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Research Article

Environmental Knowledge As A Predictor Of Science-Related Attitudes Among Senior High School Students

Janry M. Ortega [1]

[1] Instructor II, St. John Paul II College of Davao, Davao City , Philippines

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Abstract

This study examined the influence of environmental knowledge on the science-related attitude among Senior High School (SHS) students. Anchored on Theory of Planned Behavior and Expectancy-Value Theory, a quantitative descriptive-correlational design was employed. A total of 70 SHS students participated in the study, selected through stratified random sampling. Two validated instruments assessed the levels of environmental knowledge and science-related attitudes. Pearson r indicated a significant positive relationship between environmental knowledge and SRA. Regression analysis showed 28.90% of the variance in EK can be explained by SRA. A single regression model was generated, confirming that environmental knowledge substantially influenced science-related attitude. The findings underscore the importance of promoting environmental knowledge to improve science-related attitude.

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[2] Corresponding Author: Janry M. Ortega
*Corresponding Email: janryortega@sjp2cd.edu.ph

1. Introduction

Science-related attitude refers to an individual's disposition toward science, encompassing affective and cognitive aspects that shape how learners engage with scientific knowledge and practices (Tuan et al., 2005). Such attitudes are considered vital because they influence students' motivation, persistence, and achievement in science subjects, ultimately shaping their preparedness for science-related careers. To frame this study, the Expectancy-Value Theory (Eccles & Wigfield, 2002) provides a useful lens, as it posits that students' engagement and performance are largely determined by their expectations of success and the value they assign to the task. Applied to science learning, the theory suggests that students with stronger expectations of success and higher task valuation are more likely to develop positive attitudes toward science.

Despite the growing importance of science education, research has shown that students' attitudes toward science are often less positive, affecting both engagement and achievement (Böyük, 2019). Negative attitudes have been associated with low interest, perceived difficulty, and a lack of motivation to pursue science-related careers (Kahveci et al., 2020). Furthermore, many students perceive science as abstract or disconnected from daily life, leading to disengagement and reduced participation in science-related activities (Chung & Kim, 2021). Conversely, positive attitudes toward science enhance conceptual understanding, promote informed decision-making on issues such as climate change and health, and foster readiness for technological innovation (Yaman et al., 2019).

Parallel to this, studies have highlighted the role of environmental knowledge in shaping students' science-related attitudes. Students with higher levels of environmental knowledge tend to exhibit more favorable views toward science, recognizing its relevance in addressing pressing environmental issues (Kara et al., 2020). Environmental education initiatives have been found to improve students' appreciation of scientific methods, thereby enhancing their overall attitudes toward science (Olson & Morrison, 2021). These findings underscore the potential of environmental education not only for promoting environmental awareness but also for cultivating more positive science-related dispositions.

However, most existing studies examine either science-related attitudes or environmental knowledge in isolation, often within tertiary or international contexts. Few studies have simultaneously explored the relationship between environmental knowledge and science-related attitudes among Senior High School (SHS) students, particularly within the Philippine context. Addressing this gap is crucial, as localized research can provide more culturally relevant insights to guide curriculum design.

Anchored on the Expectancy-Value Theory, this study seeks to investigate how environmental knowledge influences the science-related attitudes of Filipino SHS students. By doing so, it aims to inform educators and policymakers in designing integrated science curricula that foster environmental awareness, strengthen students' attitudes toward science, and ultimately prepare a scientifically literate generation capable of contributing to national and global development.

[2] Corresponding Author: Janry M. Ortega
[*]Corresponding Email: janryortega@sjp2cd.edu.ph

2. Materials and Methods

2.1 Research Design

A research design is a specific procedure a researcher uses to collect, analyze, interpret, and report data in research studies (Creswell & Creswell, 2017). This study employed a descriptive-correlational design. The descriptive design gives a snapshot of the current situation. According to Arikunto (2007), this design aims to collect some information about the trends found in the sector. It means that this kind of research does not involve administration and control. He further justified the classification of the correlation between variables in the form of a correlation coefficient.

2.2 Respondents and Sampling

This study involved 70 Senior High School (SHS) students—35 males and 35 females—selected from the ABM, STEM, Tech-Voc, and GAS academic strands. Stratified random sampling was employed to ensure representation across these predefined subgroups (Kish, 1965; Elfil & Negida, 2017). Students were grouped by academic strand, and then randomly selected to maintain balance across gender and educational tracks. An equal number of male and female respondents were included to support balanced analysis. Inclusion criteria required participants to be officially enrolled SHS students during the data collection period, actively engaged in classroom activities, and exposed to science-related attitude and environmental knowledge measures. Students who were not officially enrolled, declined participation, transferred mid-semester, or had diagnosed cognitive or behavioral conditions were excluded to minimize confounding factors and maintain the study's validity through clear inclusion and exclusion criteria.

2.3 Research Instruments

Two survey instruments were employed in this study: the first, adapted from Harun et al. (2011), measured environmental knowledge, while the second, drawn from Fraser (1981), assessed science-related attitudes. Both tools underwent review and revision by a panel of experts to establish validity. As emphasized by Field (2005), validity reflects the extent to which the data collected accurately represents the actual domain of inquiry. In line with this, the survey questionnaire was submitted to a panel of specialists in questionnaire construction, who refined the items to ensure appropriateness and relevance within the respondents' context.

The research instrument was subjected to pilot testing to establish its reliability, which refers to the extent to which a measurement consistently produces stable and dependable results. According to Huck (2015), a scale demonstrates high internal consistency reliability when its items collectively measure the same construct. Cronbach's Alpha, the most widely used indicator of internal consistency, is particularly suitable for instruments utilizing a Likert scale. While Whitley (2002) noted that there are no absolute standards for acceptable internal consistency, a coefficient of 0.70 is generally considered the minimum threshold. For this study, a five-point Likert scale—one of the most employed scaling techniques—was utilized.

[2] Corresponding Author: Janry M. Ortega
[*]Corresponding Email: janryortega@sjp2cd.edu.ph

2.4 Data Collection and Analysis

The data collection process in this study was designed to be systematic and rigorous to uphold both validity and reliability. The methodology was first refined through consultations with the research adviser to ensure alignment with scholarly standards. The survey instrument was then revised and subjected to expert validation, where a panel evaluated its content, clarity, and relevance to the research objectives. Following validation, formal approval from institutional authorities was obtained, confirming adherence to ethical guidelines and academic protocols. Data were subsequently gathered through face-to-face surveys, enabling direct interaction with respondents and reducing potential misinterpretations of questionnaire items. This approach enhanced response accuracy and strengthened data reliability. Upon completion of the survey, statistical analyses were conducted to assess relationships among variables and generate meaningful interpretations. Through this structured process, the study ensured credible and accurate findings that contributed to a deeper understanding of its objectives.

2.5 Ethical Consideration

This study adhered to established ethical standards for research involving human participants. Prior to data collection, informed consent was obtained, ensuring voluntary participation and a clear understanding of the study's objectives and procedures. Anonymity and confidentiality were safeguarded through the coding of responses and secure handling of data. Although St. John Paul II College of Davao does not maintain a formal Institutional Review Board, ethical research practices were strictly observed. The study posed no physical, psychological, or academic risks to participants, and all data were utilized exclusively for academic purposes.

3. Results and Discussions

The data in Table 1 show that the overall level of environmental knowledge among the respondents is very high**,** with a total mean score of 4.48**.** This indicates that students consistently demonstrate strong awareness and understanding of key environmental concepts. The highest mean scores reflect students' solid grasp of fundamental principles, suggesting that they are well-informed about essential aspects of environmental protection and sustainability. However, some indicators yielded relatively lower means, particularly those related to climate change and the role of government agencies in environmental management. These results imply that while students display comprehensive knowledge in general environmental matters, there are still areas that require further emphasis and enrichment to deepen their understanding of more complex and current environmental issues.

Table 1. Level of Environmental Knowledge

	Indicator	SD	Mean	Description
1.	Wood is renewable energy.	0.50	4.59	Very High
2.	The main source of natural energy is the sun.	0.60	4.60	Very High

[2] Corresponding Author: Janry M. Ortega
[*]Corresponding Email: janryortega@sjp2cd.edu.ph

3.	Environment is the most important element of human life.	0.50	4.46	Very High
4.	Unsystematic waste management can cause long-lasting pollution.	0.63	4.47	Very High
5.	Wildlife habitat is endangered due to illegal logging.	0.49	4.60	Very High
6.	Black is one of the colors of recycle bins.	0.61	4.56	Very High
7.	Forest destruction can cause global warming.	0.50	4.46	Very High
8.	Sixty percent of our body is water.	0.63	4.53	Very High
9.	Carbon dioxide is the major gas contributing to climate change.	0.56	4.26	Very High
10.	The Department of Environment and Natural Resources in the Philippines monitors the country's environmental quality.	0.43	4.24	Very High
	Total Mean	**0.33**	**4.48**	**Very High**

The data in Table 2 show that the overall level of science-related attitude among the respondents is very high, with a total mean score of 3.94. This indicates that students consistently demonstrate positive attitudes toward science, showing enthusiasm and appreciation for its value in society and daily life. The highest mean scores suggest that students enjoy engaging with science-related activities and recognize the importance of scientific discovery and research. Meanwhile, the relatively lower mean scores, though still within the very high range, imply that while students find science enjoyable and acknowledge its significance, areas such as sustaining interest in science lessons and pursuing science teaching as a career may require further encouragement. Overall, the results highlight that students possess a strong and favorable outlook toward science, reflecting both interest and recognition of its role in improving human life.

Table 2. Level of Science-Related Attitude

	Indicator	SD	Mean	Description
1.	Thinking that public money spent on science in the last few years has been used wisely.	0.61	4.54	Very High
2.	Preferring to find out why something happens by doing an experiment rather than by being told.	0.63	4.54	Very High
3.	Believing that science lessons are fun.	0.81	4.46	Very High
4.	Liking to work with people who make discoveries in science.	0.79	4.56	Very High
5.	Liking to teach science when leaving school.	0.60	4.41	Very High
6.	Believing that science can help make the world a better place in the future.	0.72	4.47	Very High
7.	Enjoying visiting a science museum at the weekend.	0.61	4.64	Very High
1.	Thinking that the government should spend more money on scientific	0.63	4.47	Very High
8.	research.			
9.	Thinking that public money spent on science in the last few years has been used wisely.	0.61	4.54	Very High
10.	Preferring to find out why something happens by doing an experiment rather than by being told.	0.63	4.54	Very High
	Total Mean	**0.68**	**3.94**	**High**

Table 3 presents the correlation results showing the relationship between environmental knowledge and science-related attitude. The findings reveal a significant moderate positive correlation between the two variables ($r = .538$, $p = .000$). This suggests that students with greater environmental knowledge are more likely to exhibit favorable attitudes toward

[2] Corresponding Author: Janry M. Ortega
[*]Corresponding Email: janryortega@sjp2cd.edu.ph

science. The result highlights the reinforcing link between knowledge and attitude, implying that strengthening students' understanding of environmental concepts can also cultivate more positive dispositions toward science learning and scientific inquiry.

Table 3. Correlation between Variables

Pair of Variables		r-value	p-value
Independent Variable	Dependent Variable		
Environmental Knowledge	*Science-related Attitude*	*.538**	*.000*

Table 4 presents the regression analysis examining environmental knowledge as a predictor of science-related attitude. The results show that environmental knowledge has a significant positive effect on science-related attitude (β = .765, p = .000), indicating that students with higher levels of environmental knowledge tend to exhibit more favorable attitudes toward science. The regression model is statistically significant, with an R^2 value of 0.289, which means that 28.90% of the variance in science-related attitude can be explained by environmental knowledge alone. The remaining 71.10% of the variance may be attributed to other unexamined factors such as personal interests, teaching strategies, peer influence, or exposure to science-related activities. These findings support the rejection of the null hypothesis and affirm that environmental knowledge is a meaningful predictor of students' science-related attitudes.

Table 4. Regression Analysis on Environmental Knowledge as Predictors of Science-related Attitude

	Coefficients	**Standard Error**	**t stat**	**p-value**
Intercept	1.058	.656	1.614	.111
Environmental Knowledge	.765	.146	.539	.000

R square = .289
F value = 27.758
p value = 0.000

3.1. The Regression Model

The regression analysis demonstrated that science-related attitude is a significant predictor of environmental knowledge among senior high school students. The unstandardized regression coefficient for science-related attitude was B = 0.538, with a standard error of 0.082 and a 95% confidence interval ranging from 0.377 to 0.699, confirming the precision and reliability of the estimate. The model yielded an R^2 value of .289, indicating that science-related attitude explains 28.9% of the variance in environmental knowledge outcomes. This measure of model fit reflects the degree of statistical association between the predictor and outcome variable and should be interpreted separately from theoretical implications.

[2] Corresponding Author: Janry M. Ortega
*Corresponding Email: janryortega@sjp2cd.edu.ph

3.3.1 The General Model:

The model below means that for every unit increase in science-related attitude, there is a 0.538 unit increase in environmental knowledge. Y stands for Environmental Knowledge.

$$Y = 1.865 + 0.538 \text{ (Environmental Knowledge)}$$

Model 1: Y=1.865 + 0.538 (EK)

4. Discussion

4.1. Environmental Knowledge

The very high rating of the respondents for environmental knowledge suggests that students are highly aware of environmental issues and practices. This may be attributed to the growing integration of environmental topics in the school curriculum and increased exposure to media and global campaigns. According to Pe'er, Goldman, and Yavetz (2007), students with access to environmental education tend to develop stronger knowledge and more positive attitudes toward the environment. Similarly, UNESCO (2020) emphasizes that environmental literacy is essential in preparing students to address challenges like climate change and resource depletion. In the present study, students scored highest on items related to practical environmental actions, such as recycling and conservation. This aligns with Ardoin, Bowers, and Gaillard (2020), who found that hands-on environmental education leads to more meaningful learning and responsible behavior. Although Sapungan and Sapungan (2014) noted that Filipino parents may be less engaged in academic support, schools have stepped in to fill this gap. Students' environmental knowledge is shaped more by formal education and institutional efforts than by home influence. As noted by Froiland and Worrell (2016), learners who are cognitively and emotionally engaged in relevant subjects show better academic performance. Thus, the very high rating affirms the effectiveness of environmental education in promoting both awareness and action among students.

4.2. Science-related Attitide

The very high rating of respondents for science-related attitude suggests that students exhibit strong interest, enjoyment, and motivation in learning science. This may be due to the use of interactive and inquiry-based teaching strategies that make science more engaging. According to Osborne et al. (2003), students are more likely to develop positive attitudes toward science when they find it relevant and enjoyable. In fact, the highest item under this variable is enjoying visiting a science museum at the weekend. This is a clear manifestation of a science-related attitude. Blanchard et al. (2010) found that students in inquiry-based classrooms showed greater interest and engagement in science. Thus, the very high rating confirms that effective teaching methods and meaningful learning experiences contribute greatly to the development of positive science-related attitudes.

4.3. Correlation

The findings of the study revealed a significant positive relationship between environmental knowledge and science-related attitudes, as indicated by the statistical results showing a meaningful association between the two variables. This suggests that students with higher

[2] Corresponding Author: Janry M. Ortega
[*]Corresponding Email: janryortega@sjp2cd.edu.ph

levels of environmental knowledge are more likely to demonstrate positive attitudes toward science. This finding is consistent with Pe'er, Goldman, and Yavetz's (2007) assertion that environmental awareness enhances students' sense of responsibility and interest in science-related topics. Similarly, Ardoin, Bowers, and Gaillard (2020) highlighted that environmental education not only increases knowledge but also fosters behavioral and emotional engagement in science learning. UNESCO (2020) further emphasized that understanding environmental issues within science contexts can serve as a catalyst for shaping positive student dispositions, particularly in addressing global challenges such as climate change and sustainability. Thus, the results affirm that integrating environmental content into science instruction can effectively cultivate more engaged and motivated learners.

On the other hand, the relationship between sex and science-related attitudes was not statistically significant, indicating no meaningful difference between male and female students in terms of their attitudes toward science. This aligns with Osborne, Simon, and Collins (2003), who noted that gender disparities in science attitudes tend to diminish when students are provided with inquiry-based, engaging, and inclusive learning opportunities. Similarly, Blanchard et al. (2010) found that both male and female students respond positively to active, hands-on science environments, which may account for the absence of sex-based differences in the present study. Therefore, the findings suggest that when instructional methods are supportive and learner-centered, science-related attitudes can be developed equally across genders.

4.4. Influence

A single regression model was created to examine how environmental knowledge predicts science-related attitude, resulting in the rejection of the null hypothesis that no predictive model exists. In the model, environmental knowledge proved to be a significant positive predictor, with each unit increase linked to higher science-related attitude. These findings align with Eccles et al.'s (1983) Expectancy-Value Theory, which posits that students' motivation and engagement are influenced by their expectancy of success and the subjective value they assign to academic tasks. In this context, environmental knowledge enhances students' perception of the utility and relevance of science, thereby fostering more positive attitudes toward it.

Supporting this, Pe'er et al. (2007) found that students with greater environmental knowledge tend to exhibit more positive attitudes toward science due to increased awareness of its applicability. Ardoin et al. (2020) further asserted that environmental literacy strengthens cognitive engagement and intrinsic interest in science. Together, these findings underscore that as students recognize the real-world relevance of environmental issues, they value science more, resulting in improved science-related attitudes.

However, since a large portion of the variance remains unexplained, it is likely that additional predictors such as academic motivation, instructional quality, cognitive engagement, and formative assessment feedback may also play influential roles in shaping science-related attitudes. Future studies may likewise explore other factors such as teacher-student rapport and peer collaboration, which could moderate the effect of environmental knowledge on students' science-related attitudes.

[2] Corresponding Author: Janry M. Ortega
[*]Corresponding Email: janryortega@sjp2cd.edu.ph

5. Conclusions and Recommendation

From the results of the study, the following conclusions were drawn: Senior high school students consistently demonstrate very high science-related attitudes, particularly in their curiosity about natural phenomena and their willingness to engage in environmentally sustainable practices. Likewise, they also exhibit very high environmental knowledge, especially on issues such as pollution, biodiversity, and climate change.

As to the relationship between the independent and dependent variables, the study confirms a significant positive relationship between environmental knowledge and science-related attitudes. This indicates that for every unit increase in students' environmental knowledge, there is a corresponding increase in their science-related attitude.

Based on these findings, it is recommended that science educators integrate environmental issues and sustainability concepts into the curriculum to further strengthen students' positive attitudes toward science. Schools may also implement interdisciplinary projects and community-based activities that encourage students to apply their knowledge in real-life contexts. Furthermore, curriculum developers and policymakers should consider embedding environmental education more systematically across science subjects to promote lifelong environmental responsibility. Future research may also investigate other moderating variables such as teaching strategies, socioeconomic background, or access to resources, as well as conduct longitudinal studies to track how science-related attitudes develop over time.

6. Limitations

This study acknowledges several limitations. First, the relatively small sample size (n = 70) may have reduced the statistical power and accuracy of the results, limiting the ability to capture smaller effects or complex interactions. Second, because the participants were drawn from a specific group of senior high school students, the findings may not be fully generalizable to other academic strands or broader geographic contexts. Third, reliance on self-reported questionnaires may have introduced response bias, as students could have either overstated or understated their actual behaviors and learning experiences. These limitations call for cautious interpretation of the findings and emphasize the importance of employing larger, more diverse samples and alternative data-gathering methods in future studies.

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Informed Consent Statement:
Informed consent was obtained from all subjects involved in the study.

[2] Corresponding Author: Janry M. Ortega
[*]Corresponding Email: janryortega@sjp2cd.edu.ph

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[2] Corresponding Author: Janry M. Ortega
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[2] Corresponding Author: Janry M. Ortega
[*]Corresponding Email: janryortega@sjp2cd.edu.ph

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[2] Corresponding Author: Janry M. Ortega
[*]Corresponding Email: janryortega@sjp2cd.edu.ph