

Environmental Education and Student Eco-Consciousness Predictors: Implications for Sustainable Development in Higher Education

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DOI: <https://doi.org/10.51583/IJLTEMAS.2026.1502000014>

Received: 16 February 2026; Accepted: 21 February 2026; Published: 03 March 2026

ABSTRACT

This study explores the crucial nexus between environmental education (EE) and sustainable development (SD) by investigating students' eco-consciousness in collaboration with the Worldwide Fund for Nature (WWF) Philippines. In an era characterized by escalating environmental concerns and the imperative for sustainable practices, understanding the role of education in fostering environmental sustainability is paramount. The research employed a quantitative method approach, using a survey to comprehensively examine students' attitudes, knowledge, and behaviors toward environmental issues and sustainable living practices. Drawing on a diverse sample of students across educational levels, the study found that at Saint Mary's University, students have a high level of environmental awareness, eco-consciousness, and environmental stewardship. It was further affirmed that those three environmental concepts are intricately influencing one another. The profile variables of gender, age, type of high school they graduated from, and religion are not influential or predictive of their environmental awareness, eco-consciousness, and environmental stewardship. However, school, year level, and ethnicity are influential or predictive. Finally, Saint Mary's University is fertile ground for environmental sustainability practices, as students have a high level of environmental awareness, eco-consciousness, and environmental stewardship, which are important dimensions of environmental sustainability. It was then recommended that its programs, projects, and activities be sustained and intensified to protect and conserve the environment.

Keywords: Environmental Education, Environmental Stewardship, Eco-consciousness, Environmental Sustainability, Sustainable Development

INTRODUCTION

A key theory in environmental education and sustainability is the Knowledge-Awareness/Attitude-Action theory, created by Charles Ramsey and Roy Rickson in 1976. This theory suggests that we can change people's behavior by increasing their knowledge and awareness of environmental protection and related issues, as Hungerford and Volk (1990) noted. This idea is relevant in education. The belief is that the more people learn about environmental issues, the more responsible they will become, leading to better environmental protection. The relationship between knowledge and action is not always straightforward. The philosopher Socrates suggested that if someone knows what is right, they will act accordingly. However, while knowledge is important, it is not enough to develop ecological consciousness; ecological intention is also crucial for promoting environmental sustainability among students (Dzhamalova et al., 2019). Al-Faleh (2022) supports this idea by comparing students' awareness of sustainable development with their intentions to implement ecological programs, highlighting the necessity of both knowledge and intention. This aligns with the Theory of Reasoned Action (TRA), which states that a person's intentions to act are influenced by social pressures or "subjective norms," reflecting their perceptions of others' opinions (Vallerand et al., 1992; Al-Suqri & Rahma Mihammad Al-Kharusi, 2015). However, to operationalize responsible environmental behavior, UNESCO and the United Nations Environment Programme (UNEP) organized an Intergovernmental Conference on Environmental Education in Tbilisi, Georgia, as early as 1977. The intergovernmental conference led to the Tbilisi declaration

that outlined several key objectives for environmental education, including 1) Awareness and Sensitivity: Developing an awareness of the environment and its challenges, 2) Knowledge and Understanding: Providing individuals with knowledge of the environment and its interconnectedness with human activities, 3) Attitudes and Values: Cultivating attitudes and values that support environmental protection and sustainable development, 4) Skills and Competence: Enabling individuals to acquire skills for environmental problem-solving and responsible decision-making, and 5) Participation: Encouraging active participation in addressing environmental challenges (Hungerford, H. & Trudi Volk, 1990). An eco-conscious person and environmental advocate is aware of environmental issues and understands related challenges. They are concerned about environmental protection, have the skills to identify and address problems, and actively participate in solutions (Hungerford & Volk, 1990). True advocates not only have knowledge of these issues but also a commitment to take action to protect the environment.

This presents challenges for educational institutions, impacting all aspects of learning. Since the 1970s, many programs and studies have emerged to address environmental issues and promote sustainability, which this study sought to examine. Additionally, environmental education programs evolved to emphasize long-term sustainability, addressing immediate improvements while preparing for future challenges (Tilbury, D., 1995). Environmental education has been in the curriculum for a long time, yet why do we still have lingering environmental problems? However, there could be more factors, such as economics and politics. However, let us focus on education for almost all persons, whether formally or informally, passing through the education portals. Recently, there have been theories suggesting that environmental education should incorporate the concept of action. One of the reasons is the influence of scientism in environmental education, where the focus is often on giving pupils knowledge about the seriousness and extent of the environmental problems, which has not been capable of addressing the social and societal perspectives involved in questions about the root causes of problems and the action possibilities which are open to society and the individual (Jensen, B. & Karsten Schnack, 1997).

In Europe, the United Kingdom in 2020 opened the “Green Jobs Taskforce” to create 2 million green jobs. Their strategy is to support carbon literacy training for schools and universities for sustainability by 2025. Some of their strategies are 1) Climate education, where students will develop a better understanding of climate change and a greater connection to nature to tackle both the causes and impact of climate change, 2) Education estate and digital infrastructure, where students and their communities will be inspired to live sustainable lives with a green physical environment in and around education settings to promote both their physical and mental wellbeing, and 3) Operations and supply chains, where students will be introduced to more sustainable practice for waste prevention, resource efficiency and the circular economy (Okada, A., 2023). This UK initiative and others demonstrate the important role that schools, colleges, and universities play in environmental education, fostering eco-consciousness among our young students towards environmental sustainability.

In today’s environmental concerns, environmental education is considered to be very important in this decade for developing environmental awareness among the common people. It is considered helpful for developing a good quality of life and for developing ideas and practices for maintaining a sustainable environment (Laiphrakpam, M., et. al., 2020). However, it must be remembered that environmental education is interdisciplinary, as it aims to develop knowledge, build skills, and change the attitudes and lifestyles of students and future citizens to conserve the environment (JSOEE, 2016).

Environmental Education can be arranged into many stages in its progress. The first step is environmental awareness. Environmental awareness or knowledge includes understanding the main relationships between nature and human beings, as well as initiatives to protect the natural and future environment. Many studies have shown that environmental awareness is closely related to factors such as human perception of environmental problems, interdependence and relations between humans and nature, and people’s behavior and attitudes towards the environment (Huckle, H., 1991).

This concern connects us with one’s eco-consciousness. However, according to O’Sullivan and Taylor (2004), today’s education has failed to evoke eco-consciousness in the general public. Thus, as early as the year 2000s,

there were calls for reform in environmental education, which must. The reform calls for a more holistic, qualitative approach to be relevant to today's movement against environmental destruction (Kanerva, T., 2006). Recently, there has been much research about students' eco-consciousness. This was premised on the idea that action towards environmental protection would not be successful if students in the education sector were unaware of environmental concepts, problems, and issues, and of conservation efforts. Ecological knowledge will be important for more successful environmental protection in the next few years. However, to be more realistic, education must add factors besides knowledge acquisition, like skills and will, to implement all these ideas (Capra, 1996), (Kanerva, T., 2006).

A study conducted by Robyn Molsher in 2015 in Australia among environmental volunteers found that environmental volunteering engages students to be more conscious about ecological problems (Molsher, 2015). This would show that, indeed, ecological instruction, when coupled with other skills training and activities, would be more beneficial for the development of students' eco-consciousness. A study in Pakistan found that promoting ecological consciousness in everyday life is very important, particularly in education. It was suggested that universities must work to formulate policies and plans grounded in green and sustainable concepts, including sustainability-based practices and behaviors across the university domain and infrastructure (Kahn, A. et al., 2024).

In Jordan, a study was conducted among students to determine the connection between their eco-consciousness and their intention to implement their school-based environmental program. It was found that students' eco-consciousness regarding sustainable environmental development significantly influenced their intention to implement the eco-school program in their schools in Jordan. In this study, pro-environmental behavior or eco-consciousness was defined as a behavior that consciously seeks to reduce the negative impact of one's actions on the natural and built worlds (e.g., reducing resource and energy consumption, using non-toxic substances, and reducing waste pollution) (Al-Faleh, H & Baker Al Serhan, 2022).

Eco-consciousness is the awareness that fosters positive behaviors toward a sustainable society. Taina Kanerva's 2006 study examined high school students in Ontario and found that their experiences with nature and teachers' values play a vital role in developing eco-consciousness. This highlights the need for transformative education, as traditional methods are often insufficient for effective environmental education. Harold Hungerford and Trudi Volk (1990) noted that many programs focus solely on raising awareness without fostering ownership and empowerment among learners. New strategies are essential to address these challenges.

A key concept in environmental sustainability is environmental stewardship. Robert Falkner and Barry Buzan (2019) note its historical development from a concern within European society to a focus on the Global International Society (GIS), largely driven by UN conventions. Driscoll et al. (2012) emphasized the need for a more effective approach to environmental stewardship, highlighting that the urgency and complexity of global sustainability challenges require new strategies that leverage expert knowledge. They advocate for collaboration between scientists and policymakers, stressing that long-term research is essential for addressing these significant challenges.

What is environmental stewardship? Bennett et al. (2018) define it as the actions taken by individuals or groups to protect and responsibly use the environment for various environmental and social outcomes. This aligns with Jennifer Welchman's definition, which emphasizes the responsible management of human activities affecting the environment to conserve resources for future generations and accepting accountability for one's actions (Welchman, J., 2012).

The United Nations Millennium Declaration reiterated in the 2000 UN Secretary's report, states, "We resolve therefore to adopt in all our environmental actions a new ethic of conservation and stewardship." The buzzword has been challenged as "inherently sexist, and anthropocentric as well as religious" (Welchman, J., 2012), but it has become the guiding concept for policymakers in the international realm. The emergence of environmental stewardship as a coherent set of purposive ideas and beliefs within GIS is a story involving both the interplay of interstate and world society and the spread of a norm from the local to the global scale (Falkner, R. & Barry

Buzan, 2019). All of these environmental concepts and efforts, through research and policymaking, led to the formation of the so-called environmental education for sustainability.

According to Daniella Tilbury (1995), the word “Sustainability” was first given currency by the World Conservation Strategy, which refers to (a) the need for reconciliation between economic development and environmental conservation, (b) the need to place any understanding of environmental concerns within a socio-economic and political context, and (c) the need to combine environment and development concerns. The strategy redirected the goals of environmental education toward what it called education for sustainable development.

The United Nations has long been a leader in environmental protection, emphasizing its importance through various international conventions. It highlights the critical role of education, stating that “education is essential for promoting sustainable development and enhancing people's ability to tackle environmental and development issues” (UNESCO, 1992, para. 36.3, p. 2). Environmental education must adopt a holistic approach to effectively address environmental problems like air pollution. This involves understanding the broader context, including history, values, perceptions, and traditional practices that contribute to these issues, and exploring potential solutions (Meadows, 1990).

Figure 1 below presents a framework already explained above, assuming that when a person is knowledgeable about something, that knowledge can translate into awareness and attitudes, and ultimately into action.

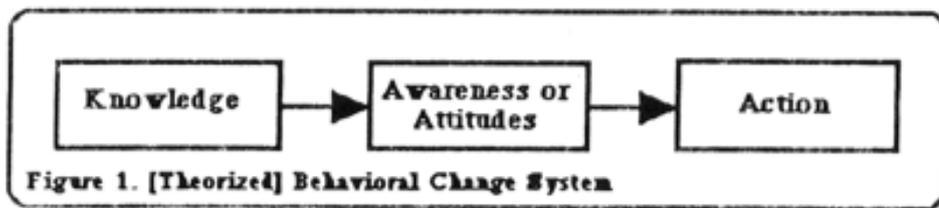


Figure 1: Traditional Thinking Framework

However, this approach to environmental education is widely criticized because knowing something does not always translate into doing it. Thus, knowing that the environment needs to be protected and conserved does not always lead people to take steps to do so. The whole framework is anchored in the idea that we can change students' behavior by providing them with more knowledge about environmental problems and issues (Hungerford, H., and Trudi Volk, 1990).

This study aims to evaluate environmental stewardship among Saint Mary’s University students by assessing their awareness and eco-consciousness, which are crucial for sustainable environmental education. It seeks to measure respondents' environmental knowledge, eco-consciousness, and stewardship, and to determine whether there is a significant relationship between these factors. The research will also examine if demographic profiles influence environmental knowledge and stewardship. Additionally, the study will discuss the implications of the findings for environmental sustainability and offer recommendations for the university and other higher educational institutions. The study hypothesizes that there is no significant relationship between environmental knowledge, eco-consciousness, and stewardship, and that demographic variables do not predict these aspects.

METHODOLOGY

The study employed a quantitative-descriptive research design to systematically collect data to describe a phenomenon, situation, or population. Descriptive research is a method used to determine the characteristics of a population or particular phenomenon (Creswell, 2009). Using descriptive research, one can identify patterns in a group's characteristics to establish everything one needs to understand, apart from why something has happened. This study quantitatively and descriptively examined Saint Mary's University tertiary students' environmental knowledge, eco-consciousness, and environmental stewardship.

The study was conducted at Saint Mary’s University, Bayombong, Nueva Vizcaya, among its tertiary students in the first semester of the School Year 2024-2025. The study used purposive sampling to choose the final participants. The majority of the participants were female (69.03%) and aged 17-20 years (70.08%). Most students attended private high schools (64.38%), and a significant proportion identified as Catholic (62.79%). In terms of ethnicity, Ilokano was the largest group (43.97%), followed by Tagalog (22.94%) and Ifugao (16.60%). Participants were distributed across schools, with the highest number from SAB (28.65%), and year levels, with most being second-year students (29.39%).

The research instrument was adopted from Rogayan & Nebrida (2019) and De Chano (2006) papers. However, a few items were changed to contextualize the study. There are three parts of the instrument. The research instrument consists of three parts: questions about students' environmental awareness, their eco-consciousness reflecting attitudes toward environmental issues, and their environmental stewardship, which indicates the actions they take to protect and conserve the environment. The data were collected through an online survey using a Google Form, with assurances of data privacy, confidentiality, and informed consent from the respondents.

Data gathered were analyzed using Frequency and Percentage to measure the demographic profile of the respondents descriptively; Mean and Standard Deviation to describe the respondents' environmental awareness, eco-consciousness, and environmental stewardship levels; Pearson r or Spearman’s Rho (ρ) to determine if there is a relationship between the respondents' level of environmental awareness and eco-consciousness with their environmental stewardship; and Analysis of Variance (ANOVA) to determine if the profile variables determine the respondents' environmental awareness, eco-consciousness, and environmental stewardship.

RESULTS AND DISCUSSIONS

The study determined the level of environmental stewardship of Saint Mary’s University students during the first semester of the school year 2024-2025 through levels of awareness and eco-consciousness, with a view to determining their potential for sustainability in environmental education.

Section 1: Environmental Knowledge

Table 1: Respondents’ level of environmental knowledge

Environmental Knowledge Indicators	Mean	SD	QD
1. Agenda 21 is a plan of the United Nations in which large developing countries promised to develop their industries with an eye toward protecting the environment.	3.06	1.18	MK
2. Rainforests are the world’s most biologically diverse ecosystems.	4.24	0.86	VK
3. Global warming is brought about by rising levels of heat-trapping gases, known as greenhouse gases, in the atmosphere.	4.51	0.70	HK
4. The atmosphere's ozone layer protects life on Earth by absorbing harmful ultraviolet radiation from the Sun.	4.53	0.73	HK
5. Sustainable development means increasing standards of living without destroying the environment.	4.44	0.76	VK
6. Desertification is the decline in the biological or economic productivity of the soil in dry and semi-dry areas resulting from various factors including human activities.	3.78	0.94	VK
7. Acid rain is a form of air pollution in which airborne acids produced by electric utility plants and other sources fall to Earth in distant regions.	3.94	0.92	VK

8. Indigenous peoples are those who have inhabited and made their living directly off the same environment for hundreds or thousands of years.	4.21	0.83	VK
9. There is only one percent of all the water in the world that is available for drinking.	3.49	1.06	MK
10. According to the Philippine Constitution, it is the state's primary duty to protect and advance the right of the people to a balanced and healthful ecology in accord with the rhythm and harmony of nature.	3.90	0.95	VK
11. Animals alive today are most likely to become extinct because the habitat where they live is destroyed	4.31	0.82	VK
12. The name of the global agency that works to protect the physical earth is the United National Environmental Programmes (UNEP)	3.45	1.02	MK
13. Burning fossil fuels (in machines) has increased the atmosphere's carbon dioxide content and is likely to cause a warmer climate on our planet.	4.26	0.86	VK
14. Radical changes to society, like change of perspectives, are needed to tackle climate change	4.08	0.88	VK
15. Schools are agents in the preservation and conservation of the environment.	4.29	0.80	VK
Overall	4.03	0.58	VK

Legend: 1.00-1.49 (NK- Not Knowledgeable); 1.50-2.49 (SK-Slightly Knowledgeable); 2.50-3.49 (MK-Moderately Knowledgeable); 3.50-4.49 (VK-Very Knowledgeable); 4.50-5.00 (HK-Highly Knowledgeable)

The analysis above reveals that participants are generally very knowledgeable about the factors that endanger our environment, including facts and concepts about the environment, and attempt to conserve it, with an overall Mean of 4.03. However, it must be noted that the level of knowledge is highly knowledgeable regarding concerns regarding the role of the ozone layer in protecting the environment and global warming, with a Mean of 4.53 and 4.51, respectively. However, they have minimal knowledge of the United Nations agencies responsible for protecting the environment and the international agenda aimed at protecting it, with a Mean of 3.45 and 3.06, respectively.

The above analysis indicates that the respondent students at Saint Mary's University are very knowledgeable about the condition of the environment and the factors that contribute to its degradation. They are knowledgeable about factual information and understand the environment, including ecosystems, biodiversity, environmental issues, and the impact of human activities. They are very knowledgeable about scientific concepts, data, and facts related to environmental concerns. This could be attributed to the fact that many environmental programs at the university, such as the Clean, Healthy, Safe, and Friendly Environment program, aim to promote environmental education. Given that respondents are college students and highly mature young individuals who have been in school for more than half of their lives, they are expected to be knowledgeable about the current state of the environment and other contributing factors, as well as efforts to protect and conserve the environment.

This is a very important finding, since, according to Hungerford & Volk (1990), an eco-conscious and environmental advocate is someone who is aware and sensitive to environmental problems and has a basic understanding of the environment and its associated problems. Knowledge of environmental concerns is a very important foundation for environmental stewardship or even sustainability. The Knowledge-Awareness/Attitude-Action theory, developed by Charles Ramsey and Roy Rickson (1976), posits that we can change people's behavior by making them knowledgeable and aware of environmental protection and related issues. One could believe that they can be more responsible when more people are knowledgeable and aware of environmental issues. This line of thinking holds that the more people know about environmental concerns, the more responsible they become, leading to better environmental protection. Hala Al-Faleh (2022) found in his study that students' awareness of sustainable environmental development was compared with their intention to

implement ecological programs. The study highlighted the importance of knowledge and an individual's intention when it comes to environmental sustainability

Section 2: Eco-Consciousness

Table 2: Participants' level of eco-consciousness

Eco-Consciousness Indicators	Mean	SD	QD
1. We are approaching the limit of the number of people the earth can support.	4.05	0.80	AG
2. I pay attention to water consumption when using the sink and toilet.	4.34	0.76	AG
3. When humans interfere with nature, it often produces disastrous consequences.	4.23	0.76	AG
4. I believe that individual actions can make a difference in protecting the environment.	4.68	0.59	SA
5. Everything I do on a daily basis contributes to the problem of climate change	3.82	1.03	AG
6. The earth has plenty of natural resources if we just learn how to develop them.	4.55	0.67	SA
7. Plants and animals have as much right as humans to exist.	4.54	0.73	SA
8. The balance of nature is strong enough to cope with the impacts of modern industrial nations.	3.86	1.09	AG
9. Despite our special abilities, humans are still subject to the laws of nature.	4.42	0.66	AG
10. The so-called 'ecological crisis' facing humankind is something that everybody has to face squarely.	4.33	0.71	AG
11. The Earth is like a spaceship with very limited room and resources.	3.97	1.00	AG
12. Young people should have a good environmental awareness for a sustainable environment.	4.67	0.60	SA
13. The balance of nature is very delicate and easily upset.	4.17	0.79	AG
14. Humans will eventually learn enough about how nature works to be able to control it.	4.13	0.88	AG
15. If things continue on their present course, we will soon experience a major ecological catastrophe.	4.55	0.65	SA
Overall	4.29	0.46	A

Legend: 1.00-1.49 (SD-Strongly Disagree); 1.50-2.49 (DI-Disagree); 2.50-3.49 (UN-Unsure); 3.50-4.49 (AG-Agree); 4.50-5.00 (SA-Strongly Agree)

The table above shows that respondents agree with the statements, indicating their eco-consciousness, with a Mean of 4.29. It is also notable that they strongly agree with the idea that individual actions can make a difference in protecting the environment (M=4.68), Young people should have a good environmental awareness for a sustainable environment (M=4.67), The earth has plenty of natural resources if we just learn how to develop them (M=4.55), If things continue on their present course, we will soon experience a major ecological catastrophe (M=4.55), and Plants and animals have as much right as humans to exist (M=4.54).

The above analysis indicates that respondents' environmental consciousness is very high. It shows a very high recognition of the interconnectedness between humans and the environment and a sense of responsibility towards the natural world. Furthermore, the analysis shows that respondents have very good attitudes, values, and

behaviors, prioritizing environmental protection. Eco-consciousness is the awareness that facilitates and motivates positive human behaviors toward an environmentally sound and sustainable society. A study by Taina Kanerva (2006) examined how eco-consciousness developed among high school students in Ontario, Canada, and concluded that students' actual experience with nature and teachers' value systems influence students' eco-consciousness. This experience with high school students shows that transformative education is possible, particularly in fostering eco-consciousness.

It has been assumed that when a person is knowledgeable about something, that knowledge can translate into awareness and attitudes, and ultimately into action. However, this approach to environmental education is widely criticized because knowing something does not always translate into doing it. Thus, knowing that the environment needs to be protected and conserved does not always lead people to take steps to do so. The whole framework is anchored in the idea that we can change students' behavior by providing them with more knowledge about environmental problems and issues (Hungerford, H., and Trudi Volk, 1990). Ecological knowledge will be important for more successful environmental protection in the next few years. However, to be more realistic, education must add factors besides knowledge acquisition, like skills and will, to implement all these ideas (Capra, 1996), (Kanerva, T., 2006). And so, eco-consciousness is very important in environmental protection activities.

Section 3: Environmental Stewardship

Table 3: Respondents' level of environmental stewardship

Environmental Stewardship Indicators	Mean	SD	QD
1. Turn off the lights and unplug appliances when not in use to save electricity.	4.67	0.58	AL
2. We should harness solar energy, a radiation produced by nuclear fusion reactions deep in the Sun's core.	3.84	1.05	OF
3. Plant endemic trees in the vacant areas in the community to prevent soil erosion and get more oxygen to breathe.	3.97	1.06	OF
4. Avoid the use of plastic and Styrofoam, which cause harm not only to the environment but also to human health.	4.21	0.91	OF
5. Avoid throwing garbage anywhere and learn the science of segregation of solid wastes.	4.69	0.58	AL
6. Keep a good food ethics and avoid eating with leftovers and wasting drinking water.	4.59	0.65	AL
7. Lessening the use of detergents, for they tend to create foam in gutters and in sewage-disposal plants and even appear in naturally occurring ground and surface waters.	3.95	0.98	OF
8. Practice the science of composting which produces partially decomposed organic material used in gardening to improve soil and enhance plant growth.	4.26	0.89	OF
9. Recycle and reuse non-biodegradable materials to lessen solid wastes.	4.51	0.71	AL
10. Use reusable water bottles or tumblers instead of buying bottled water in the canteen or stores.	4.61	0.65	AL
11. Organize or attend an environmental forum or symposium with your fellow youth and the community people.	4.02	1.01	OF
12. Volunteer to organizational groups that help preserve and conserve the environment.	3.99	1.00	OF

13. Support initiatives, environmental protection, and conservation programs like the university's CHSF and Green Campus Program.	4.50	0.71	AL
14. Encourage everyone to be an ambassador of the environment in their respective communities, specifically your fellow youth.	4.19	0.92	OF
15. When buying, I prefer those with minimal packaging, and I do not use single plastic use.	4.30	0.86	OF
Overall	4.29	0.60	OF

Legend: 1.00-1.49 (NE-Never); 1.50-2.49 (SE-Seldom); 2.50-3.49 (SO-Sometimes); 3.50-4.49 (OF-Often); 4.50-5.00 (AL-Always)

The table above shows that the respondent students at Saint Mary’s University often perform or agree with the performance of the environmental stewardship practices listed above, with an overall Mean of 4.29. It is noteworthy that in six areas, they always follow the above-listed environmental stewardship practices - Avoid throwing garbage anywhere and learn the science of segregation of solid wastes (4.69), Turn off the lights and unplug appliances when not in use to save electricity (4.67), Use reusable water bottles or tumblers instead of buying bottled water in the canteen or stores (4.61), Keep good food ethics and avoid eating with leftovers and wasting drinking water (4.59), Recycle and reuse non-biodegradable materials to lessen solid wastes (4.51), Support initiatives, environmental protection, and conservation programs like the university's CHSF and Green Campus Program (4.50).

The analysis shows that students at Saint Mary’s University exhibit a high level of environmental stewardship. The university's Clean, Healthy, Safe, and Friendly (CHSF) program, active for over two decades, has been effective but has experienced a decline in practice from great to moderate, prompting researchers to recommend the creation of an oversight office (Maslang et al., 2022). Despite the pandemic potentially halting the program, students still demonstrate strong environmental stewardship. This can be attributed to the effective reimplementing of the CHSF program after the pandemic, the launch of the green campus project, various community engagement efforts, and the university's commitment to the Sustainable Development Goals (SDGs) and the Laudato Si campaign.

Section 4: Significant Relationships of Students’ awareness, Eco-consciousness and their Environmental Stewardship

Table 4: Significant relations between students’ awareness and eco-consciousness and their environmental stewardship

		Environmental Awareness	Eco-consciousness	Environmental Stewardship
Environmental Awareness	Pearson Correlation	-	.503***	.381***
	p-value	-	.001	.001
	QD	-	Moderate Positive Correlation	Low Positive Correlation
Eco-consciousness	Pearson Correlation	.503***	-	.423***
	p-value	.001	-	.001
	QD	Moderate Positive Correlation	-	Moderate Positive Correlation
Environmental Stewardship	Pearson Correlation	.381***	.423***	-
	p-value	.001	.001	-

	QD	Low Positive Correlation	Moderate Positive Correlation	-
<i>Pearson r</i>		<i>Qualitative Description</i>		
$\pm 0.80 - \pm 0.99$		<i>Very High Correlation</i>		
$\pm 0.60 - \pm 0.79$		<i>High Correlation</i>		
$\pm 0.40 - \pm 0.59$		<i>Moderate Correlation</i>		
$\pm 0.20 - \pm 0.39$		<i>Low Correlation</i>		
$\pm 0.01 - \pm 0.19$		<i>Very Low Correlation</i>		

*** significant at $\alpha=0.001$

The analysis reveals significant positive relationships among students' environmental awareness, eco-consciousness, and environmental stewardship. Environmental awareness has a moderate positive correlation with eco-consciousness ($r = 0.503, p = 0.001$) and a low positive correlation with environmental stewardship ($r = 0.381, p = 0.001$). Similarly, eco-consciousness demonstrates a moderate positive correlation with both environmental awareness ($r = 0.503, p = 0.001$) and environmental stewardship ($r = 0.423, p = 0.001$). Additionally, environmental stewardship shows a low positive correlation with environmental awareness ($r = 0.381, p = 0.001$) and a moderate positive correlation with eco-consciousness ($r = 0.423, p = 0.001$).

These findings suggest that as students' environmental awareness and eco-consciousness improve, their environmental stewardship also increases, highlighting the interconnectedness of these variables. This finding is supported by Tilbury (1995), who developed a threefold approach that encompasses the whole cycle from awareness, through understanding, to taking concern and responsibility, and then taking action as part of environmental education for sustainability. If this is the case, then one can be assured that at Saint Mary's University, environmental stewardship is being practiced by individuals, groups, or networks of actors with various motivations and levels of capacity to protect, care for or responsibly use the environment in pursuit of environmental and/or social outcomes in diverse social-ecological contexts (Bennet, et al., 2018). These findings also strengthen the traditional theory that when a person is knowledgeable about something, that knowledge can translate into awareness and attitudes, and ultimately into action, which is called the Knowledge-Awareness-Action Framework (Hungerford & Volk, 1990).

The results also echo the spirit of open schooling promoted by the European Union, which refers to schools as agents of well-being (Hazelkorn et al., 2015). **We-CARE:** The first stage is mainly informal learning with professionals and family, engaging students with the challenge of real-life and future-oriented issues to stimulate questions and create a 'need to know', which teachers can harness in the next stage. **We-KNOW:** The second stage is formal learning focused on students acquiring the scientific understanding and skills they need to make decisions and take action in the final stage. **We-DO:** In this stage, students apply the skills and knowledge they have acquired to participatory science actions, defining ways to address the given challenge and minimize its impact (Okada, 2023).

Section 5: Profile Variable as Predictors of Students' Environmental Awareness, Eco-consciousness, and Environmental Stewardship

Gender - An analysis of variance (ANOVA) was conducted to determine if participants' gender significantly influenced their levels of Environmental Awareness, Eco-consciousness, and Environmental Stewardship. Results indicated no statistically significant differences across the three measures by gender. For Environmental Awareness, the mean scores ranged from 3.95 to 4.13, with no significant variation among the gender groups ($F(3, 942) = 0.834, p = .475$). Similarly, for Eco-consciousness, the mean scores ranged from 4.17 to 4.36, with no significant differences observed ($F(3, 942) = 2.782, p = .060$). Lastly, for Environmental Stewardship, the mean scores ranged from 4.15 to 4.37, and again, no significant differences were found among the gender groups ($F(3, 942) = 1.854, p = .136$).

These results suggest that participants' gender does not significantly determine their levels of environmental knowledge, eco-consciousness, or environmental stewardship. It would mean that whether a student is male, female, or LGBTQIA would not be a determinant in the student's level of knowledge, awareness, and stewardship. This could also be observed that they have almost the same Mean ratings.

Age - The analysis shows that age does not significantly affect the participants' levels of environmental awareness, eco-consciousness, and environmental stewardship. Across the three measures, the mean scores are relatively similar among the age groups (17–20, 21–24, and 25 and above). The F-values for environmental awareness ($F = 1.351, p = 0.257$), eco-consciousness ($F = 1.53, p = 0.205$), and environmental stewardship ($F = 0.107, p = 0.956$) are not statistically significant, indicating no notable differences between the age groups. This suggests that age is not a determining factor in these environmental measures.

These results suggest that participants' age does not significantly determine their levels of environmental knowledge, eco-consciousness, or environmental stewardship. It would mean that whether a student is younger or older than the average university student age, it would not be a determinant in the student's level of knowledge, awareness, and stewardship. This could also be observed that they have almost the same Mean ratings.

Table 5: School as a determinant of the level of environmental knowledge, eco-consciousness, and stewardship

Measure	School	f	Mean	SD	F-value	P-value
Environmental Awareness	Accountancy and Business	271	3.95 ^B	0.64	4.977**	0.002
	Health and Natural Sciences	243	4.13 ^A	0.55		
	Teacher Education and Humanities	231	3.99 ^B	0.57		
	Engineering, Architecture, and Information Technology	201	4.08 ^A	0.53		
Eco-consciousness	Accountancy and Business	271	4.25	0.45	2.112 ^{ns}	0.097
	Health and Natural Sciences	243	4.35	0.47		
	Teacher Education and Humanities	231	4.28	0.44		
	Engineering, Architecture, and Information Technology	201	4.27	0.48		
Environmental Stewardship	Accountancy and Business	271	4.30 ^B	0.60	2.782*	0.040
	Health and Natural Sciences	243	4.37 ^A	0.57		
	Teacher Education and Humanities	231	4.24 ^B	0.61		
	Engineering, Architecture, and Information Technology	201	4.23 ^B	0.62		

** significant at $\alpha=0.01$; * significant at $\alpha=0.05$

The ANOVA revealed significant differences in Environmental Awareness ($F = 4.977, p = 0.002$) among the groups. Specifically, students from SHANS ($M=4.13, SD=0.55$) and SEAIT ($M=4.08, SD=0.53$) scored significantly higher compared to those from SAB ($M=3.95, SD=0.64$) and STEH ($M=3.99, SD=0.57$). For Eco-consciousness, there were no significant differences across groups ($F=2.112, p=0.097$), indicating that the mean scores were relatively similar. However, for Environmental Stewardship, significant differences were observed ($F = 2.782, p = 0.040$). Students from SHANS ($M=4.37, SD=0.57$) scored significantly higher than students from SAB ($M=4.30, SD=0.60$), STEH ($M=4.24, SD=0.61$), and SEAIT ($M=4.23, SD=0.62$).

These findings suggest that school affiliation may influence students' environmental awareness and stewardship, with students from the School of Health and Natural Sciences (SHANS) and the School of Engineering,

Architecture, and Information Technology (SEAIT) showing higher awareness and the School of Health and Natural Sciences (SHANS) demonstrating greater stewardship. In terms of environmental knowledge, these findings may be explained by the fact that SHANS and SEAIT are schools with greater theoretical and practical relevance to environmental concerns. The former is more concerned with the health implications of environmental problems, and the latter with engineering and architectural designs related to environmental changes and disasters. In terms of environmental stewardship, the School of Health and Natural Sciences (SHANS) has a higher level of environmental stewardship since it is more aware and more conscious of the health implications of a hazardous environment.

Table 6: Year Level as a determinant of the level of environmental knowledge, eco-consciousness, and stewardship

Measure	Groups	f	Mean	SD	F-value	p-value
Environmental Awareness	First Year	265	3.99	0.62	0.998 ^{ns}	0.407
	Second Year	278	4.08	0.54		
	Third Year	222	4.01	0.56		
	Fourth Year	175	4.06	0.62		
	Fifth Year	6	4.08	0.67		
Eco-consciousness	First Year	265	4.17 ^B	0.45	8.456 ^{***}	0.001
	Second Year	278	4.33 ^A	0.41		
	Third Year	222	4.31 ^A	0.45		
	Fourth Year	175	4.38 ^A	0.46		
	Fifth Year	6	3.90 ^C	1.33		
Environmental Stewardship	First Year	265	4.25	0.61	0.498 ^{ns}	0.737
	Second Year	278	4.29	0.58		
	Third Year	222	4.3	0.57		
	Fourth Year	175	4.32	0.63		
	Fifth Year	6	4.4	1.05		

*** significant at $\alpha=0.001$

The analysis examined whether year level determines students' levels of environmental awareness, eco-consciousness, and environmental stewardship. The results revealed no significant differences in Environmental Awareness across year levels ($F=0.998$, $p=0.407$), indicating that students' environmental knowledge is consistent across years, with mean scores ranging from 3.99 to 4.08. Similarly, there were no significant differences in Environmental Stewardship ($F=0.498$, $p=0.737$), as all year levels reported comparable levels, with mean scores between 4.25 and 4.40. However, Eco-consciousness varied significantly by year level ($F=8.456$, $p<0.001$). Fourth Year students demonstrated the highest level of eco-consciousness (4.38), followed by Second Year (4.33) and Third Year (4.31). In contrast, First Year students scored slightly lower (4.17), while Fifth Year students had the lowest eco-consciousness level (3.90).

These findings suggest that while students' environmental knowledge and stewardship are unaffected by year level, eco-consciousness is influenced, with more advanced students generally exhibiting higher levels, except for those in their fifth year. Eco-consciousness is the awareness that facilitates and motivates positive human behaviors toward an environmentally sound and sustainable society (Kanerva, 2006). The result would mean that higher-year students are more aware and concerned about environmental issues, which are often tied to their values, ethics, and personal responsibility. For example, they may feel more concern about climate change and

support sustainable practices. This could also be due to the environmental awareness they had gained over the years of their education.

Types of high school that respondents graduated from - The results suggest that participants' high school type (private or public) does not significantly influence their levels of environmental awareness, eco-consciousness, or environmental stewardship. Private school participants reported slightly higher scores on environmental awareness ($M = 4.05, SD = 0.56$) than public school participants ($M = 4.00, SD = 0.63$), but the difference was not statistically significant ($t = 1.730, p = .189$). Similarly, private school participants had marginally higher eco-consciousness ($M = 4.30, SD = 0.45$) than public school participants ($M = 4.27, SD = 0.47$), yet this difference was not significant ($t = 0.553, p = .457$). Lastly, for environmental stewardship, public school participants scored slightly higher ($M = 4.30, SD = 0.60$) than private school participants ($M = 4.28, SD = 0.60$), but the difference was also not significant ($t = 0.084, p = .772$).

From the analysis above, the type of high school from which respondents graduated does not decisively shape participants' environmental awareness, eco-consciousness, or environmental stewardship.

This would only mean that, in the Philippines, where schools are generally categorized as public or private, the respondents' high school does not affect their environmental awareness, eco-consciousness, or environmental stewardship. It may mean that whether they are in a public or private high school, they receive similar environmental education. It may mean further that public and private schools provide the same environmental education to their students.

Religion - The analysis examined whether respondents' religion influenced their levels of environmental awareness, eco-consciousness, and environmental stewardship. Results indicated no significant differences between the two groups across all three measures: environmental awareness ($t = 2.154, p = 0.142$), eco-consciousness ($t = 0.739, p = 0.390$), and environmental stewardship ($t = 0.569, p = 0.451$).

This suggests that participants' religion does not determine their levels of environmental knowledge, eco-consciousness, or stewardship. This would only mean that, in the Philippines, where the majority are Catholics or Christians, respondents' religion does not affect their environmental awareness, eco-consciousness, or environmental stewardship.

It may mean that whether they are Catholics or non-Catholics, they receive similar environmental instructions from their religious groups. It may mean further that Catholic or non-Catholic Churches provide the same environmental instructions to their church members.

Table 7: Ethnicity as a determinant of the level of environmental knowledge, eco-consciousness, and stewardship

Measure	Groups	f	Mean	SD	F-value	p-value
Environmental Awareness	Ilokano	416	4.08	0.60	1.790 ^{ns}	0.129
	Tagalog	217	4.02	0.52		
	Ifugao	157	3.98	0.55		
	Igorot	79	4.01	0.61		
	Others	77	3.93	0.67		
Eco-consciousness	Ilokano	416	4.33	0.48	1.828 ^{ns}	0.121
	Tagalog	217	4.24	0.44		
	Ifugao	157	4.26	0.44		
	Igorot	79	4.23	0.48		

	Others	77	4.32	0.42		
Environmental Stewardship	Ilokano	416	4.37 ^A	0.58	6.758***	0.001
	Tagalog	217	4.31 ^A	0.55		
	Ifugao	157	4.10 ^B	0.63		
	Igorot	79	4.18 ^B	0.68		
	Others	77	4.25 ^A	0.600		

*** significant at $\alpha=0.001$

The analysis reveals that participants' ethnicity does not significantly influence their levels of environmental awareness ($F = 1.790, p = 0.129$) or eco-consciousness ($F = 1.828, p = 0.121$). These findings suggest that ethnic differences do not play a substantial role in shaping these dimensions.

However, a significant difference was found in environmental stewardship ($F = 6.758, p = 0.001$), indicating that ethnicity may influence this measure.

Post-hoc comparisons show that Ilokano, Tagalog, and participants classified as "Others" scored significantly higher compared to Ifugao and Igorot groups.

The post hoc results suggest that while ethnicity does not determine environmental awareness and eco-consciousness, it may shape environmental stewardship behaviors.

This result may be explained by the fact that Indigenous people are closer to the natural environment and can observe and experience its destruction, in contrast to most Tagalogs or Ilocanos, who are more situated in urban environments.

Section 6: Students' Environmental Awareness, Eco-consciousness, Environmental Stewardship, and Environmental Sustainability

Environmental Sustainability is closely connected with several Millennium Development Goals. The Sustainable Development Goals (SDGs) related to environmental sustainability primarily focus on protecting the planet, ensuring the sustainable use of natural resources, and addressing climate change.

If we cannot sustain the environment, all efforts for the SDGs will only be in vain. The related SDGs include SDG 6: Clean Water and Sanitation; SDG 7: Affordable and Clean Energy; SDG 11: Sustainable Cities and Communities; SDG 12: Responsible Consumption and Production; SDG 13: Climate Action; SDG 14: Life Below Water; and SDG 15: Life on Land.

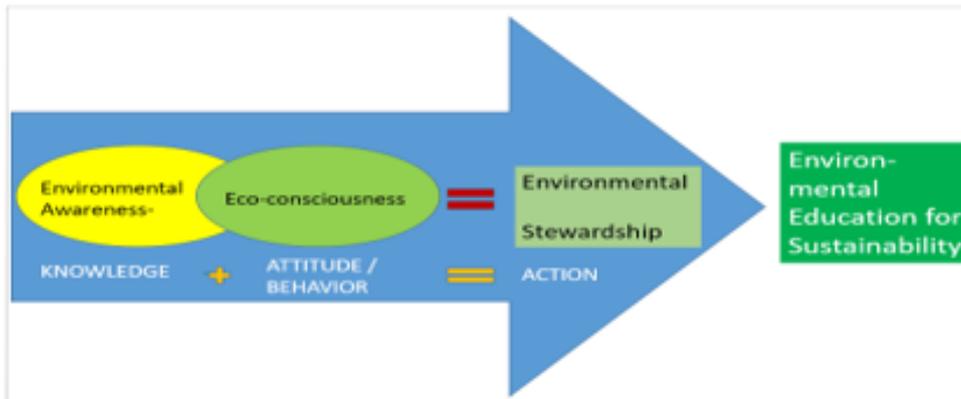
These goals are interrelated and address various aspects of environmental sustainability, including resource management, biodiversity conservation, and climate change mitigation. Each goal includes specific targets and indicators to track progress and ensure that environmental sustainability is integrated into global development efforts.

We can learn from the previous Millennium Development 7 report that said "MDG-7 focuses exclusively on changes in the state of the environment rather than on the driving forces behind these changes. Some believe that addressing these driving forces could yield greater gains for sustainable development (UNEP Post-2015 Discussion Paper 1, 2013).

This research emphasizes the importance of knowledge, attitudes, and stewardship in achieving environmental sustainability. While understanding environmental issues is crucial, personal connection and active engagement are equally necessary.

When our minds, hearts, and hands align, we can effectively protect and conserve our environment. By working together in this way, we can strive to achieve the Sustainable Development Goals (SDGs) by 2030.

Figure 4: Paradigm for Environmental Sustainability



The above paradigm serves as a guide to environmental sustainability in higher education institutions. From the literature reviewed and the study's findings, one could conclude that for environmental education to be effective and sustainable, it must be rooted in students' environmental awareness, eco-consciousness, and environmental stewardship. It is then important to determine students' levels of environmental awareness, eco-consciousness, and environmental stewardship, and to examine their relationships to assess their implications for environmental sustainability, as this study confirmed.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results and discussions, the following are concluded:

1. Tertiary students at Saint Mary's University possess a substantial and high level of environmental knowledge, encompassing factual information and a thorough understanding of ecosystems, biodiversity, environmental issues, and the effects of human activities.
2. Tertiary students at Saint Mary's University demonstrate a strong eco-consciousness, which reflects their awareness of the interconnectedness between humans and the environment, as well as a shared responsibility towards the natural world.
3. Tertiary students at Saint Mary's University exhibit strong environmental stewardship, reflecting their responsible use, protection, and management of the natural environment through conservation and sustainable practices.
4. At Saint Mary's University, students display a connection between environmental awareness, eco-consciousness, and environmental stewardship. As students' awareness and eco-consciousness improve, so does their environmental stewardship.
5. At Saint Mary's University, gender, age, type of high school they graduated from, and religion are not influential or predictive of their environmental awareness, eco-consciousness, and environmental stewardship, while school, year level, and ethnicity are influential or predictive.
6. School affiliation may influence students' environmental awareness and stewardship, with students from the School of Health and Natural Sciences (SHANS) and the School of Engineering, Architecture, and Information Technology (SEAIT) showing higher awareness and School of Health and Natural Sciences (SHANS) demonstrating greater stewardship.
7. While students' environmental knowledge and stewardship are unaffected by year level, eco-consciousness is influenced, with more advanced students generally exhibiting higher levels.

8. While ethnicity does not determine environmental awareness and eco-consciousness, it may play a role in shaping environmental stewardship behaviors.
9. Saint Mary's University is a fertile ground for environmental sustainability practices as the students have a high level of environmental awareness, eco-consciousness, and environmental stewardship, which are important dimensions of environmental sustainability.
10. Based on the findings and conclusions, the following are recommended:

For Saint Mary's University to:

- i. Sustain and intensify its programs, projects, and activities that lean towards protecting and conserving the environment.
- ii. Create environmentally related activities that would cater to the needs of those in the lower years, including those coming from the school of teacher education and humanities and the school of accountancy and business.
- iii. Intensify the CHSF program, the Green Campus Project, and its community partnerships for ecological protection and conservation activities, as they are several of the means to multiply ecological stewardship practices in society.

For future researchers to replicate the study in other schools, particularly in public higher educational institutions.

Disclosure on the Use of Generative AI

This article used generative AI solely to enhance language clarity and coherence, without altering the original research findings or interpretations.

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