



## Assessing Sustainable Environmental Awareness Among Phase C Elementary School Students in Sorong Regency

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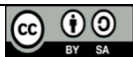
### Keywords:

Elementary school students;  
Environmental awareness;  
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Gender;  
School location

### ABSTRACT

*This study aims to describe the profile of sustainable environmental awareness among Phase C students at SD Inpres 13 in Sorong Regency, covering the dimensions of knowledge, attitudes, and behavior. The study employed a descriptive survey method involving 35 students, consisting of 20 fifth-grade students and 15 sixth-grade students. Data were collected using a 15-item questionnaire covering three dimensions of sustainable environmental awareness: knowledge, attitudes, and behavior. The instrument demonstrated satisfactory content validity (CVI > 0.80) and reliability (Cronbach's Alpha = 0.82). Data were analyzed descriptively using percentage techniques. The results showed that students' sustainable environmental awareness was generally categorized as good, with an average percentage of 72.39%. The attitude dimension achieved the highest score (81.2%), indicating that students demonstrated positive environmental attitudes and strong concern for sustainable practices. The behavior dimension reached 69.9%, while the knowledge dimension obtained the lowest score (67.4%), particularly regarding issues related to the greenhouse effect and climate change. Descriptive analysis also showed variations in sustainable environmental awareness across grade levels and gender groups; however, these findings should be interpreted cautiously because no inferential statistical tests were conducted. Overall, the findings highlight the importance of strengthening environmental education through experience-based learning, sustainability projects, and school-wide environmental practices to support the development of environmental literacy and Education for*

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*Sustainable Development (ESD) competencies among elementary school students.*

## INTRODUCTION

The increasing environmental degradation has become a global issue due to the public's low level of environmental awareness. Problems such as pollution, waste, deforestation, climate change, and the declining quality of water and air highlight the importance of environmental education from an early age. Elementary schools play a crucial role in shaping environmentally conscious mindsets, attitudes, and habits to support nature conservation and ecosystem sustainability. (Nugroho, 2022). Education for Sustainable Development (ESD) emphasizes the development of critical thinking skills, collaborative decision-making, and a long-term perspective on sustainability (Bor et al., 2023). This approach not only enhances students' conceptual understanding but also fosters values of environmental responsibility and wise consumption (Lewis et al., 2019).

Environmental literacy is the ability to understand the interconnections within natural systems and the ecological principles that underpin the sustainability of life on Earth (Kazazoglu, 2025). Therefore, instilling environmental literacy values from an early age is a crucial step toward raising a generation that is aware of and prepared to address various environmental challenges in the future. In the process of implementing environmental literacy education, schools can enhance their capacity for sustainable development by adapting educational concepts, content, and methods. Research findings help educators understand the importance of environmental literacy education, improve the effectiveness of teaching, and provide better educational resources for students (Huang & Hsin, 2023).

Environmental education at the elementary school level plays a crucial role in shaping students' character so that they develop a caring and responsible attitude toward the environment. The elementary school years are an effective stage for instilling positive values because students are in a phase of character and habit development. Environmental education does not merely focus on imparting knowledge but is also aimed at fostering environmentally friendly attitudes and behaviors in daily life. Through the implementation of effective environmental education, students can understand the importance of maintaining a balance between humans and the natural environment (Saputra et al., 2025). Sustainable environmental awareness is a critical 21st-century competency that helps students understand environmental issues and make responsible decisions regarding the sustainability of life (Saputri et al., 2024). The integration of environmental content into the educational curriculum plays a role in shaping students' character, fostering a high level of concern and awareness regarding the environment and its various impacts (Rosidah et al., 2022).

Recent developments in sustainability research indicate a growing academic interest in environmental awareness and sustainability education. Recent bibliometric evidence also indicates that sustainability awareness research has experienced significant growth over the past two decades (Hidayat et al., 2025). A bibliometric analysis of documents indexed in the Scopus database reveals a substantial increase in publications related to sustainable environmental awareness during the period 2020–2026. Figure 1 illustrates this upward trend, showing that the number of publications increased from approximately 41 documents in 2020 to a peak of 183 documents in 2025. This growth reflects the increasing global concern regarding environmental sustainability and the critical role of education in addressing environmental challenges. Consequently, environmental awareness has become an increasingly prominent topic within educational, environmental, and sustainability research.

Although research on environmental awareness and Education for Sustainable Development (ESD) continues to grow, most previous studies have focused on measuring levels of environmental awareness, evaluating environmental education programs, or integrating sustainability principles into the curriculum in general. These studies generally emphasize aspects of environmental knowledge and attitudes, while research linking sustainable environmental awareness to the dimension of ecoliteracy as the foundation for shaping sustainable behavior among elementary school students remains relatively limited. Furthermore, most research has been conducted at the secondary and higher education levels,

so empirical evidence regarding the sustainable environmental awareness profiles of elementary school students—particularly in the context of ESD implementation in Indonesia remains insufficient.

This research gap highlights the need for a study that specifically identifies the profile of elementary school students’ sustainable environmental awareness through the perspectives of ecoliteracy and ESD. Unlike previous studies that only measured general environmental awareness, this study integrates indicators of sustainable environmental awareness with ESD principles to obtain a more comprehensive picture of students’ readiness to face sustainability challenges. Thus, the novelty of this study lies in mapping the sustainable environmental awareness profiles of elementary school students, analyzed within the frameworks of ecoliteracy and ESD. The study’s findings are expected to enrich the literature on environmental education at the elementary school level and serve as a foundation for developing more effective learning strategies to support the achievement of the Sustainable Development Goals (SDGs).

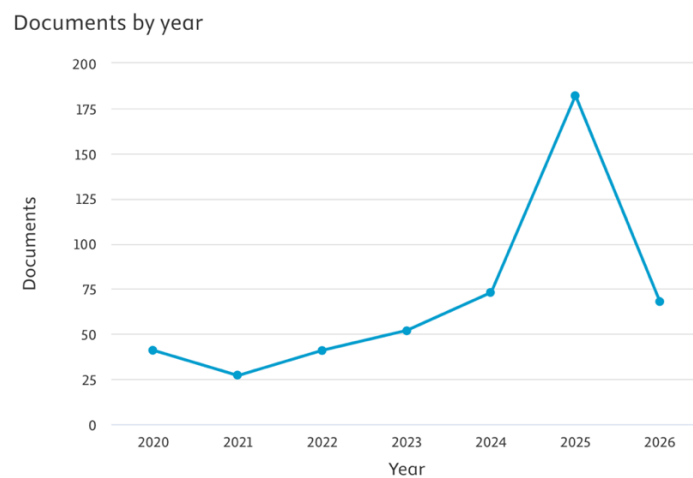


Fig.1. The publication trends presented in this study were derived from the Scopus database using the keyword “sustainability awareness” with data retrieved on June 3, 2026

In terms of geographical distribution, Figure 2 shows that Indonesia emerged as the leading contributor with approximately 79 publications, followed by the United States, Spain, Türkiye, and China. This finding indicates that Indonesia has demonstrated a strong commitment to advancing research on environmental sustainability awareness. Nevertheless, despite the large number of publications, existing studies have predominantly focused on secondary schools, higher education institutions, and urban settings. Empirical studies investigating sustainable environmental awareness among elementary school students, particularly in Eastern Indonesia, remain relatively limited.

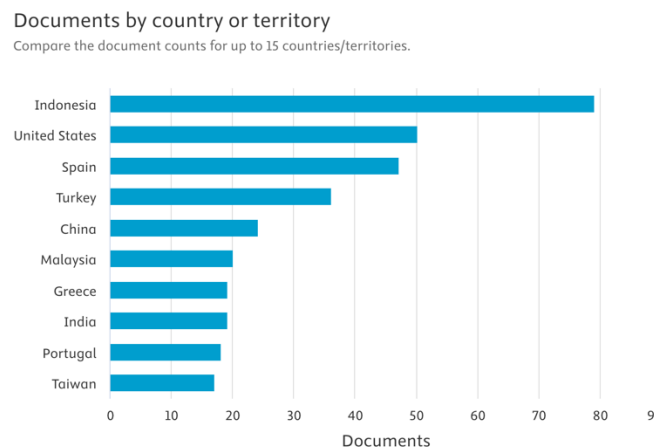


Fig.2. Top contributing countries in sustainable environmental awareness research based on Scopus database using the keyword “sustainability awareness,” with data retrieved on June 3, 2026

Furthermore, previous studies have mainly examined environmental literacy, ecoliteracy, and environmentally responsible behavior as separate constructs. Limited attention has been given to examining sustainable environmental awareness through the integrated dimensions of knowledge, attitudes, and behaviors among elementary school students. This gap is particularly evident in the context of Sorong Regency, a region characterized by rich biodiversity and significant environmental conservation challenges. Understanding students' sustainable environmental awareness in this context is essential for supporting the implementation of Education for Sustainable Development (ESD) and fostering environmentally responsible citizens from an early age.

At the elementary school level, environmental awareness can be fostered through various simple habits such as maintaining cleanliness, disposing of trash properly, conserving energy, and using resources appropriately. Consistently practicing these habits will help cultivate an environmentally conscious character in students. Various studies indicate that implementing ecoliteracy in elementary schools can sustainably enhance students' environmentally conscious character (Khoerunisa, 2024). The higher a student's level of ecoliteracy, the better their environmentally conscious behavior (Kumala, 2026). Ecoliteracy competencies can enhance environmentally conscious character, which in turn impacts environmental sustainability (Wahyuni et al., 2022). Elementary school students' ecoliteracy competencies have a positive and significant effect on environmentally conscious behavior and the environmental sustainability of the school (Anggraini et al., 2024).

Sorong Regency is known for its tropical rainforests and rich marine ecosystems, but human activities such as deforestation and plastic pollution have the potential to undermine environmental sustainability. On the other hand, environmental education has not yet been optimally integrated into science instruction in elementary schools. Various global sustainability-based programs have been developed to address this, such as the implementation of green curricula and interdisciplinary approaches, for example, recycling and reforestation (Qureshi, 2020; Sahidullah, 2022).

Phase C of the Merdeka Curriculum, which covers fifth and sixth graders in elementary school, is a crucial stage in the development of students' thinking skills and character formation. At this stage, students begin to understand the relationship between human actions and their impact on the surrounding environment. Ecoliteracy needs to be implemented in various programs that can serve as practical solutions to current global environmental issues. From a systemic perspective, the only solution that should be implemented is a sustainable one. It is hoped that this will foster a generation that is responsible and concerned about environmental sustainability. SD Inpres 13 in Sorong Regency, as one of the elementary schools, plays a vital role in shaping students' character to be environmentally conscious. The school environment, as the setting for students' daily interactions, can serve as a vehicle for instilling values of sustainability through learning and positive habits. However, to date, there has been little research specifically examining the profile of sustainable environmental awareness among Phase C students at this school. Yet, such a study is crucial for understanding the actual state of students' environmental awareness and serves as a foundation for evaluating the development of environmental education programs at the school. Based on this description, the study titled "Profile of Environmental Sustainability Awareness Among Phase C Students at SD Inpres 13, Sorong Regency" is important to conduct in order to obtain a comprehensive picture of students' level of environmental awareness as an effort to support the creation of a generation that cares about and is responsible for environmental sustainability.

## **METHOD**

This study employs a descriptive method using a survey approach to describe the profile of elementary school students' awareness of environmental sustainability, covering the dimensions of knowledge, attitudes, and behavior. The survey approach was chosen because it allows researchers to systematically gather information from respondents regarding their level of awareness of environmental sustainability.

The study population consisted of all Phase C students at an elementary school in Sorong Regency. Total sampling was used because the population size was relatively small, so all members of

the population were included as study participants. The study sample consisted of 35 students, including 20 fifth-graders and 15 sixth-graders.

The research instrument consisted of a sustainable environmental awareness questionnaire adapted from an instrument developed by Ramadany (2025). The instrument comprised three dimensions—knowledge, attitude, and behavior—with each dimension containing five items, for a total of 15 items. Prior to use, the instrument underwent a content validation process conducted by two environmental education experts and one educational evaluation expert. The validation results showed that all items in the instrument met the feasibility criteria with a Content Validity Index (CVI) score of more than 0.80. The reliability test was conducted using Cronbach’s Alpha coefficient and yielded a value of 0.82, indicating that the instrument has high reliability.

Unlike the Likert scale, which uses a graded response range, this study employs a dichotomous rating system (0–1). Each response that reflects sustainable environmental awareness is scored as 1, while responses that do not reflect sustainable environmental awareness are scored as 0. Therefore, this instrument does not use a Likert scale but rather a dichotomous scale that allows for a simple measurement of students’ level of awareness.

Data collection took place during the month of April 2026. The researchers first obtained permission from the school and explained the purpose of the study to teachers, students, and parents/guardians. Participation was voluntary, and all data was kept confidential. Next, questionnaires were distributed to students in the classroom under the supervision of teachers and researchers. It took approximately 20–30 minutes to complete the questionnaire. After all questionnaires were collected, the data were checked for completeness before the analysis process began.

The data were analyzed descriptively using percentages to describe students’ level of environmental sustainability awareness across each dimension. The percentages were calculated using the following formula (1).

$$\text{Percentage} = \frac{\text{Score obtained}}{\text{Maximum score}} \times 100\% \tag{1}$$

Next, the percentage results were categorized based on criteria for levels of environmental sustainability awareness, namely very good ( $\geq 80\%$ ), good (60–79.9%), fair (40–59.9%), poor (20–39.9%), and very poor ( $< 20\%$ ). The analysis was conducted for each of the dimensions knowledge, attitudes, and behavior to obtain a comprehensive picture of the students’ sustainable environmental awareness profile. The distribution of questionnaire items for each dimension is presented in Table 1.

**Table 1. Categories of Environmental Sustainability Awareness**

<b>No</b>	<b>Category of Sustainable Environmental Awareness</b>	<b>Item Number</b>	<b>Items</b>
1	Knowledge of sustainable environmental awareness	K-1, K-2, K-3, K-4, K-5	5
2	Attitudes toward sustainable environmental awareness	A-1, A-2, A-3, A-4, A-5	5
3	Behaviors regarding sustainable environmental awareness	B-1, B-2, B-3, A-4, A-5	5

After data collection, findings regarding students’ awareness of environmental sustainability were obtained. Based on the level of environmental sustainability awareness, the statements were categorized in Table 2.

**Table 2. Level of Environmental Sustainability Awareness**

<b>Percentage (%) &gt;</b>	<b>Category</b>
80	Excellent
60 - 79,9	Good
40 - 59,9	Fair

Percentage (%) >	Category
20 -39,9	Poor
<20	Very poor

The questionnaire uses a dichotomous scale (0–1). The highest score is 1 and the lowest is 0. The students were then grouped into three categories: (1) knowledge of sustainable environmental awareness, (2) attitudes toward sustainable environmental awareness, and (3) behavior in applying sustainable environmental awareness. Subsequently, the data were analyzed and described based on the score levels presented in Table 2.

## RESULTS AND DISCUSSION

The environmental sustainability awareness of students in Phase C at SD Inpres 13 in Sorong Regency was measured using 15 statements designed to assess students' perceptions across three aspects: knowledge, attitudes, and daily behaviors related to environmental sustainability. Table 3 shows the percentage and average score for students' sustainability awareness for each statement.

Table 3. Students' Responses Regarding Sustainable Environmental Awareness in Terms of Knowledge, Attitudes, and Behavior

No	Statement	Questions	Average Score	Percentage %	Category
1	K1	Emotional concern about global warming and climate change	0.8	80	Very good
2	K2	Concern about the impact of the greenhouse effect on living organisms and the environment	0.3	37	Poor
3	K3	Emotional response to environmental conservation behaviors	0.8	80	Very good
4	K4	Emotional sensitivity to pollution and rising greenhouse gas levels	0.6	60	Good
5	K5	Emotional concern regarding atmospheric damage and carbon emissions	0.7	77	Good
6	A1	Energy-saving habits and carbon emission reduction	0.9	91	Very good
7	A2	Support for eco-friendly actions	0.8	86	Very good
8	A3	Concern for waste reduction and energy conservation	0.6	63	Good
9	A4	Commitment to environmental protection through greening and energy conservation	0.8	89	Very good
10	A5	Awareness of daily behaviors that support sustainability	0.8	82.9	Very good
11	P1	Practices for waste reduction and energy conservation	0.7	77.1	Good
12	P2	Reuse of materials and environmental greening	0.7	74.3	Good
13	P3	Energy efficiency practices and greening	0.8	85.7	Very good
14	P4	Implementation of eco-friendly behavior in daily life	0.3	37	Poor

No	Statement	Questions	Average Score	Percentage %	Category
15	P5	Waste management practices and use of eco-friendly transportation	0.9	91.4	Very good

More specifically, the results of the analysis in Table 3 are presented in the form of a bar chart, as shown in Figure 3. The chart illustrates the percentage distribution of the analysis results regarding elementary school students' awareness of environmental sustainability across the dimensions of knowledge, attitudes, and behavior.

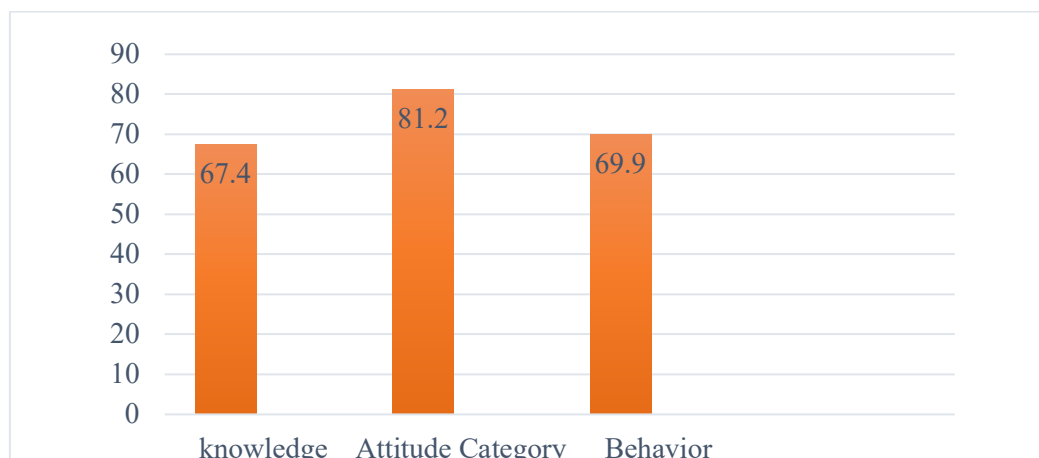


Fig.3. Diagram showing the percentage of environmental awareness among students in phase C at SD Inpres 13 in Sorong Regency

Figure 3 shows that the attitude dimension had the highest average score of 81.2%, which is categorized as “very good,” indicating that students demonstrate strong behavior related to sustainable environmental awareness. Statements such as “Energy-saving habits and carbon emission reduction” (91%) and “Commitment to protecting the environment through greening and energy conservation” (89%).

This shows that students have a positive attitude and a high level of concern toward environmental and sustainability issues. These findings suggest that the learning process and habit-forming activities at school have contributed to shaping students' affective awareness of the importance of protecting the environment in a sustainable manner. As explained in previous studies, integrating sustainability and environmental literacy into education requires engaging students (Boon, 2010; Gough, 2002; Hay & Eagle, 2020). However, it is necessary to analyze whether this understanding is translated into practical skills within the existing curriculum. The national curriculum in Indonesia includes environmental education components, but its implementation varies from school to school. Strengthening experiential learning aspects, such as integrating sustainability projects into Science and Civics classes, can help increase student engagement with environmental issues in daily life.

The student behavior dimension also showed an average score of 69.9%, which was categorized as “good,” with the highest score recorded for “Waste management practices and the use of eco-friendly transportation” (91.4%). This reflects that, in protecting the environment, students understand the importance of collective action (Collado & Corraliza, 2015; Qureshi, 2020) regarding the role of positive attitudes toward the environment. Approaches such as teachers serving as positive role models, student-led environmental campaigns, and green school programs can help bridge this gap by reinforcing the application of sustainability values in daily life.

The knowledge dimension scored low (67.4%), categorized as “good.” This indicates that there is a need to emphasize students' knowledge so that attitudes and behaviors related to sustainable environmental awareness can be consistently implemented. Statements such as “Concern about the impact of the greenhouse effect on living things and the environment” (37%) require knowledge

reinforcement for students. Research by Sahidullah (2022) states that direct experiences with the environment contribute to sustainability literacy.

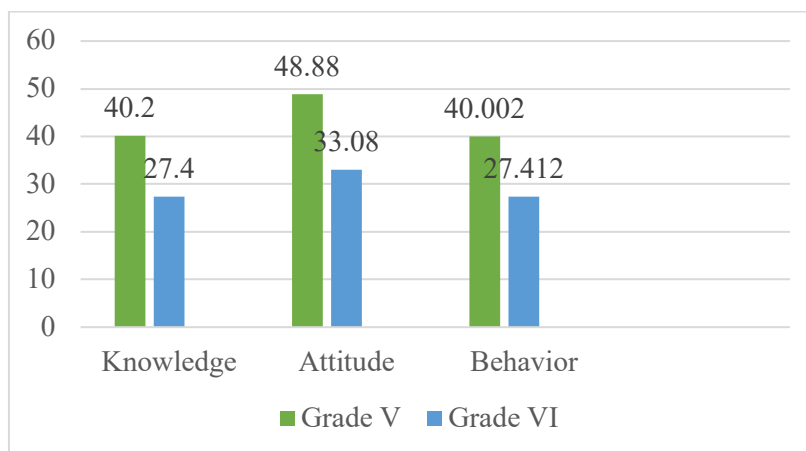


Fig.4. Diagram showing the percentage of environmental awareness among Phase C students in grades 5 and 6 at SD Inpres 13 in Sorong Regency

Based on Figure 4, among fifth- and sixth-grade students in Phase C, the attitude dimension for fifth-grade students in Phase C showed a high score (48.88%). This indicates that students in early Phase C are capable of demonstrating care for the environment by exhibiting behaviors such as “concern regarding the greenhouse effect’s impact on living organisms and the environment” (23%) and “the application of eco-friendly behaviors in daily life” (40%).

For sixth-grade students in the final Phase C, the knowledge dimension was categorized as low. This indicates that the final Phase C does not yet guarantee a strong foundation of knowledge regarding environmental sustainability awareness. There is a need to reinforce the concepts related to “Emotional response to environmental conservation behaviors” (34%) and “Emotional concern regarding global warming and climate change” (37%).

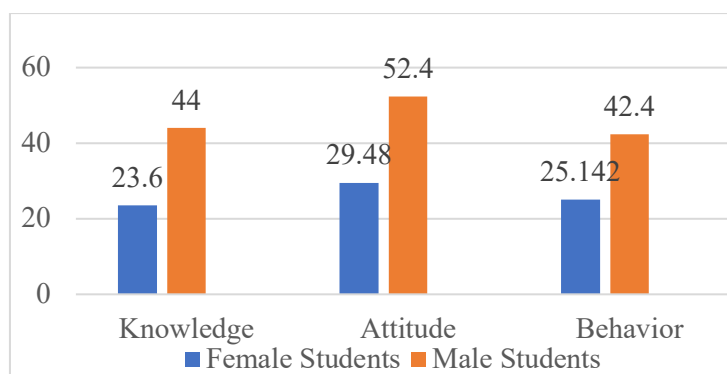


Fig.5. Diagram showing the percentage of environmental sustainability awareness among Phase C students by gender at SD Inpres 13, Sorong Regency.

Figure 5 illustrates the level of sustainable environmental awareness among Phase C students by gender. In terms of attitude, male students (52.4%) scored higher on the statement “Commitment to protecting the environment through greening and energy conservation” (54%). The lowest score was dominated by female students at 23.6%, indicating that female students require reinforcement in their knowledge regarding sustainable environmental awareness. Male students demonstrated a stronger understanding (44%).

These results indicate that male students have an advantage in conceptual understanding of sustainability principles. Consistent with the findings of Ratinen & Linnanen (2022), exposure to deeper knowledge can enhance environmental literacy among males. However, the application of this

knowledge in the form of tangible behavior still needs improvement. In general, more targeted interventions, such as community-based projects and the development of supporting infrastructure, are needed so that sustainability education can be realized in long-term, sustainable behavioral change.

## **CONCLUSION AND RECOMMENDATIONS**

This study shows that the level of environmental sustainability awareness among Phase C students at SD Inpres 13 in Sorong Regency is generally in the “good” category, with an average percentage of 72.39%. The attitude dimension received the highest score (81.2%), followed by the behavior dimension (69.9%) and the knowledge dimension (67.4%). These findings indicate that students already possess a positive concern for and commitment to the environment; however, their conceptual understanding of sustainability issues—such as climate change and the greenhouse effect—still needs to be strengthened to support more consistent environmentally friendly behavior.

The main contribution of this study is to provide an empirical overview of elementary school students’ profiles of environmental sustainability awareness based on the dimensions of knowledge, attitudes, and behavior within the context of Education for Sustainable Development (ESD). The results indicate that the development of environmental awareness among students depends not only on knowledge acquisition but also on the cultivation of values, attitudes, and real-world experiences that foster sustainable behavior. These findings reinforce the importance of integrating ESD principles and environmental literacy into elementary education to build sustainability competencies from an early age.

In practical terms, the findings of this study imply that schools need to develop more contextual, participatory, and experience-based learning to bridge the gap between students’ environmental knowledge and behavior. Strengthening green school programs, project-based learning, and incorporating local environmental issues can serve as effective strategies for holistically enhancing sustainable environmental awareness.

Future research is recommended to involve a broader sample and use a mixed-methods approach, such as observation and interviews, to gain a more comprehensive understanding of the development of sustainable environmental awareness among elementary school students.

## **CONFLICTS OF INTEREST**

The authors declare that there is no conflict of interest.

## **AUTHOR CONTRIBUTIONS STATEMENT**

Conceptualization, D.M. and F.A.H.; methodology, D.M., F.A.H., and S.S.; formal analysis, D.M. and F.A.H.; investigation, D.M., F.A.H., S.S., and S.P.R.; data curation, D.M. and S.S.; writing—original draft preparation, D.M.; writing—review and editing, F.A.H., S.S., and S.P.R.; visualization, D.M. and F.A.H.; supervision, S.P.R.; project administration, S.P.R.; All authors have read and agreed to the published version of the manuscript.

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helped ensure the successful completion of this article. It is hoped that the results of this research will contribute to the advancement of knowledge, particularly in the fields of education and the environment.

### DECLARATION OF GENERATIVE AI SOURCES

The author hereby declares that this article is an original work created independently based on the author's own research, analysis, and ideas. The entire writing process was conducted with reference to relevant scholarly sources, which have been cited in accordance with established academic standards. The author also declares that in the preparation of this article, no generative artificial intelligence (Generative AI) technology was used, including similar applications capable of automatically generating text, analysis, or scientific content. Therefore, all content, arguments, data interpretations, and conclusions contained in this article are entirely the result of the author's work and responsibility. This declaration is made in good faith as a commitment to integrity, honesty, and academic ethics in the writing of scientific works.

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