Jurnal Pijar MIPA
https://jurnalfkip.unram.ac.id/index.php/JPM

ISSN 1907-1744 (Print)
ISSN 2460-1500 (Online)

Analysis of Students Environmental Attitudes as a Contribution to the Sustainable Development Goals (SDGs)

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Received: May 10, 2025. Accepted: December 3, 2025. Published: December 9, 2025

Abstract: Environmental attitudes among university students play a crucial role in supporting the achievement of the Sustainable Development Goals through the development of responsible and sustainable behaviors. This study aims to analyze university students' environmental care attitudes in the context of the Sustainable Development Goals (SDGs). A descriptive quantitative approach was employed, involving 121 students from the Chemistry Education Program, Faculty of Teacher Training and Education, Universitas Mataram. Data were collected using a 5-point Likert scale questionnaire covering three primary dimensions of environmental attitude-cognitive, affective, and conative-along with a commitment dimension toward the SDGs. The results indicate that all dimensions fall within high to very high categories, with the highest averages observed in the cognitive (4.32), affective (4,18) and SDGs commitment (4.25) dimensions. The conative dimension scored slightly lower (3.89), suggesting the existence of an attitude–behaviour gap between awareness and actual practice. Students demonstrate strong environmental knowledge and moral commitment, but have not fully translated these into consistent, sustainable behaviors. These findings underscore the need for more contextually relevant and action-oriented learning strategies based on the SDGs, such as project-based learning and eco-campus programs, to translate environmental awareness into tangible actions. Overall, the study emphasizes the strategic role of higher education in cultivating knowledgeable, committed, and sustainable-minded youth aligned with SDG 12, SDG 13, and SDG 15.

Keywords: Chemistry Education Students; Environmental Attitude; SDGs.

Introduction

The environment is currently under increasing pressure due to unsustainable human activities, including the overexploitation of natural resources, excessive use of fossil fuels, and high levels of waste production. These activities have led to various environmental crises, including climate change, waste accumulation, and biodiversity loss. Therefore, education that instils environmental awareness and competence from an early age is essential [1], [2]. The educational process that aims to develop knowledge, skills, values, and attitudes necessary for sustainable development is known as Education for Sustainable Development (ESD) [3], [4]. The Sustainable Development Goals (SDGs), which build upon the Millennium Development Goals (MDGs), involve the collective participation of both developed and developing countries [5]. Addressing these challenges requires the active involvement of all sectors, including higher education institutions, in cultivating a young generation with strong environmental awareness and a sense of responsibility.

In a global context, the SDGs established by the United Nations (UN) provide a comprehensive framework for action across all sectors, including education. The SDGs comprise 17 goals, several of which are directly linked to education and environmental sustainability, namely SDG 4 (Quality Education), SDG 11 (Sustainable Cities and Communities), and SDG 13 (Climate Action). Higher education institutions play a pivotal role in achieving these goals, serving as agents of change and pioneers in implementing sustainable development practices [6]. Universities contribute to the promotion and realization of the SDGs through a range of initiatives, such as green chemistry programs, sustainable campus operations, research on sustainability issues, community engagement, and social responsibility activities. By taking an active role in these domains, universities can significantly enhance progress toward the overall SDG targets [7]-[9]. One essential contribution of universities is to foster environmental awareness and responsibility among students, shaping them into future leaders committed to sustainable living.

Students, particularly prospective teachers as agents of change, are expected to possess not only scientific knowledge but also attitudes and behaviors that reflect concern for environmental sustainability. One of the key indicators of higher education's success in advancing sustainable development is the cultivation of students' environmental awareness. Such awareness is manifested through students' understanding and knowledge of environmental issues. Environmental knowledge serves as the foundation for developing responsible attitudes and behaviors toward environmental preservation [10]. Moreover, learning experiences that integrate environmental values can effectively foster

How to Cite:
S. W. Al Idrus, R. Rahmawati, and A. Kadir, "Analysis of Students Environmental Attitudes as a Contribution to the Sustainable Development Goals (SDGs)", *J. Pijar.MIPA*, vol. 20, no. 7, pp. 1347–1353, Dec. 2025. https://doi.org/10.29303/jpm.v20i7.9015

motivation and awareness of the importance of caring for and protecting the natural environment [11].

Education aims not only to transmit knowledge but also to instil values and cultivate skills that support environmental sustainability [12], [13]. However, numerous studies in Indonesia have revealed that students' environmental awareness and attitudes remain at a moderate level. Although most students understand the importance of environmental protection, only a small proportion translate this understanding into daily practices such as proper waste management, energy conservation, and the use of environmentally friendly products. This indicates the need for a more systematic and continuous approach to developing environmental awareness among students [14]-[16]. Recent findings in higher education also emphasize the importance of enhancing environmental education through more applicable and reflective learning experiences [17].

Environmental concern refers to the degree of an individual's emotional involvement and commitment to addressing environmental issues [18], as well as their awareness and behavioral responses to environmental consequences [19]. Such concern has been found to significantly influence individuals' environmental attitudes [20]. Attitude, in this context, represents a psychological tendency that is not directly observable but can be inferred from consistent patterns of behavior. It reflects an individual's evaluative judgments and predispositions toward environmental protection and sustainability [21]. According to Sumarsono and Giyatno [22], an attitude of environmental concern refers to a tendency that develops within an individual and is formed through learning experiences, as individuals consistently respond to environmental conditions. This response may manifest as positive (favorable) or negative (unfavorable) reactions, which are influenced by three main components: (1) cognitive—an individual's perception and knowledge of environmental issues, (2) affective—the feelings or emotions evoked toward the environment, and (3) conative—the behavioral tendencies or intentions to act in response to environmental stimuli. These three components can serve as indicators of the effectiveness of environmental education in higher education. When students exhibit positive attitudes across all three domains, they demonstrate the potential to become agents of change who contribute actively to achieving a sustainable society.

This study aims to analyze the level of environmental awareness and commitment to sustainability among university students within the framework of the Sustainable Development Goals (SDGs). The findings are expected to serve as a reference for higher education institutions in designing learning strategies and campus initiatives that effectively support the achievement of sustainability goals. Theoretically, this research contributes to the advancement of Education for Sustainable Development (ESD) in Indonesia, particularly within the context of higher education. Practically, the results can be utilized by university administrators, lecturers, and students to evaluate the effectiveness of green campus initiatives and to foster a culture of sustainability within academic environments. Overall, this study not only measures students' environmental attitudes but also reflects on the strategic role of universities in shaping an ecologically conscious generation that actively contributes to the realization of the SDGs.

Research Methods

This study employs a descriptive quantitative approach to explain social phenomena using numerical data obtained through standardized measurement instruments. The research focuses on four key dimensions of environmental awareness: cognitive, affective, conative, and commitment to the SDGs and sustainability—each representing different aspects of students' knowledge, emotional responses, and behavioral tendencies toward environmental issues.

The study was conducted in the Chemistry Education Study Program, Faculty of Teacher Training and Education, University of Mataram, located in Mataram City, West Nusa Tenggara, Indonesia. The participants consisted of active students enrolled in semesters I through VII. A proportional random sampling technique was employed to ensure adequate representation from each semester level. A total of 127 students participated in the study, which is considered sufficient for descriptive quantitative analysis with a 95% confidence level [23].

The primary instrument used in this study was a 5-point Likert-scale environmental attitude questionnaire, developed and adapted from the Environmental Attitude Scale (EAS) and the New Ecological Paradigm (NEP) frameworks, and contextualized for Indonesian university students. The questionnaire consisted of 20 items encompassing four dimensions: cognitive, affective, conative (behavioral), and commitment to the SDGs and sustainability [24], [25].

Data were analyzed descriptively to calculate the mean, standard deviation, and percentage for each dimension of environmental attitude. The average scores were then classified into categories representing different levels of environmental awareness, as follows:

Table 1. Classification of Environmental Attitude Mean Scores

Range of Mean Scores	Category
4.21 – 5.00	Very High
3.41 – 4.20	High
2.61 – 3.40	Moderate
1.81 – 2.60	Low
1.00 – 1.80	Very Low

This classification system follows standard measurement interpretations commonly applied in environmental attitude research [26]. The descriptive approach enables researchers to understand not only the statistical distribution of environmental attitudes but also the qualitative implications behind students' cognitive, affective, and behavioral orientations.

Results and Discussion

The study's results describe the characteristics of respondents according to their current semester level. The

distribution of respondents across semester levels is presented in Table 2 below.

Table 2. Frequency of Research Respondents

Semester Level	Amount	%
I	41	28.85
III	12	5.77
V	15	14.42
VII	53	50.96

The table above shows that the majority of respondents were final-semester students (seventh semester) who must prepare to become teachers and agents of environmental stewardship. The research results were obtained through descriptive data analysis, which included calculating the average (mean), standard deviation, and attitude categories on a 1–5 Likert scale, as shown in Table 3.

Table 3. Mean Scores of Environmental Attitude Dimensions

Dimension	Mean	Standard Deviation	Category
Cognitive	4.32	0.41	Very High
Affective	4.10	0.46	High
Conative (Behavioral)	3.89	0.55	High
Commitment to SDGs and Sustainability	4.25	0.44	Very High
Overall Average	4.14	0.47	High

Table 3 presents the average scores of students' environmental awareness across three main dimensions—cognitive, affective, and conative, as well as their commitment to the SDGs. Overall, all dimensions fall within the high to very high categories, with the highest scores recorded in the cognitive dimension (M = 4.32) and commitment to the SDGs (M = 4.25). These findings suggest that students possess a strong understanding of environmental issues and a firm commitment to global sustainability values.

However, the conative dimension was found to be comparatively lower, indicating that while students demonstrate strong conceptual understanding and moral commitment to environmental preservation, their actual environmentally friendly behaviors in daily life remain suboptimal. This gap between awareness and action highlights the need for higher education institutions to reinforce sustainability-oriented learning and practical engagement. Universities have begun to integrate sustainable development principles into their curricula and campus activities, yet these efforts require further enhancement to strengthen students' behavioral involvement in sustainability [27]-[29].

The dimensional analysis reveals that the cognitive dimension of students' environmental awareness is generally classified as high, as illustrated by the percentage distribution shown in Figure 1.

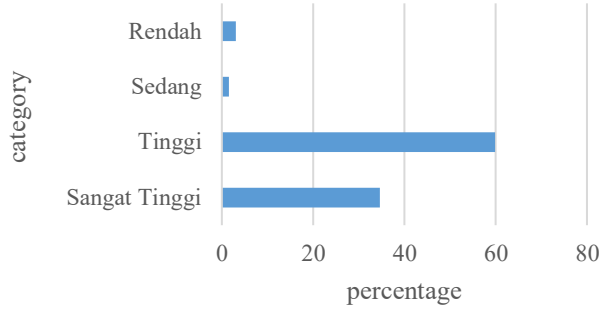

Figure 1. Percentage of Students' Cognitive Dimensions

Figure 1 illustrates that students' environmental awareness in the cognitive (knowledge) dimension predominantly falls within the high category (59.89%). This finding indicates that students possess a strong understanding of environmental issues and their consequences, such as the importance of maintaining cleanliness and recognizing the dangers of pollution. They are aware that environmental degradation is largely driven by human activities, and they acknowledge that certain daily behaviors may contribute negatively to environmental conditions [30]. A high level of environmental knowledge is expected to foster stronger affective awareness, reflected in emotional responses such as feelings of guilt when littering or broader concern about the impacts of global warming. The percentage distribution of students' environmental awareness in the affective dimension is presented in Figure 2.

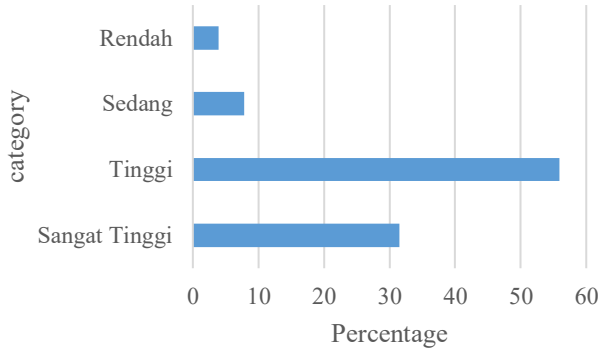

Figure 2. Percentage of Affective Dimension of Environmental Awareness

Figure 2 shows that students exhibit positive attitudes and emotional connections toward environmental preservation, such as feeling responsible for maintaining ecological balance and being aware of the importance of avoiding environmental damage. This emotional awareness contributes to the development of responsible environmental attitudes and behaviors. A positive relationship is observed between environmental knowledge and awareness—individuals with higher levels of understanding about environmental issues tend to display greater sensitivity to environmental concerns [31], [32]. Individuals who demonstrate environmental responsibility can be identified through their proactive actions, whether they are taken individually or collectively, in protecting and conserving the environment [33]. The results indicate that the majority of Chemistry

Education students demonstrate high to very high levels of environmental awareness, while only a small proportion fall into the low category. This finding reflects the influence of environmentally oriented learning practices and courses that have been integrated into the university curriculum. According to Gifford and Nilsson [34], both individual factors—such as childhood experiences, education, personality, sense of control, values, goals, cognitive biases, place attachment, age, and gender—and social factors, including urban–rural context, religion, norms, social class, culture, and ethnicity, can shape a person's environmental attitudes. These factors, either independently or in combination, contribute to variations in students' levels of environmental awareness.

The results of the conative dimension (behavior and concrete actions) show that knowledge and awareness of the environment are not always reflected in behavior toward the environment. Behavior is the process of taking concrete actions to protect and preserve the environment, such as the habit of disposing of waste properly, saving water and energy, and using reusable items. Some students have begun to take concrete actions to preserve the environment, but others still do not, as they are influenced by their lifestyle. An environmentally unfriendly lifestyle reflects a lack of awareness about waste management, water conservation, and sustainable practices [35]. The results of the conative dimension research are shown in Figure 3.

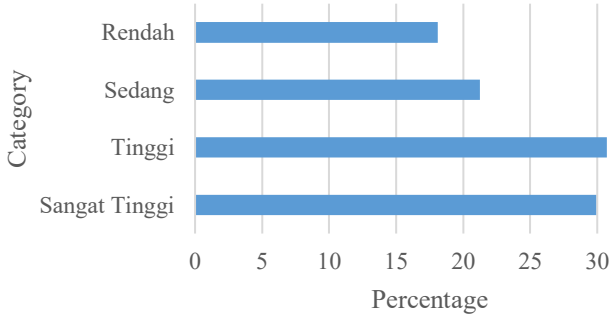

Figure 3. Percentage of Student Conative/Behavioral Dimensions

Figure 3 illustrates the results of the conative (behavioral) dimension of environmental awareness, indicating that while many students have begun to engage in environmentally responsible actions, a portion of them have yet to translate their awareness into consistent behavior. For instance, some students still prefer to purchase bottled beverages rather than carry reusable drinking bottles. Similarly, most students tend to use motorized vehicles for short distances instead of walking to campus. These findings suggest that a relatively high level of environmental knowledge has not yet fully transformed into sustainable behavioral practices. Therefore, efforts to strengthen students' environmental awareness—particularly within the conative dimension—remain essential. This finding aligns with previous studies emphasizing the gap between environmental knowledge and actual pro-environmental behavior [36-39].

The findings of this study indicate that students' environmental awareness is generally high, reflecting their knowledge, sensitivity, and conscious behavior toward environmental issues. This condition forms an important foundation for developing environmentally responsible attitudes and actions [40]. In this regard, education plays a vital role in fostering critical awareness, positive attitudes, and sustainable behavioral change. Higher education institutions should not only focus on transmitting knowledge but also emphasize the cultivation of values and the development of skills that promote sustainability [41]. Therefore, environmentally conscious knowledge, attitudes, and behaviors must be systematically embedded into higher education curricula to nurture future generations committed to sustainability [42].

Prospective teachers represent a strategic group that plays a pivotal role in achieving the SDGs. They are expected not only to possess a deep understanding of environmental issues but also to apply sustainable practices in both their personal and professional lives. Such practices may include the application of green chemistry principles, innovation of environmentally friendly technologies, and the formulation of sustainability-oriented policies [43]. Understanding students' commitment to the SDGs and sustainability is therefore essential, as it reflects their readiness to act as agents of change for sustainable education. The results of this study show that students demonstrate a high average level of commitment to the SDGs and sustainability, as illustrated in Figure 4.

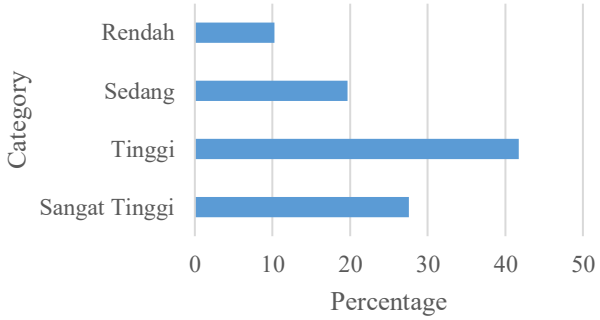

Figure 4. Percentage of Commitment to SDGs and Sustainability

Figure 4 illustrates that students' commitment to the SDGs is reflected in their level of awareness, with 27.56% classified as very high and 41.73% as high. These results suggest that students possess a relatively strong understanding and commitment to the SDGs, despite many of them having only a preliminary awareness of the concept. Previous studies have similarly reported that university students often recognize the term "SDGs" but lack a deeper understanding of its implementation [44]. This situation is understandable, as many respondents in the present study were first-semester students who had not yet been formally introduced to SDG-related content. In general, the broader an individual's knowledge and experience regarding the SDGs, the greater their potential to align personal commitments and actions with the principles of sustainable development [45], [46].

A comparative analysis between students' commitment to the SDGs and the conative (behavioral) dimension was conducted to examine the extent to which

value awareness aligns with the implementation of concrete actions in daily life. Within the framework of attitude theory, particularly Ajzen's Theory of Planned Behavior, attitudes do not always directly translate into observable behavior [47]. The results of this comparison provide a more comprehensive understanding of the quality and consistency of students' environmental attitudes. When the average score for commitment to the SDGs exceeds that of the conative dimension, it indicates the presence of an attitude–behavior gap—a discrepancy between awareness and action [48]. This suggests that although students have internalized sustainability values, they still require contextual experiences and behavioral reinforcement to consistently enact pro-environmental practices. Conversely, when both dimensions show relatively balanced scores, it may be inferred that environmental education at the higher education level has been effective in fostering alignment between conceptual understanding and practical implementation.

The comparative analysis of the commitment and conative dimensions not only reflects students' environmental attitudes but also serves as an indicator of the effectiveness of SDG-oriented educational strategies. These findings carry significant pedagogical implications for the development of action-oriented learning programs, such as project-based learning, eco-campus initiatives, and educational ecotourism activities, which are designed to help students transform sustainability values into tangible pro-environmental behaviors.

Conclusion

The analysis revealed that students demonstrated high levels of environmental knowledge, awareness, and commitment to the SDGs, while their conative (behavioral) attitudes were comparatively lower. This imbalance indicates that students' cognitive and affective understanding of sustainability has not yet been fully translated into consistent pro-environmental actions. The discrepancy between knowledge and practice reflects the well-documented attitude–behavior gap, which remains a major challenge in achieving Education for Sustainable Development (ESD). To address this issue, more applicable and context-based learning strategies are required to strengthen the linkage between students' knowledge, values, and real-world actions. The integration of the SDGs framework into classroom learning, community-based environmental projects, and eco-campus initiatives can serve as a strategic approach to foster genuine commitment accompanied by sustainable behavior. Furthermore, higher education institutions must play a greater role in cultivating a generation that not only understands sustainability principles but also possesses the skills, agency, and willingness to actively contribute to achieving the Sustainable Development Goals, particularly SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), and SDG 15 (Life on Land).

Author's Contribution

S. W. A. Idrus: conceptualized the study, conducted data collection and analysis, and drafted the manuscript. Rahmawati: contributed to data interpretation. A. Kadir: validated the findings and reviewed the final manuscript.

Acknowledgement

The authors would like to express their sincere gratitude to the University of Mataram for the academic support, research facilities, and institutional assistance provided during the conduct of this study.

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