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Comparison of Environmental Literacy Components Among Students and Faculty Members of Payame Noor University

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A B S T R A C T

Purpose: The purpose of the present study is to examine the status of environmental literacy components (environmental knowledge, environmental skills, environmental attitudes, and sensitivity to environmental issues) among faculty members and students at Payame Noor University.

Methods and Materials: This research is applied in terms of purpose, causal-comparative in nature, and conducted using a survey methodology. The statistical population includes all faculty members of the Department of Educational Sciences and e-learning students of Payame Noor University during the 2018–2019 academic year. A total of 372 students and 86 faculty members were selected through stratified random sampling. Following a review of the literature, a researcher-made environmental literacy questionnaire—whose validity and reliability were confirmed—was distributed among the sample.

Findings: Results of the independent t-test indicated a statistically significant difference between students and faculty in the components of environmental knowledge, environmental attitudes, and sensitivity to environmental issues. However, no significant difference was found between the two groups in terms of environmental skills. Additionally, the results of the Friedman test for ranking the components of environmental literacy showed that both groups—faculty and students—selected environmental knowledge as their top priority. Faculty members subsequently prioritized environmental attitudes and environmental behavior as their second and third choices, respectively. In contrast, students reversed these priorities. Furthermore, both groups ranked environmental sensitivity as the lowest priority.

Conclusion: Ultimately, it was recommended that, due to the importance of education in fostering environmental literacy, specialized environmental education courses emphasizing sensitivity to environmental issues be held for both students and faculty members.

Keywords: *Environmental knowledge, environmental skills, environmental attitudes, sensitivity to environmental issues, students, faculty, Payame Noor University.*

1. Introduction

The escalating environmental challenges confronting the modern world have underscored the vital importance of environmental education as a foundation for sustainable development. As societies grapple with issues such as biodiversity loss, air and water pollution, climate change, and the depletion of natural resources, the cultivation of environmental literacy—comprising knowledge, attitudes, skills, and sensitivity—has become an indispensable objective of educational systems globally. This imperative is particularly critical in the context of higher education institutions, where future decision-makers and professionals are formed. Numerous studies have emphasized that universities play a pivotal role in nurturing responsible environmental citizenship and fostering ecologically conscious behavior through formal curricula and informal educational experiences (Bezi et al., 2024; Salehi & Pazooki, 2013).

Environmental literacy is broadly conceptualized as a multidimensional construct encompassing factual knowledge about ecological systems, pro-environmental attitudes, practical environmental skills, and an ethical sensitivity toward environmental concerns. According to Pourmasoom et al. (2016), this literacy must be cultivated through integrated, multimedia approaches within curricula to effectively engage learners at cognitive, affective, and behavioral levels (Pourmasoom et al., 2016). In Iran, however, the incorporation of environmental education across different levels of schooling has faced several structural and systemic challenges. Research suggests that current efforts remain fragmented, lacking coherence, pedagogical innovation, and institutional commitment (Saeidi & Meiboudi, 2023; Shobeiri et al., 2013). As a result, environmental literacy levels among students and even educators vary considerably, reflecting inconsistencies in policy implementation and curricular design.

Globally, numerous models and frameworks have been proposed to embed environmental education across academic systems. The “Aker” approach, for example, offers a curriculum development model that emphasizes the interconnectivity between learners, content, and real-world applications, thereby promoting deeper engagement and contextual understanding (Bezi et al., 2024). Similarly, the use of system dynamics and simulation-based learning has been demonstrated to enhance conceptual clarity and learner motivation in environmental and energy-related subjects (Strapasson et al., 2022). International efforts, such as those reported in the studies by van de Wetering et al. (2022) and Jaime et al. (2023), reinforce that environmental education programs have measurable effects on both student behaviors and parental attitudes, particularly when interactive and experiential pedagogies are utilized (Jaime et al., 2023; van de Wetering et al., 2022).

In the Iranian context, the National Document on the Fundamental Transformation of Education explicitly acknowledges the necessity of integrating environmental education to foster sustainable values among youth. Samadi (2022) emphasizes that this policy initiative outlines the dimensions and components necessary for institutionalizing environmental awareness and behavior, though its practical realization remains inconsistent across educational settings (Samadi, 2022). Other scholars have noted that higher education institutions in Iran often approach environmental topics with limited depth and scope. Rahbari (2014) found significant disparities in environmental knowledge and skill acquisition among students at Islamic Azad University, attributing such variation to the absence of structured pedagogical strategies (Rahbari, 2014).

The diversity of environmental literacy levels is not limited to students. Faculty members, as influential actors in the academic environment, also demonstrate varying degrees of engagement with environmental education. Studies have highlighted that professors' personal environmental attitudes and their commitment to sustainability often shape the institutional climate and curricular priorities. For instance, Kose et al. (2011) examined undergraduate students' environmental attitudes and found that faculty behavior and values significantly influenced student engagement and perceptions (Kose et al., 2011). Likewise, Shivakumar and Vandevappa (2011) illustrated that school-level educators’ environmental attitudes are key predictors of student learning outcomes in this domain (Shivakumar & Vandevappa, 2011).

Given these dynamics, examining environmental literacy from a comparative standpoint—particularly between students and faculty—offers critical insights into the strengths and gaps within educational ecosystems. Research conducted by Paishani et al. (2017) compared environmental education practices in Iran with those of selected countries and recommended the adoption of international best practices tailored to local needs and cultural contexts (Paishani et al., 2017). Similarly, Moftooh et al. (2022), using a grounded theory approach, emphasized the necessity of context-specific environmental education models in Iran’s high school system, which are rooted in learners’ real-

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life environmental experiences (Moftooh et al., 2022). These findings suggest that for environmental education to be effective, it must move beyond theoretical discussions and instead foster active participation, reflective inquiry, and value-based learning.

This paradigm shift toward experiential and participatory education is also evidenced in ecotourism contexts. Cook (2024) and Ojeda (2022) reported that immersive experiences in natural environments significantly enhance participants' environmental awareness and ethical responsibility, demonstrating the powerful role of informal learning outside the traditional classroom (Cook, 2024; Ojeda, 2022). Shir-Mohammadi et al. (2024) further argue that branding and identity creation in ecotourism destinations can resonate with visitors and strengthen environmental learning outcomes through emotional and cultural connection (Shir-Mohammadi et al., 2024). These findings support the broader notion that environmental education must be holistic and cross-disciplinary, integrating both formal instruction and community-based experiences.

Despite the global momentum surrounding environmental literacy, Iran continues to face substantial barriers in the implementation and evaluation of such programs. Saeidi and Meiboudi (2023) identified a series of institutional and methodological challenges in evaluating green school initiatives in Iran, pointing to a need for more robust frameworks and performance indicators to assess program impact (Saeidi & Meiboudi, 2023). Obasi and Osah (2022) echoed similar concerns in the context of Nigeria, advocating for curriculum development strategies that foster environmental citizenship from early education stages (Obasi & Osah, 2022). These challenges underline the importance of continuous teacher training and faculty development, as advocated by Vatan Khah et al. (2023), who found that environmental education has a significant effect on shaping student attitudes and awareness (Vatan Khah et al., 2023).

Moreover, the role of institutional culture and leadership cannot be overstated. Jones (2023), in a study of Welsh schools, demonstrated that systemic transformation in environmental education is only possible through coherent planning, teacher collaboration, and leadership support rooted in a Theory of Change framework (Jones, 2023). This suggests that change at the curricular level must be supported by administrative vision and resource allocation to sustain long-term progress. Huang et al. (2023) also emphasize the value of embedding sustainability principles into ecotourism-based environmental education, which not only improves learner outcomes but also aligns with broader national sustainability goals (Huang et al., 2023).

In summary, the multifaceted nature of environmental literacy necessitates a coordinated and inclusive educational strategy that spans all levels of the academic system. While students represent the next generation of environmental stewards, faculty members are the catalysts who shape their learning environments, beliefs, and behaviors. As such, the present study seeks to compare environmental literacy components—namely, knowledge, attitudes, skills, and sensitivity—among students and faculty members at Payame Noor University. By identifying the areas of convergence and divergence, this research aims to inform targeted interventions and curricular improvements that will enhance environmental education in Iran's higher education sector.

2. Methods and Materials

This study is applied in terms of purpose, causal-comparative in nature, and conducted using a survey method. The statistical population consisted of all faculty members of the Department of Educational Sciences and e-learning students at Payame Noor University during the 2018–2019 academic year. A total of 372 students and 86 faculty members were selected through stratified random sampling. The research instrument was a researcher-made environmental literacy questionnaire comprising 24 items: 7 items related to the environmental knowledge component, 7 items related to environmental behavior, 5 items related to environmental attitudes, and 4 items addressing sensitivity to environmental issues. The questionnaire was designed using a Likert scale. The content validity of the instrument was confirmed by subject-matter experts, and its reliability was calculated using Cronbach's alpha, yielding a coefficient of 0.82, which indicates acceptable reliability of the questionnaire.

3. Findings and Results

Among the faculty members, 41 individuals (47.7%) were female and 45 individuals (52.3%) were male. In terms of age, 9 faculty members (10.4%) were under 35 years old, 69 (80%) were between 35 and 45 years old, and 8 (9.4%) were over 45 years old. Among the students, 180 individuals (48.4%) were female and 192 individuals (51.6%) were male. Regarding age distribution, 215 students (57.8%) were under 30 years old, 126 (33.9%) were between 30 and 35 years old, and 31 (8.3%) were over 35 years old.

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Table 1

Mean (M) and Standard Deviation (SD) of Environmental Knowledge Subcomponents among Faculty and Students

Subcomponents of Environmental Knowledge	Faculty M (SD)	Students M (SD)
The environment consists of living organisms around us	3.04 (1.04)	3.81 (0.96)
Our necessities are provided by the environment	3.06 (1.04)	3.92 (0.64)
Increasing pollution leads to a decline in biodiversity	3.71 (0.80)	3.96 (0.89)
Unrestrained construction is a main cause of environmental degradation	2.71 (0.92)	4.00 (1.08)
Suitable green spaces help reduce air and noise pollution	3.64 (0.64)	4.13 (0.80)
Population growth contributes to environmental degradation	3.49 (0.62)	3.16 (0.99)
Environmental degradation limits human activity	3.43 (0.93)	4.01 (0.91)

The findings in the above table show that among the subcomponents of environmental knowledge, faculty members gave the greatest importance to the statement "Increasing pollution leads to a decline in biodiversity" with a mean score of 3.71. In contrast, students prioritized the statement "Creating suitable green spaces can reduce air and noise pollution" with the highest mean score of 4.13. Additionally, the results revealed that the least prioritized item for faculty members was "The environment consists of living organisms around us," while for students, it was "Population growth contributes to environmental degradation."

Table 2

Independent Samples t-Test Comparing Environmental Knowledge Between Faculty and Students

Group	M (SD)	Levene's Test F	Sig.	t	df	Sig. (2-tailed)
Faculty	3.82 (4.30)	3.07	.074	-2.981	598	.003
Students	3.56 (5.04)					

The results of the mean comparison test indicate that at a significance level of less than 1% and with 99% confidence, there is a statistically significant difference in environmental knowledge between faculty members and students ($t = -2.981$, $p < 0.01$). Faculty members ($M = 3.82$) demonstrated higher levels of environmental knowledge compared to students ($M = 3.56$).

Table 3

Mean (M) and Standard Deviation (SD) of Environmental Behavior Subcomponents among Faculty and Students

Subcomponents of Environmental Behavior	Faculty M (SD)	Students M (SD)
Paying attention to reducing waste generation	3.91 (0.69)	2.96 (1.10)
Saving energy consumption	4.12 (0.71)	2.97 (1.10)
Saving water consumption	2.72 (0.83)	3.37 (0.84)
Using fewer environmentally harmful detergents	2.89 (0.90)	2.73 (0.89)
Using glass containers instead of plastic ones	3.76 (7.35)	2.72 (0.94)
Paying attention to recycling at the source	3.94 (0.69)	2.99 (1.09)
Using organic products	2.62 (0.84)	2.69 (0.74)

The findings in the above table reveal that among the subcomponents of environmental behavior, faculty members gave the highest importance to "Saving energy consumption" with a mean of 4.12, while students prioritized "Saving water consumption" with a mean of 3.37. The results also indicated that "Using organic products" received the lowest level of importance from both faculty members and students.

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Table 4

Independent Samples t-Test Comparing Environmental Behavior Between Faculty and Students

Group	M (SD)	Levene's Test F	Sig.	t	df	Sig. (2-tailed)
Faculty	3.79 (4.23)	8.14	.049	-0.715	598	.475
Students	3.78 (4.98)					

The results of the mean comparison test for environmental behavior between faculty and students showed that, at a significance level of less than 5% and with 95% confidence, there is no statistically significant difference between the two groups ($t = -0.715$, $p > 0.05$).

Table 5

Mean (M) and Standard Deviation (SD) of Environmental Attitudes Subcomponents

Subcomponents of Environmental Attitudes	Faculty M (SD)	Students M (SD)
Environmental balance is easily disturbed due to human negligence	3.74 (0.90)	3.17 (1.28)
Humans do not have the right to manipulate the natural environment for their needs	3.74 (0.90)	3.95 (0.98)
Human intervention in nature often results in catastrophic consequences	4.17 (7.37)	4.39 (1.26)
Humans must be in harmony with nature to survive	3.54 (0.86)	3.47 (1.00)
Earth's resources and space are limited	2.88 (0.52)	3.16 (1.11)

Both faculty ($M = 4.17$, $SD = 7.37$) and students ($M = 4.39$, $SD = 1.26$) gave the highest importance to the belief that "Human intervention in nature often results in catastrophic consequences." The belief that "Earth's resources and space are limited" received the least importance from both groups.

Table 6

Independent Samples t-Test Comparing Environmental Attitudes Between Faculty and Students

Group	M (SD)	Levene's Test F	Sig.	t	df	Sig. (2-tailed)
Faculty	3.09 (4.43)	0.096	.757	-2.811	598	.005
Students	3.78 (4.41)					

The independent samples t-test revealed a significant difference in environmental attitudes between faculty and students, $t(598) = -2.811$, $p = .005$. Students ($M = 3.78$, $SD = 4.41$) reported significantly stronger environmental attitudes than faculty ($M = 3.09$, $SD = 4.43$).

Table 7

Mean (M) and Standard Deviation (SD) of Sensitivity to Environmental Issues Subcomponents

Subcomponents of Sensitivity to Environmental Issues	Faculty M (SD)	Students M (SD)
Sensitivity to water pollution	3.41 (1.11)	3.44 (1.23)
Sensitivity to soil pollution	2.82 (1.13)	2.20 (0.87)
Sensitivity to air pollution	3.51 (0.69)	4.40 (0.76)
Sensitivity to noise pollution	3.38 (1.11)	3.16 (0.99)

Among the subcomponents of environmental sensitivity, both faculty ($M = 3.51$, $SD = 0.69$) and students ($M = 4.40$, $SD = 0.76$) rated "Sensitivity to air pollution" as the highest, whereas "Sensitivity to soil pollution" received the lowest importance (faculty: $M = 2.82$, $SD = 1.13$; students: $M = 2.20$, $SD = 0.87$).

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Table 8

Independent Samples t-Test Comparing Sensitivity to Environmental Issues Between Faculty and Students

Group	M (SD)	Levene's Test F	Sig.	t	df	Sig. (2-tailed)
Faculty	3.83 (4.17)	3.425	.065	-3.064	598	.002
Students	3.07 (4.70)					

The results indicate a significant difference in environmental sensitivity between faculty and students, $t(598) = -3.064$, $p = .002$. Faculty members (M = 3.83, SD = 4.17) reported higher sensitivity toward environmental issues compared to students (M = 3.07, SD = 4.70).

Table 9

Ranking of Environmental Literacy Components from the Perspective of Faculty

Component	Mean Rank
Environmental Knowledge	9.22
Environmental Attitudes	8.80
Environmental Behavior	8.57
Environmental Sensitivity	7.21

According to Friedman's test, faculty members ranked environmental knowledge as their top priority (M = 9.22), followed by environmental attitudes and behavior. Environmental sensitivity was ranked lowest.

Table 10

Friedman Test Results for Ranking Priorities (Faculty)

N	χ^2	df	p
86	701.204	9	.000

The Friedman test results were statistically significant ($\chi^2(9) = 701.204$, $p < .001$), indicating that the faculty's priority rankings are valid.

Table 11

Ranking of Environmental Literacy Components from the Perspective of Students

Component	Mean Rank
Environmental Knowledge	9.2
Environmental Behavior	9.0
Environmental Attitudes	7.5
Environmental Sensitivity	7.3

Students ranked environmental knowledge as their top priority (M = 9.2), followed by environmental behavior. Like the faculty group, they placed the lowest priority on environmental sensitivity.

Table 12

Friedman Test Results for Ranking Priorities (Students)

N	χ^2	df	p
372	3075.87	9	.000

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Friedman's test revealed a statistically significant difference in ranking ($\chi^2(9) = 3075.87$, $p < .001$), validating the students' priority order of environmental literacy components.

4. Discussion and Conclusion

The findings of the present study offer significant insight into the status of environmental literacy among faculty members and students at Payame Noor University. By examining and comparing the four main components of environmental literacy—knowledge, behavior, attitude, and sensitivity—the results reveal both areas of convergence and notable discrepancies that reflect broader trends in environmental education research. Specifically, the data indicated that while faculty members exhibited higher levels of environmental knowledge and sensitivity to environmental issues, students demonstrated more favorable environmental attitudes. No statistically significant difference was observed between the two groups in terms of environmental behavior, suggesting potential gaps between environmental cognition, emotion, and practice that warrant closer pedagogical and institutional attention.

The higher mean scores of environmental knowledge among faculty members are consistent with expectations, as their academic training and access to information sources typically exceed that of students. This aligns with the findings of Salehi and Pazooki (2013), who reported that environmental knowledge levels tend to increase with educational attainment, particularly in higher education environments where faculty are more directly engaged with content generation and policy discourse (Salehi & Pazooki, 2013). Similarly, Bezi et al. (2024) emphasized that well-designed curricular models, such as the Aker-based approach, can significantly improve conceptual understanding among educators (Bezi et al., 2024). Furthermore, this result resonates with the broader observation by Samadi (2022), who noted that environmental literacy frameworks embedded in national educational policies require faculty mediation to effectively translate abstract knowledge into classroom practice (Samadi, 2022).

In contrast, students scored higher on environmental attitude scales, indicating a potentially stronger emotional or value-based orientation toward environmental preservation. This phenomenon could reflect generational shifts in environmental values or the influence of global environmental movements that increasingly target youth demographics. The results are consistent with research by Jaime et al. (2023) and Marcela et al. (2023), who found that school-based environmental education programs had a pronounced effect on shaping pro-environmental attitudes among students and even their parents (Jaime et al., 2023; Marcela et al., 2023). Moreover, Kose et al. (2011) suggested that although students may possess less factual environmental knowledge than faculty, they often express higher levels of environmental concern, likely due to peer influence, media exposure, and identity development during the academic years (Kose et al., 2011).

Notably, no statistically significant difference was found between students and faculty members regarding environmental behavior. While both groups reported moderate engagement with eco-friendly actions—such as recycling, reducing plastic use, and conserving water and energy—the uniformity in scores may reflect broader societal or institutional constraints that limit the translation of knowledge and attitude into consistent behavioral practices. This aligns with findings from Moftooh et al. (2022), who argued that environmental behaviors among high school students in Iran are often influenced by contextual and infrastructural limitations that extend into higher education settings (Moftooh et al., 2022). Furthermore, van de Wetering et al. (2022) found through a meta-analysis that while environmental education programs often enhance knowledge and attitudes, their impact on behavior is comparatively weaker unless supported by sustained reinforcement and systemic change (van de Wetering et al., 2022).

The study also highlighted an interesting contrast in environmental sensitivity. Faculty members demonstrated higher levels of concern regarding issues such as air, water, and noise pollution, whereas students placed slightly lower emphasis on these concerns. This may suggest that professional exposure to academic or scientific literature, as well as heightened awareness of long-term environmental risks, influences faculty perceptions. Research by Shir-Mohammadi et al. (2024) on environmental messaging in ecotourism further supports the idea that direct and reflective exposure to environmental degradation enhances individuals' sensitivity toward environmental threats (Shir-Mohammadi et al., 2024). Similarly, Ojeda (2022) demonstrated that tourists with structured educational experiences in ecologically sensitive areas reported higher environmental sensitivity levels, particularly when learning was contextualized and immersive (Ojeda, 2022).

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Regarding the prioritization of environmental literacy components, both students and faculty ranked environmental knowledge as the top priority, followed by environmental attitudes and behaviors. Environmental sensitivity was consistently ranked lowest among both groups. This shared hierarchy reflects a general trend in Iranian educational institutions, where cognitive aspects of environmental literacy are more emphasized than affective or behavioral components. Pourmasoom et al. (2016) criticized this imbalance, arguing that environmental education in Iran remains overly focused on factual knowledge while neglecting the development of emotional engagement and action-oriented skills (Pourmasoom et al., 2016). Saeidi and Meiboudi (2023) also noted this discrepancy in the context of Iran's green schools, where evaluation systems tend to prioritize theoretical understanding over behavioral change (Saeidi & Meiboudi, 2023).

The consistency in low prioritization of environmental sensitivity is particularly noteworthy. Although sensitivity is an affective domain that can bridge the gap between awareness and action, it appears to be undervalued in both pedagogical frameworks and institutional cultures. Obasi and Osah (2022) emphasized the importance of developing emotional and ethical relationships with the environment from early educational stages to cultivate responsible environmental citizenship (Obasi & Osah, 2022). This view is supported by Cook (2024), who demonstrated that visitor experiences in ecotourism settings in New Zealand—where emotional engagement with nature was central—significantly increased participants' motivation to adopt sustainable behaviors (Cook, 2024).

Furthermore, the findings corroborate previous research on curriculum implementation challenges in Iranian universities. Shobeiri et al. (2013) pointed out that despite repeated mentions of environmental education in national development plans, there is a persistent lack of structured, cross-disciplinary programs capable of addressing the full spectrum of environmental literacy (Shobeiri et al., 2013). Jones (2023) also emphasized the importance of using a Theory of Change approach in curriculum reform to ensure alignment between educational goals, teaching practices, and student outcomes (Jones, 2023). The uniform prioritization patterns in this study thus may reflect an entrenched pedagogical tradition that favors theoretical instruction over experiential or transformative learning.

Finally, this study affirms the importance of contextually grounded models in environmental education. Paishani et al. (2017) recommended adapting international best practices to fit local educational and cultural realities in Iran, noting that successful models in other countries often rely on participatory teaching, place-based learning, and intergenerational engagement (Paishani et al., 2017). Huang et al. (2023) similarly advocated for the integration of environmental education into broader sustainability policies and regional development plans, highlighting ecotourism and community-based initiatives as vital components of this integration (Huang et al., 2023).

This study, while comprehensive in its comparison of environmental literacy components among students and faculty at Payame Noor University, is subject to certain limitations. First, the research relied exclusively on self-reported data collected via questionnaires, which may be influenced by social desirability bias or respondent misinterpretation. Second, the study was geographically limited to one university system, which may not fully represent the environmental literacy status of other institutions or regions in Iran. Third, while the study identified statistical differences between groups, it did not investigate the causal factors behind those differences, such as prior exposure to environmental programs, disciplinary background, or extracurricular engagement.

Future research could expand the scope of analysis by incorporating qualitative methods, such as interviews or focus groups, to gain deeper insights into the motivations, experiences, and barriers that shape environmental literacy among different academic populations. Longitudinal studies could also be designed to examine how environmental attitudes and behaviors evolve over time in response to specific interventions or institutional changes. Moreover, comparative studies across universities with and without structured environmental education programs would help assess the effectiveness of various curricular models and pedagogical strategies.

To improve environmental literacy outcomes in higher education, it is recommended that universities adopt a holistic approach to curriculum design that integrates knowledge, skills, attitudes, and sensitivity in a balanced manner. Faculty development programs should be established to train educators in experiential and interdisciplinary methods for teaching environmental topics. Additionally, universities should invest in infrastructure and campus-wide initiatives—such as recycling programs, sustainability clubs, and green certifications—that provide students and faculty with real-life opportunities to practice environmental responsibility. These efforts, when

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combined, can help close the gap between environmental understanding and sustainable action.

Authors' Contributions

Authors equally contributed to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

All procedures performed in studies involving human participants were under the ethical standards of the institutional and, or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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