

Environmental Education Teaching Practices and Environmental Literacy among Public School Teachers in Davao Del Sur

ABSTRACT

This study explored the relationship between environmental education teaching practices and environmental literacy among 85 public elementary school teachers in Davao del Sur. Using a descriptive-correlational research design, the investigation was conducted at the Department of Education, UM Digos College, Davao del Sur, Philippines, between May 2023 and December 2025. Results indicated that teachers demonstrated high levels of environmental concern, positive attitudes toward environmental education, and strong classroom practices. Their environmental knowledge was also rated high. A statistically significant positive correlation was found between teachers' environmental literacy and teaching practices, suggesting that frequent engagement in environmental education activities is associated with higher literacy. The findings highlight the importance of enhancing teachers' environmental literacy and pedagogical approaches to strengthen environmental education. Ultimately, the study underscores the role of teachers in fostering environmentally responsible learners who can contribute to sustainable development.

Keywords: environmental literacy, environmental problems, teachers, environmental education

1. INTRODUCTION

Environmental degradation is a pressing global challenge of the 21st century. Natural disasters such as floods, landslides, and earthquakes affect millions, disrupting livelihoods and undermining sustainable development (Sukumaran, 2022). While some calamities are natural, their increasing frequency and severity are often linked to human activities like

deforestation, improper land use, pollution, and irresponsible waste disposal (Atoi et al., 2023). These issues intensify the impact of natural hazards and threaten public health and ecosystem stability. Traditional mitigation strategies are insufficient without promoting environmental awareness and behavioral change. Therefore, it is crucial to instill environmental consciousness early in life through formal education, especially among children and youth who will become future stewards of the environment (Oyeleke & Onyike, 2025).

Environmental literacy is increasingly recognized by educators, researchers, and policymakers as essential for sustainable development. It encompasses knowledge of environmental issues, attitudes, competencies, and responsible behaviors. Fang et al. (2023) and Amalia (2024) argue that fostering environmental literacy enables individuals to understand environmental systems and make informed, ethical decisions. Environmentally literate individuals are more likely to reduce their environmental footprint and contribute to community solutions. Teachers who promote environmental literacy tend to engage in sustainable practices and embrace long-term environmental values (Miao & Nduneseokwu, 2025; Chiang, 2021). It also involves immersive experiences with nature, fostering empathy and a deeper sense of environmental responsibility.

Recent global studies in environmental education highlight the need for effective, evidence-based strategies to enhance environmental literacy. Experiential learning is a key pedagogical approach, engaging educators with practical activities and real-world environmental challenges (Alabi, 2024). This method boosts teachers' intrinsic motivation, promotes higher-order thinking skills, and deepens environmental consciousness, all vital for quality environmental education (Lu et al., 2021; Pongsophon, 2024).

Sustained professional development and the integration of environmental themes into the curriculum are essential for effective instruction (Boarin & Martinez-Molina, 2022). Educational institutions that encourage teachers to partner with local stakeholders and lead environmental initiatives often see increased professional engagement and improved outcomes (Zakariah et al., 2024). Interdisciplinary approaches that embed environmental concepts across subjects like science, social studies, and language education enhance understanding and long-term retention of environmental knowledge (Ahmad, 2024).

In the Philippines, various policy initiatives have been introduced to integrate environmental education into the formal education system, recognizing teachers as key agents. Republic Act No. 9512, or the Environmental Awareness and Education Act of 2008, mandates the incorporation of environmental concepts across all subjects in public and private educational institutions. This is supported by DepEd Order No. 52, s.2011, which promotes the establishment of school-based environmental organizations like the Youth for Environment in Schools Organization (YES-O) and the inclusion of environmental themes in teaching materials and extracurricular activities. The National Environmental Education Action Plan for 2018–2040, developed by the Department of Environment and Natural Resources and the Department of Education, calls for sustainable practices in school operations that rely on active teacher participation. However, challenges remain. As Mansfield (2023) noted, the curriculum's environmental content is often superficial, lacking experiential engagement.

Additionally, barriers such as inadequate teaching materials, limited access to professional development, and weak implementation monitoring hinder the full realization of these policies (Enyiazu, 2022).

In Digos City, Davao del Sur, data on the environmental literacy of public school teachers is limited. Although schools have adopted national environmental programs, issues such as improper waste disposal, lack of green spaces, and poor environmental practices persist, often linked to teachers as policy implementers (Mariñas et al., 2022, as cited in Carangan, 2023). This highlights a gap between environmental understanding and practices, indicating that professional development may not meet teachers' needs. Galut (2025) noted that without localized strategies addressing teachers' realities, environmental education may not lead to lasting changes in behavior or teaching practices.

The theoretical foundation of this study is grounded in three key educational theories that support transformative environmental teaching: Social Learning Theory and Transformative Learning Theory. Social Learning Theory, introduced by Bandura (1997), suggests that individuals learn by observing others and modeling behaviors, underscoring the importance of teachers as role models who can influence students through visible pro-environmental actions (Liang et al., 2022). Meanwhile, Transformative Learning Theory, developed by Mezirow (2009), emphasizes the importance of self-reflection and re-examining one's perspectives, which can lead to significant shifts in how teachers approach environmental topics in the classroom.

This study provides evidence-based insights into the environmental literacy levels of public elementary teachers in Davao del Sur and the teaching practices that support environmental education. The findings will guide curriculum developers, school administrators, and local education authorities in enhancing teacher preparation and environmental instruction to promote sustainable behaviors and values (Corpuz et al., 2022). By aligning its objectives with national education policies and sustainability goals, this study aims to cultivate environmentally competent and action-oriented teaching professionals (Sinakou et al., 2022; Lohmann et al., 2021). Ultimately, this research seeks to inform the development of inclusive teacher education programs that address the environmental challenges and instructional realities of schools in Davao del Sur and similar communities.

Research Objectives

The current study examines the correlation between teachers' practices and environmental Literacy.

1. To determine the level of elementary teachers' environmental practices in terms of:
 - 1.1 Environmental Education Attitudes (EEA); and
 - 1.2 Teacher Practices in Environmental Education (TPEE).
2. To determine the environmental literacy perceived level of elementary teachers in terms of:
 - 2.1 Environmental Knowledge (EK); and
 - 2.2 Environmental Concern (EC).
3. To determine whether there is a significant relationship between teachers' practices and the teachers' Environmental Literacy

2. METHOD

2.1 Respondents

The study involved 85 elementary school teachers from public schools in Davao del Sur. The selection was based on sampling adequacy using purposive sampling, targeting teachers directly involved in environmental education or school-based activities (Khalefa et al., 2021). A sample size of this magnitude balances sufficient data for statistical analysis with manageable data collection (Lakens, 2022). The researchers ensured participants had the necessary experience with environmental education. The number 85 was chosen to provide meaningful results and reliable statistical analyses, as a sample size of 50-100 is commonly accepted in educational research for identifying significant patterns (Newton, 2024). Additionally, the study was conducted within time and resource constraints, making 85 a feasible number without compromising the quality of findings.

Table 1. Demographic profile of respondents, n=85

Indicators	Descriptions	f	%
Gender	Female	73	85.9
	Male	12	14.1
Age	23 to 25 years old	1	1.2
	26 to 30 years old	16	18.8
	31 to 35 years old	9	10.6
	36 to 40 years old	9	10.6
	41 to 45 years old	16	18.8
	Over 45 years old	34	40
Total Years of Teaching	1 to 5 years	13	15.3
	6 to 10 years	19	22.4
	11 to 15 years	11	12.9
	16 to 20 years	16	18.8
	21 to 25 years	10	11.8
	Over 25 years	16	18.8
Environmental Education training/s	No	36	42.4

	Yes	49	57.6
Grade Level	4	31	36.5
	5	31	36.5
	6	23	27.1

Selecting respondents from public schools ensures a broad and representative sample of teachers within the local educational system (Svensson et al., 2022). It is essential to collect demographic information from participants, including gender, age, total years of teaching experience, environmental education training, and the academic level they instruct. The sample consisted of 85 individuals, comprising 85.9% female and 14.1% male teachers. Among the respondents, 40% were over 45 years old, 18.8% were aged 26 to 30, and a further 41% were aged 41 to 45. Additionally, 10.6% were between 31 and 35 years old, and 1.2% were aged 23 to 25. In terms of teaching experience, 22.4% had taught for 6 to 10 years, 18.8% for 16 to 20 years, 15.3% for 1 to 5 years, and 11.8% for 21 to 25 years. Notably, 42.4% reported having no education or training in environmental education, while 57.6% acknowledged having received such education or training. Furthermore, 36.5% taught grades 4 and 5, while 27.1% taught grade 6.

2.2 Instruments

The research instrument used in the study was a survey questionnaire. The researcher-adopted instrument consisted of 3 parts: Part One was used to gather the following information about the respondent: Gender, Length of Service, Training, and Subject Taught. Part (2) Teacher's Practices and two variables comprised 22 items. Next was Environmental Literacy, with two variables composed of 10 items. The researchers seek relevant research questions that are aligned with the topic of the research. It was interpreted with the qualitative description:

Table 2. Qualitative description of the ratings in the teacher's level of environmental education teaching practices.

Scale	Range of Means	Descriptive Level	Interpretation
5	4.20-5.00	Very high	The expected level of competence described in the indicators is highly demonstrated.
4	3.40-4.19	High	The expected levels of competence described in the indicators are demonstrated at an average level.
3	2.60-3.39	Moderate	The expected level of competence described in the indicators is fairly demonstrated.
2	1.80-2.59	Low	The expected levels of competence described in the indicators are poorly

1	1.00-1.79	Very Low	demonstrated. The expected levels of competence described in the indicators need to be demonstrated.
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The environmental literacy level was rated and interpreted with the qualitative description:

Table 3. Qualitative description of the environmental literacy rating

Scale	Range of Means	Descriptive Level	Interpretation
5	4.20-5.00	Always	The indicator described is always observed and manifested.
4	3.40-4.19	Oftentimes	The indicator described is oftentimes observed or manifested.
3	2.60-3.39	Sometimes	The indicator described is sometimes observed or manifested.
2	1.80-2.59	Rarely	The indicator described is rarely observed or manifested.
1	1.00-1.79	Never	The indicator described is never observed or manifested.

2.3 Design and Procedure

This study used a quantitative descriptive-correlational research design to examine relationships between measurable variables (Creswell, 2014). The descriptive aspect provided an overview of teachers' practices and environmental literacy without establishing causality, while the correlational component explored the relationship between these variables (Sirisilla, 2023; Remler et al., 2021). Data collection utilized validated instruments, and statistical analysis was conducted through correlation techniques to identify patterns and associations.

Before data collection, the questionnaire was validated by experts and the Research and Publication Center (RPC). This was followed by approval from the research panel and final clearance from the RPC office. A formal request to conduct the study was submitted and approved by the participating schools. Additionally, the researchers obtained permission from the original author of the questionnaire via email to ensure ethical use of the instrument.

The school head signed our letter to conduct the survey. The researcher administered the questionnaire and collected the data. After the survey, the researchers tallied the participants' data, kept it confidential, and used it solely for the study. The research instruments were standardized and validated by panel experts. The researchers then requested a statistician from the RPC office. After approval, they forwarded the consolidated data to the statistician and later collected the results for presentation.

The collected data were tallied, tabulated, and analyzed using descriptive and inferential statistics. The arithmetic mean calculated the average scores (Malakar, 2023). Percentages were calculated based on response frequencies of certain questions (Jia et al., 2024). Lastly, Pearson's r analyzed the hypothesis and the relationships between variables (Temizhan et al., 2022).

2.4 Ethical Considerations

Ethical considerations were observed as research ethics involve principles and guidelines that protect participants' rights, welfare, and dignity. This study explores environmental education practices and literacy among public school teachers in Davao del Sur and adheres to strict ethical standards outlined by the UM Digos Research and Publication Center. The researcher ensured that participants' rights were protected while maintaining the study's integrity. Ethical protocols were followed in securing permissions, handling data, and addressing potential risks. Informed consent was obtained from teachers, ensuring voluntary participation, protecting privacy, and minimizing research-related risks.

2.4.1 Voluntary Participation. Participation in this study was voluntary. All selected teachers were informed of the study's objectives, their involvement, and potential benefits. Teachers could withdraw at any time without negative consequences. No personal identifiers were collected, ensuring anonymity. Responses were anonymized with numeric codes, and only the researcher had access to the matching key. The study respected participants' autonomy in accordance with ethical guidelines.

2.4.2 Privacy and Confidentiality. The researcher maintained strict confidentiality throughout the study by following ethical data protection standards. All information from teachers was treated as confidential and used solely for academic purposes. Personal identifiers were removed from the survey to protect privacy. Teachers' responses were securely recorded and only accessible to the researcher. Results were presented in aggregate form to ensure individual responses could not be traced back to participants. This approach fostered trust and encouraged openness, which were essential for the integrity of the research findings.

2.4.3 Informed Consent Process. The informed consent process was essential to ensure participants understood the study's purpose and their role. The researcher explained the study's goals, tasks, and potential benefits to the teachers and the educational community. Teachers were informed that participation was voluntary, allowed to ask questions, and provided with a written consent form. They were reminded of their right to withdraw at any time without negative consequences. This process respected the participants' rights and autonomy, ensuring they were aware of their involvement.

2.4.4 Risks. The study involved minimal risks to participants, as it did not require physical or emotional exposure. However, potential discomfort from sharing personal experiences or beliefs about environmental teaching practices was considered. To mitigate these risks, the researcher designed the survey non-intrusively and ensured responses were anonymous. Teachers were reassured that their answers would not impact their professional standing or relationships. The

primary goal was to gain insights into environmental education teaching practices for the benefit of teachers and students.

2.4.5 Benefits. This study aims to improve environmental education practices among public school teachers in Davao del Sur. By examining the relationship between teachers' environmental practices and their environmental literacy, the findings will help educators and policymakers develop effective teaching strategies. The results may lead to targeted professional development programs for teachers, enhancing their environmental literacy and teaching methods. Additionally, the study could inform local educational authorities about the need to integrate environmental education into the curriculum, thereby boosting community awareness and action. Teachers, administrators, and policymakers can use these findings to enhance the quality of environmental education in schools and promote sustainable practices in the community.

2.4.6 Plagiarism and Fabrication. To ensure academic integrity, the researcher adhered to strict guidelines regarding plagiarism and fabrication. All sources were properly cited, and the paper underwent thorough plagiarism checks using Turnitin and Grammarly. The researcher used credible, peer-reviewed sources, accurately citing quotes and paraphrased material. The study relied on verified data and literature, ensuring conclusions were based on sound evidence. This process maintained the study's credibility and authenticity.

2.4.7 Falsification. The study adhered to strict rules for data accuracy and representation. The collected data were analyzed and reported without alterations. The researcher presented all findings transparently and honestly, with no manipulation to fit predetermined conclusions. By presenting the data authentically, the study's results accurately reflected the participating teachers' environmental education practices and literacy levels.

2.4.8 Conflict of Interest. The study was conducted transparently, with no conflicts of interest. The researcher had no financial or personal interests that could influence the outcomes. Guided by academic and ethical principles, the research aimed to produce unbiased results, focusing solely on the relationship between teachers' environmental education practices and their environmental literacy.

2.4.9 Deceit. The researcher ensured no deceit in the research process. All information was presented truthfully, and no data were fabricated or manipulated. The research followed ethical guidelines in data collection, analysis, and reporting. The study was transparent, and experts validated all findings to ensure integrity and no intent to deceive or mislead participants.

2.4.10 Permission from Organization/Location. Formal permission to conduct the study was obtained from the relevant authorities in the public schools of Davao del Sur. A letter of request was sent to the school administrators for approval to engage teachers in the study. The research proceeded only after obtaining the necessary permissions, ensuring compliance with institutional protocols.

2.4.11 Authorship. This study followed proper authorship guidelines. The researcher collaborated with the adviser on the research design, data analysis, and report drafting, ensuring a high-quality final manuscript.

3. RESULTS AND DISCUSSION

3.1 Level of Elementary Teachers' Environmental Practices

Table 4 illustrates the extent of environmental practices among elementary teachers, displaying an overall mean of 4.17(SD=0.36), which is very high. It is interpreted as the expected level of competence described in the indicators, which is highly demonstrated. The mean for the Environmental Education Attitudes was 4.42(SD=0.34), which is very high. The expected level of competence described in the indicators is highly demonstrated. The findings reveal that the respondents exhibit notably high enthusiasm and positive attitudes toward incorporating environmental education into their teaching practices. Also, the mean for Teacher Practices in Environmental Education was 3.91(SD=0.48), which is high. The expected levels of competence described in the indicators are demonstrated at an average level.

Table 4. Level of Environmental Practices

Indicators	\bar{x}	SD
Environmental Education Attitudes	4.42	0.34
Teacher Practices in Environmental Education	3.91	0.48
Overall	4.17	0.36

Environmental attitude encompasses individuals' beliefs, emotions, and intentions toward environmental issues. A positive attitude predicts pro-environmental teaching behavior among teachers and influences how they integrate sustainability into their instruction (Teig et al., 2024). Teacher practice in environmental education involves strategies and methods for conveying content, including lesson planning, instructional techniques, assessments, and curriculum implementation, all influenced by educators' attitudes and beliefs (Dillon & Herman, 2023). The effectiveness of environmental education relies on teachers' commitment, knowledge, and willingness to incorporate environmental topics into their teaching. Lack of interest or expertise can hinder delivery, while teachers who engage in environmental initiatives—such as addressing local ecological issues, promoting eco-friendly practices, or leading sustainability projects—help foster a culture of environmental responsibility within schools (Liao et al., 2022).

Furthermore, environmental literacy among educators is enhanced through experiential learning and active involvement in sustainable practices. For instance, when teachers engage in community-based environmental projects or collaborate in developing school-based recycling or gardening programs, they model eco-conscious behaviors and reinforce the value

of environmental stewardship (Fang et al., 2023). These practices enrich their teaching approaches and contribute to a broader institutional commitment to sustainability (Maki, 2023; Simon, 2024).

3.2 Level of Environmental Literacy Perceived by Elementary Teachers

Table 5 presents that the overall mean for environmental literacy is 4.40 (SD = 0.36), interpreted as "Always," indicating that the behaviors and attitudes described are consistently demonstrated. The sub-indicator "Environmental Knowledge" received a mean score of 4.16 (SD = 0.50), with a descriptive level of "Oftentimes," suggesting that while teachers frequently demonstrate environmental understanding, there remains potential for further improvement in this area. On the other hand, the sub-indicator "Environmental Concern" achieved a mean of 4.64 (SD = 0.40), categorized as "Always," which reflects a strong and consistent display of environmental concern among respondents.

Table 5. Level of Environmental Literacy

Indicators	\bar{x}	SD
Environmental Knowledge	4.16	0.50
Environmental Concern	4.64	0.40
Overall	4.40	0.36

The findings indicate that many in-service teachers struggle to fully engage with environmental education (EE). While they have foundational knowledge, deeper understanding and integration are often lacking. Teachers show awareness and concern for the environment, but their focus is more on learning about it than learning for it (Liu et al., 2023). Despite above-average environmental awareness, gaps in content knowledge and pedagogical application remain (Sukma et al., 2020). Teacher educators, in particular, demonstrate only average understanding of most EE concepts, with significant deficiencies in areas like waste management and sustainable development (Zinu et al., 2019). These gaps highlight the need for professional development and targeted training to enhance teachers' competencies in EE and their ability to teach it effectively.

Supporting this, Tan et al. (2021), cited by Uyen et al. (2022), Wang (2020), and Ernst and Monroe (2019), all of which revealed that teachers often lack sufficient environmental knowledge. Similarly, Husin et al. (2020) found that teachers tend to possess only basic knowledge of environmental care.

3.3 Significant Relationship Between Teachers' Practices and the Teachers' Environmental Literacy

A Spearman's rank-order correlation was conducted to explore the relationship between environmental literacy and teachers' practices in environmental education among public elementary school teachers in Davao del Sur. The results of the analysis revealed a

statistically significant, strong, and positive correlation between overall environmental literacy and overall teacher practices ($r_s(83) = .657, p < .001$), as presented in Table 6. This suggests that teachers who frequently apply environmental education practices tend to have higher levels of environmental literacy.

A moderate to strong correlation was also found between teachers' environmental education attitudes and all components of environmental literacy, specifically environmental knowledge ($r_s = .525, p < .001$), environmental concern ($r_s = .574, p < .001$), and overall environmental literacy ($r_s = .659, p < .001$). This implies that teachers with positive attitudes towards environmental education are more likely to exhibit higher environmental understanding and concern levels, further supporting the integration of affective and cognitive dimensions in EE (Kuswendi & Arga, 2020).

The correlation matrix presented in Table 6 reveals significant relationships between various components of environmental literacy and teacher practices in environmental education. Notably, a strong positive correlation was observed between environmental education attitudes and both environmental practices ($r_s = .659, p < .001$) and environmental knowledge ($r_s = .574, p < .001$), suggesting that teachers who possess more positive attitudes towards environmental education are more likely to engage in effective environmental teaching practices. Furthermore, a significant correlation between teacher practices and environmental knowledge ($r_s = .533, p < .001$) highlights the strong link between teachers' understanding of environmental concepts and their ability to implement them in the classroom.

Table 6. Correlation matrix between Environmental Literacy and Practices

Environmental Practices	Environmental Knowledge	Environmental Concern	Overall
Environmental Education Attitudes	.525** 0.000	.574** 0.000	.659** 0.000
Teacher Practices in Environmental Education	.533** 0.000	.221* 0.042	.458** 0.000
Overall	.635** 0.000	.440** 0.000	.657** 0.000

A weaker correlation was found between teacher practices and environmental concern ($r_s = .221, p = .042$), indicating that teacher practices influence environmental attitudes, though not strongly. This may be due to personal values, resources, or institutional support (Hines et al., 2019; Hermawan et al., 2022). These findings highlight the role of teacher practices in enhancing environmental literacy, with teachers engaged in environmental education demonstrating higher levels of knowledge and concern. Teachers with stronger environmental literacy are more effective in promoting sustainable behaviors among students (Ibourk et al., 2024). Additionally, professional development is critical for strengthening teachers' metacognitive abilities and fostering environmental values, improving their ability to teach

ecological concepts and address issues like climate change (Petkou et al., 2021; Ibourk et al., 2024).

4. CONCLUSION

This study measured elementary teachers' environmental literacy and teaching practices and explored their relationship. Results indicated that teachers exhibited strong environmental practices and high competence in integrating environmental education. While their attitude toward environmental issues was very positive, actual teaching practices were less developed, indicating a need for enhancement in methods and strategies. Teachers showed a high overall level of environmental literacy, but there was a distinction between their high environmental concern and comparatively lower environmental knowledge, suggesting a need for further strengthening. Correlation analysis showed a significant positive relationship between teachers' practices and their environmental literacy, indicating that improved practices are closely tied to higher literacy. These findings emphasize the need for professional development programs focused on enhancing teachers' environmental knowledge and effective strategies for teaching environmental education.

5. RECOMMENDATIONS

Based on the findings of this study, it is recommended that the Department of Education (DepEd), school division offices, and school administrators take strategic actions to strengthen teachers' environmental literacy and teaching practices. Given the high level of environmental concern among respondents, school administrators should designate environmentally committed teachers as coordinators of school-based initiatives like solid waste management programs, campus greening projects, and eco-club leadership to translate their concern into meaningful actions.

In this study, environmental knowledge was high but not exemplary. DepEd and local education units should implement intensive, content-based professional development programs on environmental topics such as climate change, biodiversity, disaster risk reduction, and sustainable development to address knowledge gaps. Additionally, school heads should organize regular workshops that provide practical strategies and lesson plans for integrating environmental education across subjects.

Considering the significant relationship between teachers' environmental literacy and classroom practices, school division offices should establish mentoring, coaching, and performance-monitoring programs to promote the consistent application of environmental concepts in teaching. Implementing these recommendations can lead to a more environmentally literate teaching workforce, fostering sustainability-oriented behaviors and values among learners.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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