessary to promote sustainable development. Through its examination of sustainability integration, ecological awareness, and student engagement in TLE classes, the study offers insights that may inform practical educational approaches connecting environmental learning with everyday responsible behavior.

2. METHODOLOGY

2.1. Research Design

This study employed a quantitative descriptive-correlational research design to examine factors associated with sustainable consumption behavior among junior high school students. The descriptive component assessed teachers' integration of sustainability in Technology and Livelihood Education (TLE) classes, ecological awareness, student engagement, and sustainable consumption behavior. The correlational component determined whether the three independent variables significantly predicted sustainable consumption behavior through multiple regression analysis. This design was appropriate because it enabled the examination of statistical relationships among naturally occurring variables without experimental manipulation or establishing causal relationships (Creswell & Creswell, 2023).

2.2. Research Locale, Population, and Participants or Respondents

The study was conducted in a public secondary school in the Division of Malaybalay City, Bukidnon, Philippines, during School Year 2026–2027. The target population consisted of 386 officially enrolled junior high school students, comprising 125 Grade 7, 90 Grade 8, 84 Grade 9, and 87 Grade 10 learners. A total of 193 students participated in the study. Eligible participants were enrolled in TLE classes and provided student assent and parental or guardian consent. Students who participated in the preliminary instrument testing were excluded from the final survey. The selected participants represented the four grade levels within the participating school.

2.3. Sampling Technique and Sample Determination

Proportionate stratified random sampling was employed to ensure representation across grade levels. The sample size was determined using Cochran's formula with finite population correction, a 95% confidence level, a 5% margin of error, and a 50% population proportion (Cochran, 1977). From the population of 386 students, 193 respondents were selected. The sample allocation comprised 63 Grade 7, 45 Grade 8, 42 Grade 9, and 43 Grade 10 students. Each grade level served as a stratum, and eligible participants were randomly selected according to their proportional allocation. Data were collected using a structured, researcher-developed questionnaire consisting of four components: teachers' integration of sustainability in TLE classes, ecological awareness, student engagement, and sustainable consumption behavior. Student engagement covered cognitive, affective, and behavioral dimensions, while sustainable consumption behavior included waste reduction and energy conservation. The instrument underwent expert content validation and pilot testing involving 30 students who were excluded from the final sample. Confirmatory factor analysis was also conducted to assess the measurement models. Responses were evaluated using a five-point Likert-type scale, with higher scores indicating higher levels of the measured constructs.

2.4. Data Gathering Procedure

Before data collection, the researcher secured ethical clearance from the Lourdes College Research Ethics Committee (LC-REC) and obtained permission from the Department of Education Schools Division of Malaybalay City and the participating school head. Coordination with TLE teachers and class advisers facilitated questionnaire administration without disrupting

regular classes. Following expert validation and pilot testing, the revised questionnaires were administered to eligible students who had provided the required consent and assent. Completed responses were collected, organized, and prepared for statistical analysis.

2.5. Data Analysis and Statistical Treatment

Descriptive statistics were used to summarize respondents' assessments of sustainability integration, ecological awareness, student engagement, and sustainable consumption behavior. Mean scores and standard deviations were used to describe the measured constructs, with interpretations based on the instrument's five-point scale. Multiple regression analysis determined the independent predictive contributions of teachers' sustainability integration, ecological awareness, and overall student engagement to sustainable consumption behavior. Statistical assumptions, including residual normality and multicollinearity, were examined. The null hypotheses were evaluated at a 0.05 significance level, and findings were interpreted as statistical associations rather than causal effects.

2.6. Ethical Considerations

The study obtained ethical clearance from LC-REC and the necessary institutional permissions before data collection. Since participants were minors, written parental or guardian consent and student assent were required. Participation was voluntary, and respondents were informed of their right to refuse or withdraw without academic consequences. Confidentiality, privacy, and protection from coercion were emphasized throughout the research process. Participants were assured that their responses would not affect their grades, class standing, or relationships with school personnel.

3. RESULTS AND DISCUSSION

3.1. Teachers' Integration of Sustainability in TLE Classes

The findings revealed that teachers' integration of sustainability in Technology and Livelihood Education (TLE) classes was Moderate, with an overall mean of 3.47 and a standard deviation of 0.83. Among the 193 participants, 41.45% reported Moderate integration, 38.86% High, 6.74% Very High, 10.36% Low, and 2.59% Very Low. These results indicate that sustainability concepts were incorporated into TLE instruction, although students experienced varying levels of integration. The highest-rated indicators were teachers' explanations connecting TLE lessons with environmental sustainability (M = 3.56, SD = 1.19) and their use of technology to engage students in sustainability learning (M = 3.56, SD = 1.28). Conversely, the use of videos, presentations, websites, and other digital materials to explain sustainable practices received the lowest mean (M = 3.23, SD = 1.35). This suggests that while teachers introduced sustainability concepts and employed technology-supported activities, specific digital resources were not consistently utilized. Hajj-Hassan et al. (2024) emphasized the potential of digital tools to strengthen environmental education and sustainability awareness, while Jäggle et al. (2024) highlighted the importance of appropriate instructional approaches in promoting sustainability education. Similarly, UNESCO (2020) emphasized the need to connect environmental knowledge with practical learning experiences. The findings suggest that TLE teachers may strengthen sustainability integration through contextualized instruction, accessible digital resources, and experiential activities involving waste reduction, resource conservation, and environmentally responsible decision-making. UNESCO (2024) likewise recommends action-oriented, participatory climate and sustainability education that connects classroom learning with practical environmental decisions.

3.2. Ecological Awareness Among Junior High School Students

The participants demonstrated a High level of ecological awareness, with an overall mean of 3.81 and a standard deviation of 0.76. The distribution indicated that 38.86% of students belonged to

the High category, followed by 33.68% at Moderate, 23.83% at Very High, and 3.63% at Low, with no participants classified as Very Low. These findings suggest that most students understood environmental problems and recognized the consequences of human activities on natural resources and ecosystems. The highest-rated indicator concerned understanding the harmful effects of improper waste disposal on people, animals, and ecosystems (M = 4.02, SD = 1.16), followed by the ability to identify environmental protection practices (M = 3.86, SD = 1.10). In contrast, awareness that excessive consumption contributes to natural resource depletion received the lowest mean (M = 3.64, SD = 1.16), although it remained within the High category. These findings indicate that students were particularly familiar with waste-related environmental concerns but demonstrated comparatively lower awareness of the relationship between consumption and resource depletion. Van de Wetering et al. (2022) found that environmental education positively influenced environmental knowledge and related outcomes among children and adolescents. However, Phupan et al. (2025) demonstrated that high environmental awareness did not necessarily correspond to equally strong waste management practices. Similarly, Zeng et al. (2023) emphasized the relevance of environmental knowledge and concern to sustainable consumption behavior. The present findings suggest that ecological awareness provides an important foundation for responsible consumption, although awareness alone does not establish consistent behavioral practices. TLE teachers may therefore strengthen students' environmental understanding by connecting excessive consumption, resource depletion, waste management, and energy conservation with familiar household and school activities.

3.3. Student Engagement in Technology and Livelihood Education Classes

The findings indicated that participants demonstrated a High level of student engagement in TLE classes, with an overall mean of 3.65 and a standard deviation of 0.66. Among the three dimensions, cognitive engagement obtained the highest mean (M = 3.69, SD = 0.77), followed by behavioral engagement (M = 3.66, SD = 0.86) and affective engagement (M = 3.62, SD = 0.82). These results suggest that students generally invested mental effort in understanding their lessons, participated in classroom activities, and recognized the importance of sustainability education. In cognitive engagement, understanding the main ideas presented in TLE lessons received the highest assessment (M = 3.83), while connecting sustainability concepts with home, school, and community situations obtained the lowest mean (M = 3.60). In behavioral engagement, following classroom instructions during sustainability-related activities received the highest mean (M = 3.83), whereas active participation in sustainability-related discussions obtained the lowest mean (M = 3.46). Regarding affective engagement, recognizing the importance of sustainability topics received the highest assessment (M = 3.86), while excitement about environmental projects obtained the lowest mean (M = 3.49). These findings indicate that students were generally willing to understand lessons and complete assigned activities but reported comparatively lower levels of emotional interest and active participation in discussions. Fredricks et al. (2004) conceptualized student engagement as involving cognitive, emotional, and behavioral dimensions, providing a theoretical foundation for understanding these findings. Setiawan et al. (2023) examined student engagement in sustainability-oriented project-based learning, while Jäggle et al. (2024) emphasized participatory educational approaches that encourage meaningful environmental learning. The findings suggest that TLE teachers may strengthen student engagement through collaborative projects, contextualized problem-solving activities, environmental discussions, and practical sustainability tasks. These approaches may provide opportunities for students to connect classroom knowledge with responsible consumption practices.

3.4. Sustainable Consumption Behavior in Terms of Waste Reduction and Energy Conservation

The participants demonstrated a High level of sustainable consumption behavior, with an overall mean of 3.83 and a standard deviation of 0.78. Energy conservation obtained a higher mean (M = 3.94, SD = 0.90) than waste reduction (M = 3.73, SD = 0.82), indicating that participants reported practicing energy-saving behaviors somewhat more frequently than waste-reduction activities. In energy conservation, turning off lights when unnecessary received the highest assessment (M = 4.03, SD = 1.15), followed by unplugging chargers and appliances after use (M = 3.99, SD = 1.14). Using natural lighting or ventilation whenever sufficient received the lowest mean (M = 3.83, SD = 1.07), although it remained within the High category. Regarding waste reduction, proper segregation of biodegradable, recyclable, and non-recyclable materials obtained the highest mean (M = 3.94, SD = 1.01), followed by using reusable containers, utensils, bags, or bottles (M = 3.81, SD = 1.03). Conversely, avoiding unnecessary purchases or consumption received the lowest assessment (M = 3.45, SD = 1.26). These findings suggest that students were comparatively more accustomed to conserving electricity and managing waste than preventing unnecessary consumption. Piscitelli and D'Uggento (2022) identified energy-saving activities and responsible consumption choices as important components of sustainable lifestyles among young people. Similarly, Betzler and Kempen (2025) examined the potential of experiential sustainability learning to strengthen consumption-related behaviors among secondary school students. The present findings highlight the importance of teaching students not only how to manage waste but also how to prevent unnecessary consumption through responsible purchasing decisions, material reuse, and efficient resource utilization. Nevertheless, the findings were based on self-reported practices and did not directly measure actual waste generation or electricity consumption.

3.5. Predictors of Sustainable Consumption Behavior Among Junior High School Students

The multiple regression analysis revealed that teachers' integration of sustainability in TLE classes, ecological awareness, and student engagement collectively and significantly predicted sustainable consumption behavior, $F(3, 189) = 48.794$, $p < .001$. The model yielded $R = .661$, $R^2 = .436$, and adjusted $R^2 = .428$, indicating that the three predictors explained 43.6% of the variation in sustainable consumption behavior. Thus, the first null hypothesis was rejected. Student engagement emerged as the strongest significant positive predictor ($B = .485$, $\beta = .409$, $t = 5.849$, $p < .001$), followed by ecological awareness ($B = .325$, $\beta = .315$, $t = 4.997$, $p < .001$). These findings indicate that students with higher engagement and ecological awareness tended to report more sustainable consumption practices. Consequently, the third and fourth null hypotheses were rejected. The results align with Fredricks et al. (2004), who emphasized the importance of cognitive, affective, and behavioral engagement, and Zeng et al. (2023), who highlighted the relationship between environmental knowledge and sustainable consumption behavior. In contrast, teachers' integration of sustainability did not significantly predict sustainable consumption behavior after controlling for the other variables ($B = .063$, $\beta = .067$, $t = 1.071$, $p = .285$). Therefore, the second null hypothesis was not rejected. This finding suggests that sustainability instruction alone may not independently explain students' consumption practices, consistent with van de Wetering et al. (2022), who identified varying relationships between environmental education and behavioral outcomes. Overall, the findings highlight the importance of strengthening ecological awareness and meaningful student engagement through contextualized and participatory TLE activities. However, the results establish predictive associations rather than causal relationships.

4. CONCLUSIONS AND RECOMMENDATIONS

The study concluded that ecological awareness and student engagement were significant positive predictors of sustainable consumption behavior among junior high school students in

the Division of Malaybalay City, Bukidnon. Participants demonstrated high levels of ecological awareness, student engagement, and sustainable consumption behavior, while teachers' integration of sustainability in TLE classes was moderate. Student engagement emerged as the strongest predictor, followed by ecological awareness, indicating that students who were more actively involved in learning and demonstrated greater environmental understanding tended to report more responsible waste reduction and energy conservation practices. However, teachers' integration of sustainability did not demonstrate a statistically significant independent predictive contribution. These findings suggest that sustainability education should emphasize not only the integration of environmental concepts into classroom instruction but also the development of ecological understanding and meaningful student participation. Overall, the study provides localized evidence supporting the importance of ecological awareness and student engagement in understanding sustainable consumption behavior.

Based on the findings, TLE teachers are encouraged to strengthen sustainability education through contextualized, participatory, and experiential learning activities that promote ecological awareness and student engagement. Classroom instruction should incorporate practical projects involving waste segregation, material reuse, responsible purchasing, and energy conservation. Teachers should also provide opportunities for collaborative discussions, problem-solving, and reflection to strengthen students' cognitive, affective, and behavioral engagement. School administrators may support these initiatives by providing appropriate instructional resources and implementing school-based environmental programs. Curriculum developers and educational leaders may consider strengthening sustainability-related competencies and providing professional development opportunities for TLE teachers. Parents and guardians are likewise encouraged to reinforce responsible consumption practices at home. Future researchers may investigate additional factors influencing sustainable consumption behavior and examine how sustainability instruction, ecological awareness, and student engagement interact across different educational settings.

The study was limited to 193 junior high school students from one public secondary school in the Division of Malaybalay City, Bukidnon, which may restrict the generalizability of the findings to other educational settings. Data were obtained through self-reported questionnaires, making the results potentially susceptible to response bias and differences between reported and actual consumption practices. Furthermore, the descriptive-correlational research design established statistical associations but could not determine causal relationships among the variables. The regression model explained 43.6% of the variation in sustainable consumption behavior, indicating that other relevant factors were not examined. Future studies may involve larger and more diverse samples, incorporate direct behavioral observations, and employ longitudinal or mixed-methods approaches to provide a more comprehensive understanding of sustainable consumption behavior among students.

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