Awareness of Environmental Issues among Preservice Teachers

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Abstract. Environmental awareness among preservice teachers is essential for fostering sustainability-oriented education in elementary schools. This study aims to describe the level of environmental awareness among preservice elementary teachers during their teaching practicum. A descriptive quantitative design was employed involving 87 seventh-semester students from the Elementary Teacher Education Department of Universitas Muhammadiyah Magelang. Data were collected using a structured questionnaire consisting of three dimensions: environmental knowledge, attitudes, and pro-environmental behavior. Descriptive statistical analysis revealed that participants demonstrated a moderate level of environmental awareness, with mean scores of 7.2 for knowledge, 7.6 for attitudes, and 7.4 for pro-environmental behavior. While students showed basic understanding and positive attitudes toward sustainability, gaps were identified between attitudes and actual behaviors, particularly in school-based environmental engagement. The findings suggest the need for stronger integration of practical environmental education within teacher preparation programs to enhance future teachers' capacity to promote sustainable practices in elementary education.

1 Introduction

Environmental sustainability has become a global educational priority, positioning teachers as key agents in cultivating environmentally responsible behaviors from an early age. Preservice elementary teachers, in particular, are expected to possess adequate environmental knowledge, positive ecological attitudes, and consistent pro-environmental behaviors, as these competencies directly influence classroom practices and students' environmental literacy [1].

Previous studies have explored environmental literacy in teacher education, focusing on knowledge, attitudes, and behavior as interconnected dimensions [2]. Research using instruments such as the New Ecological Paradigm (NEP) scale has demonstrated that although preservice teachers often express positive attitudes toward the environment,

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these attitudes do not consistently translate into sustainable behavior [3]. This attitude-behavior gap remains a persistent challenge in environmental education.

Despite growing attention to sustainability in teacher education, limited empirical evidence focuses on preservice teachers during their teaching practicum, a critical phase where theoretical understanding meets classroom practice [4,5]. Limited empirical evidence focuses on preservice teachers during their teaching practicum, a critical phase where theoretical understanding meets classroom practice (e.g., studies examining sustainability implementation during practicum have been limited, with notable exceptions showing contextual challenges and partial integration [6].

This study addresses this gap by examining the environmental awareness of preservice elementary teachers actively engaged in school-based teaching. The study aims to describe their levels of environmental knowledge, attitudes, and pro-environmental behavior, providing empirical insights to inform the development of more effective sustainability-oriented teacher education programs.

2 Method

This study employed a descriptive quantitative survey design. The participants were 87 seventh-semester preservice elementary teachers enrolled in the Elementary Teacher Education Department of Universitas Muhammadiyah Magelang during the 2025/2026 academic year. Purposive sampling was used, targeting students who were actively undertaking their teaching practicum in elementary schools.

Data were collected using a structured questionnaire adapted from established environmental literacy instruments, and ecological knowledge and behavior scales developed by [7]. The questionnaire comprised three sections: **Table 1** environmental knowledge (10 true false items), **Table 2** environmental attitudes (Likert-scale items ranging from 1 to 5), and **Table 3** pro-environmental behavior (Likert- scale items). The questionnaire employed a combination of multiple-choice knowledge items and Likert-scale statements to capture both cognitive and behavioral dimensions. It was distributed in November 2025 through Google Form.

Table 1. Environmental knowledge true false items

No	Statement
1	Deforestation can cause global climate change.
2	Recycling means reusing items for a new purpose.
3	Greenhouse gases have no effect on the Earth's temperature. (reverse)
4	Plastic takes a long time to decompose in nature.
5	Dumping waste into rivers does not affect aquatic life. (reverse)
6	Saving electricity helps reduce carbon emissions.
7	Planting trees has no impact on air quality. (reverse)
8	The greenhouse effect is partly caused by human activities.
9	Rainwater is always safe to drink without filtration. (reverse)
10	Using public transportation can help reduce air pollution.

Adapted from [2], this section assesses preservice teachers' understanding of fundamental environmental concepts, including climate change, resource management, and human impacts on natural systems. The items are presented in a true false format to

evaluate participants' factual knowledge and identify potential misconceptions related to key environmental issues.

Adapted from the Revised New Ecological Paradigm (NEP) Scale developed by [3], this section measures preservice teachers' ecological worldviews and their attitudes toward the relationship between humans and the natural environment. The items capture beliefs about environmental limits, human responsibility, and sustainability to indicate the extent to which participants endorse pro-environmental values.

Table 2. Environmental attitudes likert scale items

No	Statement
1	Humans should live in harmony with nature to maintain balance on Earth.
2	Nature is strong enough to handle the impacts of human activities. (reverse)
3	Environmental education should be taught starting from elementary school.
4	Environmental problems are too big for me to make a difference. (reverse)
5	We need to change our lifestyles to be more environmentally friendly.
6	Nature exists to be used as much as possible by humans. (reverse)
7	I feel responsible for protecting the environment at the school where I teach.
8	The natural balance is easily disrupted by human activities.
9	I am interested in participating in environmental conservation activities at school.
10	Environmental protection should be the responsibility of all school members.

Adapted from the instruments developed by [2,7,8], this section assesses the extent to which preservice teachers engage in and intend to engage in environmentally responsible actions. The items reflect both everyday sustainable practices and intentions to promote pro-environmental behaviors within educational and school-based contexts.

Table 3. Pro-environmental behavior likert scale items

No	Statement
1	I try to save electricity during my teaching practicum.
2	I bring my own water bottle to reduce plastic waste.
3	I encourage students to throw trash into the proper bins.
4	I involve students in small environmental projects (e.g., planting or recycling).
5	I use environmentally friendly learning materials whenever possible.
6	I avoid excessive paper use when teaching.
7	I talk with colleagues about the importance of protecting the school environment.
8	I participate in school clean-up or tree-planting activities.
9	I feel happy when students show environmentally friendly behaviors.
10	I intend to continue practicing environmentally friendly behaviors after graduation.

Data analysis was conducted using descriptive statistics, including mean, median, standard deviation, minimum, and maximum scores, to identify overall trends. Cross-tabulation and chi-square analysis were used to explore patterns across demographic variables related to the teaching practicum context.

3 Results and discussion

3.1 Results

The descriptive analysis provides an overview of participants' environmental awareness across knowledge, attitudes, and pro-environmental behaviors among 87 respondents.

Overall, the results indicate a moderate level of environmental knowledge accompanied by generally positive environmental attitudes and moderately enacted pro-environmental behaviors show in **Table 4**. These findings suggest that while participants demonstrate adequate cognitive understanding and favorable dispositions toward environmental issues, there remains room for strengthening the translation of awareness into consistent pro-environmental actions.

Table 4. Questionnaire results

Variable	Number of Items	Score Range	Mean Score	Category
Environmental Knowledge	10 (True/False)	0–10	7.2	Moderate
Environmental Attitudes	10 (Likert 1–5)	1–5*	7.6**	Moderate–Positive
Pro-Environmental Behaviors	10 (Likert 1–5)	1–5*	7.4**	Moderate

3.1.1 Environmental knowledge

The analysis of environmental knowledge scores indicates a moderate level of conceptual understanding among preservice teachers. Scores ranged from 2 to 10, demonstrating a wide dispersion of achievement levels across respondents. The mean knowledge score (M=7.2) suggests that, on average, participants demonstrated adequate mastery of fundamental environmental concepts, including climate change, deforestation, waste management, and greenhouse gas emissions. Most respondents obtained scores within the moderate-to-high range (6-9), indicating that basic environmental literacy has been established in the majority of the sample.

Despite this generally satisfactory performance, the distribution of scores reveals notable variability. Only a limited number of participants achieved the maximum score, while several respondents remained in the lower knowledge range (≤5). This spread in scores indicates inconsistencies in conceptual depth and accuracy across individuals. The presence of lower scores suggests persistent misconceptions or partial understanding of specific environmental issues, pointing to gaps in systematic knowledge acquisition. Overall, the findings demonstrate that while preservice teachers possess a foundational level of environmental knowledge, their understanding remains uneven, highlighting the need for more coherent and integrative environmental content within teacher education curricula.

3.1.2 Environmental attitude

Environmental attitudes were assessed using ten Likert-type items rated on a five-point scale (1 = strongly disagree to 5 = strongly agree), with individual item scores aggregated into a composite environmental attitude score. The descriptive analysis revealed a mean attitude score of 7.6, indicating that preservice teachers generally demonstrated a moderate to high level of pro-environmental attitudes. Across individual respondents, attitude scores ranged from lower-moderate to high categories, suggesting some degree of variability in how strongly students endorsed environmentally responsible values.

While a substantial proportion of participants fell into the moderate attitude category, a notable number achieved high attitude classifications, reflecting positive orientations toward environmental protection, sustainability, and ecological responsibility.

Further examination of item-level responses showed that higher scores were most consistently associated with statements emphasizing personal responsibility for environmental preservation, concern for environmental degradation, and support for environmentally friendly practices. Conversely, comparatively lower scores appeared on items requiring active commitment or sustained behavioral change, indicating a potential gap between attitudinal endorsement and readiness for long-term engagement. Overall, the distribution of scores suggests that although preservice teachers generally possess favorable environmental attitudes, these attitudes may not yet be fully internalized as strong, action-oriented dispositions. This pattern underscores the importance of structured pedagogical interventions within teacher education programs to reinforce not only environmental awareness but also the translation of positive attitudes into consistent professional and personal practices.

3.1.3 Pro-environmental behavior

The analysis of preservice teachers' pro-environmental behavior reveals a relatively strong tendency toward environmentally responsible actions. Based on the composite behavioral scores, the overall mean score was 7.4, indicating a moderate-to-high level of pro-environmental behavior among seventh-semester students. Most participants demonstrated consistent engagement in daily environmentally friendly practices, such as waste sorting, energy conservation, and reducing plastic use. Descriptive statistics further show that a substantial proportion of respondents fell into the High behavior category, while the remaining majority were classified as Moderate, with only a negligible number exhibiting low behavioral engagement. This distribution suggests that pro-environmental behavior is more firmly established than environmental knowledge among the participants, reflecting a pattern in which behavioral intentions and habits may develop even when conceptual understanding is not fully comprehensive.

A closer examination of individual behavioral indicators shows variability across specific dimensions of pro-environmental conduct. Items related to personal responsibility and habitual actions such as conserving electricity, minimizing waste, and supporting environmentally friendly products recorded higher mean scores, frequently exceeding 3.7 on a five-point Likert scale. In contrast, behaviors requiring collective action or active advocacy, including participation in environmental campaigns or influencing others' environmental behavior, tended to score lower, clustering around the moderate range. This discrepancy indicates that while preservice teachers are generally willing to adopt environmentally responsible behaviors at the individual level, their engagement in broader, community-oriented environmental actions remains limited.

3.2 Discussion

The results indicate that preservice elementary teachers possess a moderate level of environmental awareness across the dimensions of knowledge, attitudes, and pro-

environmental behaviors. This overall finding suggests that while participants have begun to develop ecological awareness, their competencies have not yet reached an optimal level required for future teachers who are expected to act as agents of change in promoting sustainability in elementary education [9]. Similar patterns have been reported in international studies [10], which consistently show that preservice teachers tend to demonstrate basic environmental literacy but lack depth in conceptual understanding and practical application. These findings align with international evidence indicating that, although preservice teachers often display environmental awareness and concern, they struggle to translate this understanding into concrete actions and community level advocacy. Moreover, variations in their grasp of environmental concepts particularly across social and cultural dimensions suggest that their literacy remains largely surface level, reinforcing the persistent gap between foundational knowledge and deeper, actionable competence.

In terms of environmental knowledge, the mean score of 7.2 indicates that students are generally familiar with fundamental environmental issues such as deforestation, waste management, climate change, and greenhouse gas emissions. However, the persistence of misconceptions highlights limitations in their scientific understanding. This finding supports earlier research suggesting that environmental topics in teacher education programs are often fragmented or treated as supplementary content rather than as an integrated pedagogical foundation [11]. Without solid conceptual knowledge, preservice teachers may struggle to design meaningful learning experiences that foster environmental literacy among young learners. Strengthening content knowledge through interdisciplinary approaches and problem-based learning has been recommended as an effective strategy to address this issue

The moderate level of environmental knowledge observed in this study aligns with research indicating that pre-service teachers often possess limited or incomplete understanding of scientific concepts related to environmental issues, including climate change and greenhouse gas emissions, leading to persistent misconceptions. Moreover, evaluations of initial teacher education programs have documented that environmental education content is frequently fragmented or offered as supplementary modules rather than a core integrated component of the curriculum, which may constrain deeper conceptual learning.

The attitude dimension yielded a mean score of 7.6, reflecting generally positive ecological worldviews consistent with the principles of the New Ecological Paradigm [3]. Most participants acknowledged the importance of living in harmony with nature and integrating environmental education at the elementary level. However, the belief held by some respondents that natural systems can recover without human intervention suggests an incomplete understanding of ecological vulnerability. Research indicates that such misconceptions may weaken personal responsibility and reduce motivation for environmental action [12]. This finding emphasizes that positive attitudes alone are insufficient unless they are grounded in accurate ecological knowledge and critical reflection on human–environment interactions.

Pro-environmental behavior also fell within the moderate category, with a mean score of 7.4. Participants reported engaging in everyday sustainable practices such as conserving electricity, reducing plastic use, and encouraging students to dispose of waste

properly. While these behaviors are encouraging, involvement in broader school-based environmental initiatives such as environmental campaigns, greening programs, or collaborative sustainability projects remained limited. This phenomenon reflects the well-documented attitude behavior gap in environmental psychology, where favorable attitudes do not consistently translate into action due to psychological, social, and institutional barriers [12–14].

To address this gap, teacher education programs must move beyond awareness-raising toward experiential and participatory learning models. Providing preservice teachers with opportunities to lead sustainability projects during their teaching practicum can enhance their sense of agency and professional identity as environmental role models. Such approaches are increasingly recognized as essential for preparing teachers to embed sustainability meaningfully within classroom practice and school culture [15]. Strengthening these competencies is crucial for ensuring that future elementary teachers are not only environmentally aware but also capable of fostering enduring environmental responsibility among their students.

4 Conclusion

The study shows that preservice elementary teachers have a moderate level of environmental awareness across knowledge, attitudes, and pro-environmental behaviors. Although they understand basic environmental issues, several misconceptions indicate gaps that need strengthening, and the common attitude and behavior gap remains evident. Their limited involvement in school-based environmental programs also suggests a need for more practical experiences. Overall, these findings highlight the importance of strengthening environmental education in teacher-preparation programs through deeper conceptual learning and hands-on sustainability activities. Future research should explore how different instructional methods, school contexts, and long-term interventions influence preservice teachers' environmental competencies, and include more diverse samples to better understand factors shaping their environmental responsibility.

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