# Locus of control and literacy in environment of students in Magsaysay National High School

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## *Abstract*

This study aimed to investigate and describe the relationship between locus of control and literacy in the environment of students in Magsaysay National High School. A mixed exploratory sequential design was employed to gather the data. For the qualitative method, an interview guide question was used to identify the practices of the students in protecting the school environment. The data generated from the interview were analyzed using thematic analysis and resulted in the following: environmental knowledge, environmental attitudes, and environmental skills. For the quantitative method, the 30-item researcher-made questionnaire that describes literacy in the environment, and the 16-item adopted questionnaire, namely the Internal Environmental Locus of Control (INELOC) by Cleveland et al. (2012), were used to collect data, which was carried out on 345 students. This study reveals three indicators that are perceived by the student participants as contributing to literacy in the environment. The final theme is presented in a semi-circular figure which includes environmental knowledge, environmental attitudes, and environmental skills. The major findings of this study indicate that there is a significant relationship between the students' locus of control and their literacy in environment.

*Keywords:* locus of control, literacy in environment, self-learning module, mixed exploratory sequential design, school environment

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### 1. Introduction

We are currently experiencing an unprecedented environmental crisis. A series of existing environmental crises constitute the scenery of the environmental problems. Many environmental problems, such as waste disposal, generating unsustainable waste, pollution, global warming, and climate change cause massive damage to humans and other organisms (Hadjichambis et al., 2020). Increasing pressures on the environment could cause irreversible damage within the next few decades and the current inaction will have an enormous impact on the environment in 2030 (OECD, 2012 & NASA, 2023). As the face-to-face classes started on August 22, 2022, there is an abrupt increase in waste and garbage in Magsaysay National High School. There is no proper disposal and segregation of waste. (J. Vasquez, personal communication, June 21, 2022). Due to this problem, the Supreme Secondary Learner Government (SSLG) officers focus on proper waste disposal and solid waste management. Not only them, but the MDF Club together with YES-O Club and other clubs strengthened proper labeling of garbage bins in every classroom and clean-up drives inside the school. Furthermore, the Magsaysay Municipal Environment and Natural Resources Office (MENRO) works jointly in this matter by ensuring regular collection of waste every Friday of the week.

The Philippines is considered the fourth top waste generator in Southeast Asia and one of the top ocean polluters in the world (Teh, 2022). According to DENR (2021), the Philippines is producing over 21 million metric tons of garbage every year. It is very alarming since improper waste and garbage disposal causes land, water, and air pollution which are harmful to human health and the environment. According to the World Bank (2018), there will be a 70% increase in waste generation by 2050. Global waste generation is expected to grow from 2.1 billion tons per year to 3.4 billion tons per year. The result of the study by Kaza et. al (2018) reveals that waste generation is projected to double in most developing countries by 2050. Peng et al. (2021) report that the pandemic worsened the problem of waste disposal.

To address the problems in waste and garbage in the Philippines, the Republic Act 6969 regulates, restricts, or prohibits the sale, distribution, use, and disposal of chemical substances and mixtures that present unreasonable risk and/ or injury to health or the environment. Also, the Republic Act 9003 or the Ecological Solid Waste Management of 2000 mandates to establish of integrated solid waste management to attain 25 % waste reduction. In line with this, Mamburao, the capital of Occidental Mindoro, formulated the 10-Year Solid Waste Management Plan (SWMP) to address the municipality's present solid waste management needs from 2019 to 2028. Also, the DENR- MIMAROPA Region, and the local government unit of San Jose in Occidental Mindoro joined forces to intensify environment protection efforts through a MOA-signing activity establishing the municipality as a local chapter of Tayo Ang Kalikasan (TAK) on January 10, 2020. San Jose strengthened an ordinance it previously issued, the waste segregation and prohibition of disposable or single-use plastics (DENR, 2020). These showed the problem that people are facing with waste disposal. In addition to that, Presidential Decree No. 856, or the Philippine Sanitation Code sets sanitary standards for schools. The DepEd (2020) in Environmental Codes of Practice (ECOP) requires schools to provide separate garbage cans for dry waste, wet waste, and hazardous waste. DepEd also advocates practices on proper waste management at home, school, and in the community (DepEd, 2020). The study by Wardani et al. (2018) emphasizes that the student's environmental literacy is a vital component in solving environmental problems such as waste disposal. The result of the study by Nunez & Clores (2017) stresses that educators in the K–10 levels should prioritize enhancing students' environmental literacy, especially regarding environmental attitudes and knowledge. Garcia & Garcia (2016) suggest that science-based environmental literacy instruction be provided in a classroom setting. In light of this study, the students will gain a clear understanding of the connection between their locus of control and literacy in the environment. Furthermore,

this research will contribute to raising students' environmental literacy and addressing environmental issues like improper waste disposal in school and poorly maintained waste facilities and bins.

*Statement of the Problem -* This study aimed to investigate and describe the relationship between locus of control and literacy in environment of students in Magsaysay National High School. Specifically, the study was conducted to answer the following questions: (1) What are the practices of the students in protecting the school environment? (2) What is the level of locus of control of students in Magsaysay National High School in terms of (Adopted from Cleveland, 2015) 2.1 Green Consumerism, 2.2 Activism, 2.3 Advocacy and 2.4 Recycling Materials? (3) What is the level of literacy in environment of students in Magsaysay National High School in terms of: 3.1 Environmental Knowledge, 3.2 Environmental Attitudes and 3.3 Environmental Skills (4) Is there a significant relationship between the locus of control and the literacy in environment of students in Magsaysay National High School? and (5) What self-learning module can be proposed about literacy in environment?

*Significance of the Study -* The result of the study will be significant to the following: First, this study would serve as an eye-opener to the students. This will help them to become more aware of their actions toward the environment. This will drive them to enhance their environmental knowledge, improve environmental attitudes, and build the environmental skills required to address and to solve environmental issues in schools and our community, and to have positive and significant impacts in the environment. Second, as a student organization that works to preserve and protect the environment, YES-O Club would benefit from this study since it gives them a foundation for what to adjust in their events, projects, and programs. This will encourage more students to join the YES-O Club and help them in the completion of more environmental plans. Third, this study would be beneficial to them as it deepens their understanding of students' literacy in the environment. Teachers play a significant role in the teaching-learning process, the result of the study will guide them about the knowledge, attitudes, and skills of the students, this will capacitate them to integrate environmental literacy in their lessons and to reinforce environmental activities outside the four corners of the classroom. Fourth, the results of this study will give an update on students' environmental literacy. This will motivate the PTA to assist and participate in school-based projects and initiatives that prioritize the welfare of students as well as their living environment. This will enable them to recognize the school's efforts.

Fifth, the findings of the study will help school administrators adhere to the "Makakalikasan" core values more fervently. This will act as a roadmap for them as they update School-Based Management (SBM), which will address what resources, initiatives, projects, or services should be given top priority to benefit students, the school, the community, and the environment in general—both now and in the future. In addition, the result of the study may be used as a reference for current and future endeavors specifically about literacy in the environment. Since they must protect the environment, this study would be advantageous to them. The study's findings will enlighten them, enabling them to make specific plans for supporting students in the schools and fostering community cooperation. This study would empower people to make small and big sound decisions when it comes to protecting and taking care of our environment. This will encourage them to develop intrinsic values and attitudes and become stewards of the environment. Lastly, the outcomes of the study are beneficial to future researchers. This will serve as a source of information about the student's literacy in the environment.

*Scope and Delimitation of the Study -* The study was confined to describing the relationship between locus of control and literacy in the environment of the students in Magsaysay National High School. The covered variables in this study were the (1) locus of control in terms of green consumerism, activism, advocacy, and recycling materials; and (2) literacy in environment in terms of knowledge, attitudes, and skills. The scope of this study in terms of respondents was from grade 7 to 10 students in Magsaysay National High School. The researcher-made questionnaire and the adopted questionnaire- Internal Environmental Locus of Control (INELOC) Scale by Cleveland et al., (2012) were used in this study. The researcher informed and asked permission from the author to the use of Internal Environmental Locus of Control (INELOC) Scale. The coverage of the study was school year 2023-2024. The external locus of control was excluded from the study in light of the researcher's goal to solely examine the respondents' beliefs that their actions can affect the environment.

## 2. Methodology

**Research Design -** This study employed the mixed exploratory sequential design. The exploratory sequential design was based on qualitative data collection and analysis, followed by quantitative data collection, analysis, and interpretation. In this design, the qualitative results are used to develop a new instrument or taxonomy for the quantitative strand (Berman, 2017).

**Respondents of the Study -** The researcher included the selected students as respondents in this study. The primary respondents of this study were the selected students of Magsaysay National High School for the school year 2023-2024. For the qualitative method, fifteen (15) students were randomly chosen as the respondents from Magsaysay National High School Main Campus. The data were gathered through an interview using the guide question. They were not included in the final administration of the questionnaire. The respondents that were included in the study were from grade 7 to 10 students from Magsaysay National High School Main Campus, and extension schools- Caguray, Calawag, Lourdes, and Nicolas. Out of 3, 322 students, the total number of respondents was 345 based on the RAOSOFT formula with a 5% margin of error and 95% confidence level. In the final administration of the questionnaire, the researcher used stratified random sampling, by dividing the respondents based on their grade level and based on their sections of grades 7 to 10. Hayes (2023) states that stratified random sampling is a method of sampling that involves the division of a population into smaller sub-groups known as strata. It ensures that specific subgroups are present in the sample. It helps to obtain precise estimates of each group's characteristics. Hence, it is a cost-effective and time-effective sampling method due to the large population of the school.

**Research Instrument -** The instruments used in this study were the researcher-made questionnaire and the entirely adopted questionnaire from Cleveland et al. (2012). The questionnaire was based on the related studies under the Review of Related Literature. For the qualitative method, consisted of one (1) interview question to identify the practices of the students in protecting the school environment. For the quantitative research, it consisted of the (1) an adopted questionnaire that investigated the level of locus of control in terms of green consumerism, activism, advocacy, and recycling materials; and (2) a researcher-made questionnaire that described the level of literacy in an environment in terms of knowledge, attitudes, and skills. In addition, the experts of the DWCSJ Graduate School were consulted to assess the validity of the questionnaire. To ensure that the questionnaire was valid, comments and recommendations from experts were considered. Moreover, the reliability test of the questionnaire was done using the test-retest method. The questionnaire was tried out first to thirty (30) student respondents, and then a week after, it was administered to the same group of students. As such, they were excluded from the final administration of the questionnaire. The locus of control in environment which was described in the 16 statement indicators and the environmental literacy with three (3) components of ten items each was tested for consistency using Cronbach's Alpha. The results of the reliability analysis are shown in Table 1.

**Table 1**

*Reliability Results of the Instruments*

| Components | Number of Items | Reliability Coefficient* | Interpretation |
|---|---|---|---|
| Environmental Locus of Control | 16 items | 0.914 | Very High Reliability |
| Environmental Knowledge | 10 items | 0.881 | High Reliability |
| Environmental Attitude | 10 items | 0.911 | Very High Reliability |
| Environmental Skills | 10 items | 0.912 | Very High Reliability |

*Cronbach's Alpha based on standardized items

The computed coefficients yielded generally large indices which denote a very high level of reliability of the instrument resulting in its administration to the final group of respondents.

**Data Gathering Procedure -** The researcher asked permission from the assistant principal for junior high school, and assistance from the Learners Information System Coordinator to get the total number of students. The

researcher asked permission from the school heads to interview students. Following authorization, fifteen (15) students from grades 7 to 10 at Magsaysay National High School Main Campus were chosen at random selection procedure to serve as preliminary respondents. A thematic analysis was drawn up by the researcher based on the results of the interview. This was taken into consideration when constructing the questionnaire. Experts reviewed and assessed the constructed questionnaire to confirm its validity. After verifying the validity, the researcher personally sent a letter requesting permission to administer the questionnaire to assess its reliability, to the district supervisor of the public schools and the principal of the school. Following approval, thirty (30) students from grades 7 to 10 at Magsaysay National High School Main Campus were chosen at random by the researcher. They were not included in the final administration of the questionnaire. After one week, the researcher administered again the questionnaire to the selected respondents. After verifying the reliability of the questionnaire, the researcher gave an approval letter to the district supervisor, school principal, and teachers-in-charge to the extension schools for the final administration of the questionnaire. The researcher personally administered the questionnaire to explain the purpose of the study, and to ensure the accuracy and confidentiality of the results.

***Statistical Treatment of the Data -*** The qualitative method used thematic analysis, which involves working through data collection and searching for patterns to identify themes. Interpreting the data with the researcher's subjective experience at its foundation is important to determine the students' practices in protecting the environment. In the quantitative method, the SPSS version 26.0 was used to describe the students' locus of control and literacy in the environment. The responses on the students' locus of control and literacy in environment-knowledge, attitudes, and skills were employed using the 5-point Likert-type scale. For the inferential problem, The Partial Least-Square-Structural Equation Modeling (PLS-SEM) software in WarpPLS version 7.0 was used to analyze the structural relationship. This was employed to test the null hypothesis. All computations were anchored at the 0.05 significance level.

***Ethical Considerations -*** In this study, the researcher valued the respondents' voluntary participation. She made sure that the participants' concerns and queries were addressed during the orientation. The consent forms to take part in the research were completed and signed. Furthermore, the participants were assured by the researcher regarding the collection, processing, and gathering of the data, as well as the information they provided would be treated with confidentiality during and after the study.
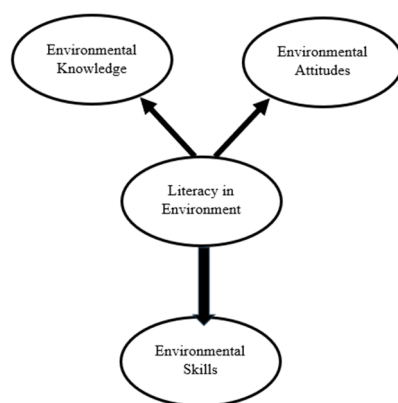
## 3. Results and Discussions



*Figure 1.* Final Thematic Map for Students' Practices in Protecting the School Environment

After the descriptions were finally categorized, the final thematic map as reflected in Figure 1 reveals three indicators that are perceived by the student participants as contributing to literacy in the environment. The final themes are presented in semi-circular figures. These include environmental knowledge, environmental attitudes, and environmental skills. The study by Marušić (2020) describes environmental literacy as a complex construct. It includes three components: cognitive, affective, and behavioral. She emphasizes that environmental literacy is

not only about knowledge and cognitive skills, but also the affective component: "sensitivity, care, self-efficacy, certain attitudes and values, and the actions that correlate with these phenomena". Environmental literacy is indeed a complex thing. Consequently, NAAEE, (2010) refers to environmental literacy as a person's environmental knowledge and skills, as well as their attitudes, values, and behavior toward the environment. This clearly states that it comprises three components- environmental knowledge, environmental attitudes and behavior, and environmental skills. UNESCO (2018) emphasizes that environmental literacy develops the specified skills and expertise necessary to deal with environmental problems and promotes attitudes, motivations, and commitments to make thoughtful decisions and act responsibly toward the environment.

The four indicators of the locus of control in the environment are presented in Table 2. As used in the study, locus of control refers to the belief that individual actions may have an impact on the environment. As defined by Cherry (2022), locus of control is the extent to which a person feels he or she has control over events that impact his or her life. Two types of locus of control are identified and these are the internal and external locus of control. Internal locus of control is described when a person believes that he or she has control over what happens while external locus of control exists when a person believes that he or she has no control over what happens and that external variables are to blame (Garido, 2023). Cleveland & Kalamas (2015), Eatough (2022), and Berrios (2022) emphasize that if people possess the internal locus of control, they can or may give changes in taking care of the environment. An overall mean is registered at 3.72 described as a high level of control. Topping the list is recycling materials with a weighted mean of 3.72, followed by green consumerism (3.69), advocacy (3.65), and activism with a weighted mean of 3.57. Apparently, all these four indicators of the environmental locus of control garnered a high level of assessment by the students. This finding indicates that when it comes to programs on recycling materials, green consumerism, advocacy, and activism, the students have been active in participating in such programs as these have been initiated by schools as well as local government units. While the findings reveal a generally high locus of control, these outcomes may be impacted by individual control over the environment similar to the finding revealed in the study of Yang & Weber (2019).

**Table 2**

*Mean Level of Locus of Control in terms of Green Consumerism, Activism, Advocacy and Recycling Materials*

| Indicators (Consumerism) | Weighted Mean | Verbal Description |
|---|---|---|
| 1. The sooner consumers start buying environment-friendly products, the sooner companies will respond to their demands. | 3.53 | High Control |
| 2. The more I buy environment-friendly products, the more I help persuade companies to become "friendlier" to the environment. | 3.71 | High Control |
| 3. By buying environment-friendly products, I can make a difference in helping the environment. | 3.83 | High Control |
| Composite Mean | 3.69 | High Control |
| Indicators (Activism) | | |
| 1. Any donation to environmental groups such as Greenpeace helps attain its goals. | 3.77 | High Control |
| 2. The efforts deployed by environmental groups have an impact on ecological challenges. | 3.51 | High Control |
| 3. By donating something to pro-environmental groups, I can make a difference in the state of the environment. | 3.53 | High Control |
| 4. Pro-environmental groups make a difference in fighting local environmental issues. | 3.34 | Moderate Control |
| 5. By donating to environmental groups, I help them attain their mission and goals. | 3.70 | High Control |
| Composite Mean | 3.57 | High Control |
| Indicators (Advocacy) | | |
| 1. I am able to convince a friend to improve his/her conservation habits. | 3.66 | High Control |
| 2. I am able to convince my friends to take an action in addressing environmental challenges. | 3.74 | High Control |
| 3. I can influence my friends to walk or ride a bike when going to areas within short distances. | 3.39 | Moderate Control |
| 4. If willing, people can influence their friends to develop a more environment-friendly transportation habit. | 3.80 | High Control |
| Composite Mean | 3.65 | High Control |

| Indicators (Recycling Materials) | | |
|---|---|---|
| 1. By recycling, I am doing my part to improve the state of the environment. | 3.92 | High Control |
| 2. The more paper I recycle, the more trees I save. | 3.95 | High Control |
| 3. By recycling, I am helping to reduce pollution. | 4.02 | High Control |
| 4. By recycling, I am saving valuable natural resources. | 3.91 | High Control |
| Composite Mean | 3.95 | High Control |
| OVERALL MEAN (LOCUS OF CONTROL) | 3.72 | High Control |

**Scale**: 4.50-5.00 -Very High Control; 3.50-4.49 –High Control; 2.50-3.49 –Moderate Control; 1.50-2.49 –Low Control; 1.00-1.49 –Very Low Control

Environmental literacy is described as the one referring to environmental knowledge, attitudes, and skills. While it appears that in Table 3, two indicators are described to have a moderate literacy level, the mean values when averaged still reached an overall mean of 3.56 which falls on a high level of literacy in the environment. This is a good indication that students have generally a high level of environmental literacy. In the case of attitude and skills, students still need to improve on these aspects and also maintain a high level of environmental knowledge. The value of environmental literacy has also been underscored in the findings of Ta Fang et al. (2022) and Paço & Lavrador (2017). The findings disclosed the environmental literacy's overall effect of the learning process and to solve environmental problems, environmentally literate people should involve themselves in environmental issues and problems and give their time and effort in taking care of the environment. UNESCO (2016) states that environmental literacy can empower students.

**Table 3**

*Level of environmental knowledge, environmental attitudes & environmental skills*

| Indicators (Environmental Knowledge) | Weighted Mean | Verbal Description |
|---|---|---|
| 1. I dispose of garbage in the garbage bins to avoid pollution. | 3.87 | High Literacy |
| 2. The common cause of pollution is the dumping of waste. | 3.77 | High Literacy |
| 3. The single-used plastic has a bad effect on the environment. | 3.78 | High Literacy |
| 4. I save water and electricity by washing once a week to decrease the greenhouse effect. | 3.48 | Moderate Literacy |
| 5. Burning of plastic depletes the ozone layer. | 3.66 | High Literacy |
| 6. More carbon emissions from vehicles are one of the main causes of climate change. | 3.76 | High Literacy |
| 7. The consumers should be environmentally aware of the products they purchase. | 3.79 | High Literacy |
| 8. The impacts of climate change are very evident in the Philippines, like stronger typhoons and changes in rainfall patterns. | 3.95 | High Literacy |
| 9. Planting trees helps to prevent floods and soil erosion. | 4.17 | High Literacy |
| 10. Planting trees reduces the effect of global warming. | 3.95 | High Literacy |
| Composite Mean | 3.82 | High Literacy |
| Indicators (Environmental Attitudes) | | |
| 1. At school, I practice waste segregation. | 3.78 | High Literacy |
| 2. I enjoy tree-planting activities in our school. | 3.68 | High Literacy |
| 3. At school, I tighten faucets when I see water dripping. | 3.47 | Moderate Literacy |
| 4. I reported the faulty faucets to the teachers. | 3.30 | Moderate Literacy |
| 5. I switch off the unused lights and electric fans. | 3.78 | High Literacy |
| 6. I advise my friends to avoid burning garbage. | 3.35 | Moderate Literacy |
| 7. I join environmental groups such as the YES-O Club in our school. | 2.33 | Low Literacy |
| 8. I avoid throwing candy wrappers anywhere. | 3.34 | Moderate Literacy |
| 9. I feel good when I save energy. | 3.93 | High Literacy |
| 10. I practice the 3Rs (Reduce, Reuse, Recycle). | 3.85 | High Literacy |
| Composite Mean | 3.48 | Moderate Literacy |
| Indicators (Environmental Skills) | | |
| 1. I share environmental issues with my peers. | 3.10 | Moderate Literacy |
| 2. I plant trees whenever there is an opportunity. | 3.43 | Moderate Literacy |
| 3. I join clean-up drives in our community. | 3.34 | Moderate Literacy |
| 4. I promote local ecotourism. | 2.85 | Moderate Literacy |
| 5. I walk to save energy. | 3.74 | High Literacy |
| 6. I reuse paper for drafts and other informal writings. | 3.59 | High Literacy |
| 7. I use reusable materials like tumblers and eco-bags. | 3.74 | High Literacy |
| 8. I buy refills and concentrates as they involve less packaging. | 3.22 | Moderate Literacy |
| 9. I patronize energy-efficient and environment-friendly products. | 3.42 | Moderate Literacy |
| 10. I participate in ecological solid waste management. | 3.34 | Moderate Literacy |
| Composite Mean | 3.38 | Moderate Literacy |

| | | |
|---|---|---|
| OVERALL MEAN (READING COMPREHENSION DIFFICULTIES) | 3.56 | High Literacy |

**Scale**: 4.50-5.00 -Very High Literacy; 3.50-4.49 –High Literacy; 2.50-3.49 –Moderate Literacy; 1.50-2.49 –Low Literacy; 1.00-1.49 –Very Low Literacy

The Environmental Literacy Improvement Act s. 2017 explains that environmental literacy enhances critical thinking, contributing to solving problems, and allowing effective decision-making skills. In this regard, recommendations were provided by Astuti, & Aminatun (2020) that schools must initiate programs to improve environmental literacy by making the character of caring for the environment. UNESCO and Republic Act No. 9512 s. 2008 also underpinned the importance of environmental literacy in addressing environmental challenges and integrating environmental education into all subject areas with environmental literacy being integrated at all grade levels through a spiral progression curriculum. In addition, DepEd Order No. 52, s. 2011 has sought to improve environmental education in public and private schools, requiring effective school-based activities that promote, protect, and preserve the environment

**Table 4**

*Path Coefficients and P-values for $H_0$*

| Paths | Beta (β) Coefficients | p-values* | Interpretation |
|---|---|---|---|
| Green Consumerism → Environmental Knowledge | 0.262 | <0.001 | Highly Significant |
| Green Consumerism → Environmental Attitudes | 0.110 | 0.019 | Significant |
| Green Consumerism → Environmental Skills | 0.066 | 0.146 | Not Significant |
| Activism → Environmental Knowledge | 0.206 | <0.001 | Highly Significant |
| Activism → Environmental Attitudes | 0.172 | <0.001 | Highly Significant |
| Activism → Environmental Skills | 0.144 | 0.003 | Significant |
| Advocacy → Environmental Knowledge | 0.218 | <0.001 | Highly Significant |
| Advocacy → Environmental Attitudes | 0.131 | 0.007 | Significant |
| Advocacy → Environmental Skills | 0.166 | <0.001 | Highly Significant |
| Recycling Materials → Environmental Knowledge | 0.239 | <0.001 | Highly Significant |
| Recycling Materials → Environmental Attitudes | 0.213 | <0.001 | Highly Significant |
| Recycling Materials → Environmental Skills | 0.140 | 0.004 | Significant |

*Significant at p<0.05

The table above displays the paths, *Beta* coefficients, and *p*-values that came from the direct link between environmental literacy and environmental locus of control. Based on the results, highly significant connections, with *p*-value of <0.001 are found between the students' literacy on green consumerism and environmental knowledge (*β*=0.262), on activism and environmental knowledge (*β*=0.206) and attitudes (*β*=0.172), on advocacy and environmental knowledge (*β*=0.218) and skills (*β*=0.166), and their literacy on recycling materials and environmental knowledge (*β*=0.239) and attitudes (*β*=0.213). The rest of the paths recorded significant direct links with p-values of 0.019 (green consumerism and environmental attitudes), 0.003 (activism and environmental skills), 0.007 (advocacy and environmental attitudes), and 0.004 (recycling materials and environmental skills). While the beta coefficients registered positive low values, these indicate the direct link between the aforementioned variables since these entered the structural model. However, when the students' literacy on green consumerism is linked to environmental skills, a negligible coefficient is recorded at 0.066 with a *p*-value or significance level of 0.146 which exceeded 0.05. This revealed that there is no significant relationship between green consumerism and the environmental skills of the students. With this exception, it can therefore be stated that the hypothesis of no significant relationship between the students' environmental literacy and their environmental locus of control is rejected. On the whole, the students' environmental locus of control is significantly influenced by their level of literacy in the environment.

The coefficients of determination ($R^2$) yielded values of 0.53, 0.25 and 0.16. These indicate the percentage of variations in the extent of environmental knowledge, attitude, and skills (53%, 25%, and 16%) that can be accounted for by the variations in environmental locus of control. A large percentage of variations can be attributed to factors not included in the study. The result of this study on the significant relationship between the environmental locus of control and environmental literacy is found similar to the findings of Patel et al. (2019) and Simiyu et al. (2022) which revealed that internal environmental locus of control is the strongest predictor environmental attitudes and skill. This is supported by Yang & Weber (2019) which stated the finding that internal

environmental locus of control had an indirect positive impact on the environment. However, this is contrary to the finding of Nwankwo & Nkamnebe (2021) which revealed that there is no positive relationship between environmental literacy and waste disposal among students. The findings of this study show support for the theory of Environmental Responsibility Behavior (ERB) (Gao et al., 2021) that the individual's attitudes are directly impacted by their locus of control, which results in better intentions and behavior. The ERB model identified factors that affect an individual's behavior, including knowledge, attitudes, locus of control, intention to act, and sense of personal responsibility, thus, the individual's ERB is determined by their internal control center, which has a significant impact on their intention to act.
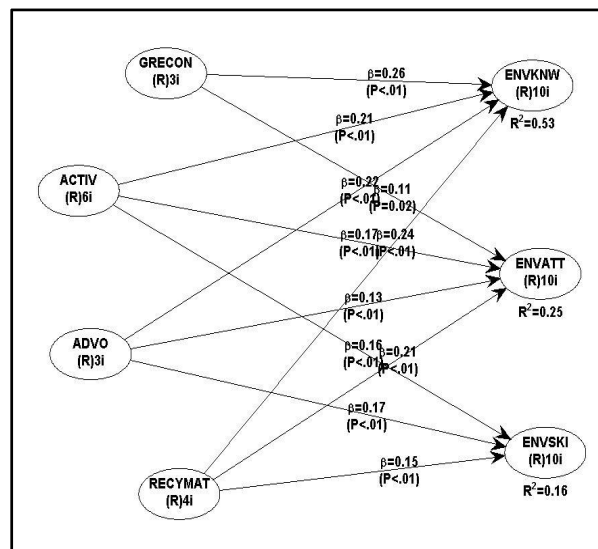


*Figure 2*. Structural Model

The model in Figure 2 emerged as a result of the structural equation modelling. Considering the students' literacy on green consumerism, activism, advocacy, and recycling materials, it is directly connected to the students' environmental locus of control. From among the environmental literacy components, only the literacy on green consumerism has two direct links to locus of control. This means that environmental skills are not directly connected to students' green consumerism. The rest are directly linked to all the components of the locus of control. The coefficients of determination ($R^2$) shown in two decimal places yielded similar results as shown in the structural model. This suggests that it influences of two variables under locus of control did not greatly affect the percentage of variability of the influence of the exogenous variables on the endogenous variables. The result of the emerging model shows that the students' environmental skills may not be affected by their locus of control on green consumerism. In contrast, the book of Hadjichambis et al. (2020) explains that individuals may also impact the environment by influencing the actions of organizations by purchasing major household goods or services and using environmentally important goods, through green consumerism.

**Table 5**

*Proposed Self-Learning Module*

| Week | Content | Learning Objective/s | Lesson | Instruction | Success Indicator |
|------|---------|---------------------|--------|-------------|-------------------|
| 1 | Environmental Knowledge | Explain the importance of saving water and electricity.<br><br>Explain greenhouse effect. | Water and Energy Conservation<br><br>Greenhouse Effect | Start It Now (Objectives)<br>Try It Now! (Pre-test)<br>Discover It Now! (Motivation)<br>Read It Now! (Topic)<br>Learn It Now! (Activities)<br>Apply It Now! (Application) | The learners will earn 80% of the assessment. |
| Week | Content | Learning Objective/s | Lesson | Instruction | Success Indicator |
|  |  |  |  | Conclude It Now! (Generalization)<br>Show It Now! (Assessment)<br>Enjoy It Now! (Additional Activities) |  |

| Week | Content | Learning Objective/s | Lesson | Instruction | Success Indicator |
|---|---|---|---|---|---|
| 2 | Environmental Attitudes | Demonstrate/ Display the importance of conserving water, joining YES-O, and not littering and burning the garbage | Water conservation Garbage YES-O Club | Start It Now (Objectives) Try It Now! (Pre-test) Discover It Now! (Motivation) Read It Now! (Topic) Learn It Now! (Activities) | The learners will earn 80% of the assessment. |
| Week | Content | Learning Objective/s | Lesson | Instruction | Success Indicator |
|  |  |  |  | Apply It Now! (Application) Conclude It Now! (Generalization) Show It Now! (Assessment) Enjoy It Now! (Additional Activities) |  |
| 3 | Environmental Skills | Initiate in the sharing of information about environmental issues, local ecotourism, products with less packaging, | Environmental issues Tree-planting Clean-up drives Local ecotourism Product with less packaging | Start It Now (Objectives) Try It Now! (Pre-test) Discover It Now! (Motivation) Read It Now! (Topic) | The learners will earn 80% of the assessment. |
| Week | Content | Learning Objective/s | Lesson | Instruction | Success Indicator |
|  |  | and energy-efficient and environment-friendly products.<br><br>Initiate in tree-planting activities, clean-up drives, and ecological solid waste management. | Energy-efficient and environment-friendly products Ecological solid waste management | Learn It Now! (Activities) Apply It Now! (Application) Conclude It Now! (Generalization) Show It Now! (Assessment) Enjoy It Now! (Additional Activities) |  |

Self-learning modules are a systematic set of instructions that facilitates learners' mastery of a body of knowledge or a complex process (Maile & Cooper, 2018). The table above shows the proposed content of the self-learning module to improve the literacy in environment of students. It includes the week, content, learning objective, lesson, instruction, and success indicator. The lessons included are the environmental knowledge, attitudes, and skills. Science teachers need to use multiple teaching methods and teaching aids in their teaching-learning activities to make students learning more effective. Moreover, teachers should explore students' prior knowledge, and misconceptions and connect them with new scientific knowledge in the science classroom (Rahman, 2018). The teacher must be able to provide a learning media that stimulates students to think critically in learning and have the creativity to solve environmental problems that surround them. Learning media such as videos, android applications, and modules, will make students active and interested in the environment so that it will be easier for teachers to convey various concepts related to the environment. In this context, the teacher must develop their learning to be more interesting to students (Fitriani et al., 2018). Dhamija (2014) and Padmapriya (2015) emphasize that the use of self-learning modules was proved effective. This claim supports the study of Amiroh et al. (2021). The result of their study reveals that the development of a guided inquiry-based module is effective in increasing students' environmental literacy.

## 4. Conclusions

On the basis of the findings of the study, the following conclusions are drawn: The students' practices in protecting the environment are described as literacy in environment. Literacy in environment includes environmental knowledge, environmental attitudes, and environmental skills. The level of locus of control considering green consumerism, activism, advocacy and recycling materials was: The students are mindful that buying environmental- friendly products can make a difference in helping the environment. The students are aware that they can contribute in addressing environmental problems by donating to environmental groups. The students believe that they can influence friends and family members to live an environmental- friendly lifestyle. The students are convinced that recycling improves the state of the environment; reduces pollution; and saves more trees and valuable natural resources.

The level of literacy in environment was: The students are well- informed that planting trees helps to prevent

floods and soil erosions, and reduces the effects of global warming. They are cognizant of the impacts of climate change in the Philippines like stronger typhoons and changes rainfall patterns. The students rarely join environmental groups like the YES-O Club. The students rarely participate in tree-planting activities, clean-up drives, and ecological solid waste management. Also, they seldom share environmental issues and local ecotourism to their peers.; Though the students' environmental skills are not affected by their locus of control in green consumerism, generally there is a significant relationship between the students' locus of control and their literacy in environment. A self-learning module is formulated to improve the literacy in environment of the students in terms of environmental knowledge, attitudes, and skills.

*4.1 Recommendations*

Based on the findings of the study, the following recommendations are offered: The students in Magsaysay National High School should protect the school environment by improving their literacy in environment through proper waste disposal and segregation, correct garbage bins labels, and well-established Materials Recovery Facility (MRF). The school administrators, specifically the principal, head teachers, department heads, and the different clubs should encourage students to ride a bicycle when going to school or to other nearby places. The school administrators should focus on enhancing the environmental attitudes and environmental skills of the students in Magsaysay National High School by supporting the tree-planting activities, clean-up drives, ecological solid waste management, and environmental youth camps of environmental clubs in school like the YES-O Club, and other environmental groups like MENRO and other religious groups like quarterly.

The school administrators and teachers should continue improving the literacy of students by initiating the use of a.) energy efficient products like solar fans; b.) environmental- friendly products like tumblers and eco-bags and other reusable materials; and c.) less- packaging products like using of paper cups and paper plates at school. The teachers should integrate literacy in environment to their lessons using the proposed self-learning module as their guide. A recommendation for the future researchers to conduct a study using other variables like external environmental locus of control.

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