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JPBI

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JPBI (Jurnal Pendidikan Biologi Indonesia) was established in 2015, published three times a year, on March, July, and November. Started by Volume 3, Number 3, November 2017, the journal was only published by using one language namely English. Based on input from the Arjuna team (Prof. Istadi), starting from Volume 6 Issue 3 November 2020, to improve the quality of publishing / management, we only published 10 articles. Starting from Volume 8 Issue 3 November 2022, we are launching **a new template** with the aim of improving quality and readability. The journal has been indexed in **ERIC**, **EBSCO**, **DOAJ**, **BASE**, **Garuda**, **Google Scholar**, **SINTA**, **ACI**, and others.

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2025-03-27

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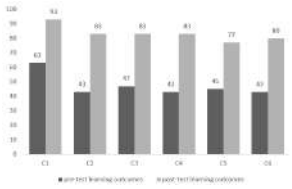

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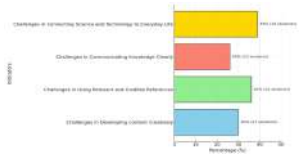

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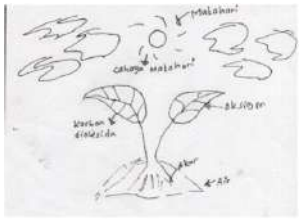

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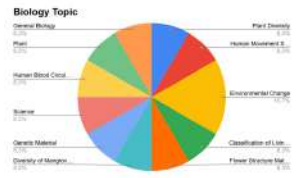

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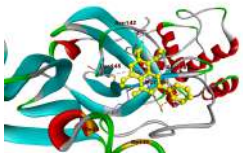

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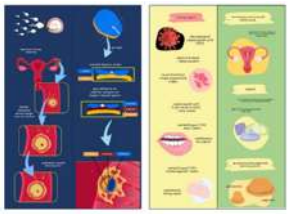

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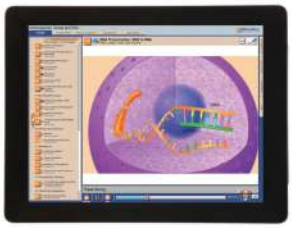

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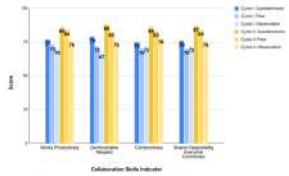

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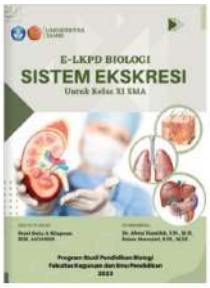

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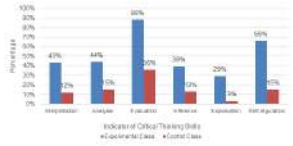

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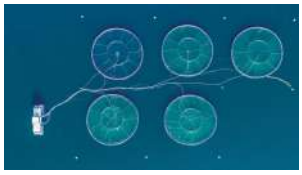

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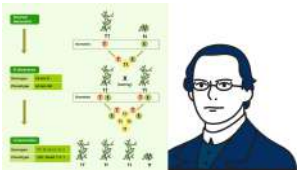

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Exploring the environmental awareness: Knowledge, attitudes, and behaviors in Indonesia's academic community

Hendra Michael Aquan
Department of Biology Education, Faculty of Teacher Training and Education, Sanata Dharma University, Indonesia

Luisa Diana Handoyo
Department of Biology Education, Faculty of Teacher Training and Education, Sanata Dharma University, Indonesia

Antonius Tri Priantoro
Department of Biology Education, Faculty of Teacher Training and Education, Sanata Dharma University, Indonesia

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Environmental Education and Literacy

Abstract

This study examines environmental awareness at a university in Indonesia, focusing on knowledge, attitudes, and behaviors in seven environmental areas: climate, water, food, energy, natural resources, biodiversity, and waste. A total of 442 respondents (380 students, 42 lecturers, 20 educational staff) were surveyed using a Likert scale questionnaire. The data obtained was then analyzed quantitatively using ANOVA. The mean scores for the knowledge dimension across the three respondent groups were: lecturers (4.60), educational staff (4.23), and students (4.32). The mean scores for the attitude category were: lecturers (4.44), while students and educational staff had the same mean score of 4.12. In the environmentally friendly behavior category, the mean scores were: lecturers (4.18), students (3.73), and educational staff (3.95). Statistical analysis results show that the lecturer group differs significantly compared to students and educational staff across all three dimensions. These findings indicate that lecturers consistently demonstrate higher environmental awareness in all categories. There

were no significant differences between student and educational staff groups. From these findings, there is a need to strengthen environmental awareness through knowledge, attitudes, and behaviors among student and educational staff groups. Strengthening awareness among students can be done through integration of environment-related courses and extracurricular activities, while for educational staff it can be done through regular training and workshops in environmental management.

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RESEARCH ARTICLE

Exploring the environmental awareness: Knowledge, attitudes, and behaviors in Indonesia's academic community

Hendra Michael Aquan[a,1], Luisa Diana Handoyo[a,2,*], Antonius Tri Priantoro[a,3]

[a] Department of Biology Education, Faculty of Teacher Training and Education, Sanata Dharma University, Jl. Paingan, Maguwoharjo, Sleman, Daerah Istimewa Yogyakarta 55281, Indonesia
[1] hendra.aquan@usd.ac.id; [2] luisadianahandoyo@usd.ac.id*; [3] trie003@usd.ac.id

Abstract: This study examines environmental awareness at a university in Indonesia, focusing on knowledge, attitudes, and behaviors in seven environmental areas: climate, water, food, energy, natural resources, biodiversity, and waste. A total of 442 respondents (380 students, 42 lecturers, 20 educational staff) were surveyed using a Likert scale questionnaire. The data obtained was then analyzed quantitatively using ANOVA. The mean scores for the knowledge dimension across the three respondent groups were: lecturers (4.60), educational staff (4.23), and students (4.32). The mean scores for the attitude category were: lecturers (4.44), while students and educational staff had the same mean score of 4.12. In the environmentally friendly behavior category, the mean scores were: lecturers (4.18), students (3.73), and educational staff (3.95). Statistical analysis results show that the lecturer group differs significantly compared to students and educational staff across all three dimensions. These findings indicate that lecturers consistently demonstrate higher environmental awareness in all categories. There were no significant differences between student and educational staff groups. From these findings, there is a need to strengthen environmental awareness through knowledge, attitudes, and behaviors among student and educational staff groups. Strengthening awareness among students can be done through integration of environment-related courses and extracurricular activities, while for educational staff it can be done through regular training and workshops in environmental management.

Keywords: environmental awareness; environmental sustainability; Indonesian higher education; knowledge-behavior gap; university sustainability

For correspondence:
luisadianahandoyo@usd.ac.id

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Introduction

Environmental sustainability faces serious challenges due to damage caused by human activities, such as climate change, water crises, and environmental pollution. Every individual plays a role in both environmental degradation and conservation through daily actions. The hope is that everyone can make positive contributions to environmental preservation to achieve common goals through the Sustainable Development Goals (SDGs) driven by international institutions like the UN (Concina & Frate, 2023).
These positive contributions are built in part through educational institutions. Specifically, universities as educational institutions play an important role in developing their academic community members to have insights related to SDGs, not only in theory but in practical and applicable domains (Concina & Frate, 2023; Žalėnienė & Pereira, 2021). In the educational context, universities have a strategic role in preparing young generations oriented toward environmental sustainability (Grau et al., 2021; Kapitulčinová et al., 2018). This potential development applies not only to students but also to the broader scope of a university's academic community, including lecturers and educational staff. These academic interactions are expected to develop the potential of academic community members to become active and responsible citizens in the future (Ruiz-Mallén & Heras, 2020). Moreover, the context of awareness building, academic community members are not only exposed to knowledge about environmental conservation but also develop positive attitudes toward sustainable development through learning activities (Corcoran & Wals, 2004).
As centers of knowledge and innovation, universities are not only tasked with educating students about environmental issues but also function as models in implementing sustainable practices (Dzimińska et al., 2020). This role becomes important in creating sustainable social and cultural changes both at local

and global levels (Findler et al., 2019). The concept of environmental awareness includes knowledge, attitudes, and behaviors related to environmental issues (Erwinsyah, 2022). Further research affirms that implementing environmentally friendly behaviors can have a major impact on reducing environmental damage impacts, such as in global climate change issues (Clayton et al., 2015). Several studies show that although environmental knowledge and attitudes among respondents are generally high, there is often a significant gap between awareness and environmentally friendly behavior (Dagiliūtė et al., 2018; Ramstetter & Habersack, 2020). This difference presents challenges for higher education institutions in efforts to promote environmentally friendly behavior.

The global community has witnessed a surge in platforms advocating for the transformation of higher education institutions into more sustainable entities, aligning with the United Nations' Sustainable Development Goals (SDGs) (Tabanao et al., 2025). Universitas Sanata Dharma (USD) has actively participated in this global movement by joining the UI GreenMetric initiative, a university ranking system focused on sustainability. USD's commitment to this transformation extends beyond mere declarations, as evident in its efforts to revamp campus governance with a focus on environmental sustainability. Concrete examples of these efforts include the provision of segregated waste facilities, water hydration systems, and energy-saving campaigns. These initiatives have been reinforced by the issuance of a Rector's Decree, which regulates the structured management of water, energy, and waste. This holistic approach not only reduces the campus's carbon footprint but also fosters an environmentally conscious academic ecosystem, serving as a role model for other educational institutions to integrate sustainability principles into their operations and organizational culture (Radar Malioboro, 2024).

Efforts to transform Universitas Sanata Dharma (USD) into a green campus necessitate collective support from the entire academic community, encompassing not only students but also faculty members and academic staff. The transformation of a university into an environmentally friendly institution requires more than the provision of facilities that support sustainable lifestyle initiatives; it also demands a paradigm shift in the motivations and actions of academic community members in their daily practices. However, in practice, modifying the behavior of academic community members to adopt environmentally friendly lifestyles is not always a seamless process. The campus waste management team has reported encountering uncooperative attitudes among students, as well as faculty and educational staff.

Assessing the level of environmental awareness among the USD's academic community is a crucial aspect that requires examination. This issue is particularly significant, as the cooperative attitude of the academic community will play a pivotal role in determining the success of USD's transformation into a sustainable university. Previous research on environmental awareness in higher education has primarily focused on students (Kapitulčinová et al., 2018; Mkumbachi et al., 2020; Quijano et al., 2023), with limited attention given to lecturers (Moganadas et al., 2020; Saleem et al., 2023) and educational staff (Barth & Rieckmann, 2012). Narrow studies focusing on specific groups seem to ignore the important role that university academic community members have in creating a culture of sustainability. This creates a gap in our understanding of the overall map of environmental awareness in higher education institutions (Sugiarto et al., 2022). Evaluating awareness levels among lecturers and educational staff is crucial for promoting sustainable practices, yet existing literature focuses more on students than lecturers or educational staff. Therefore, this research intends to map environmental awareness among academic community members, consisting of students, lecturers, and educational staff at a private university.

This research uses the Knowledge-Attitude-Behavior (KAB) framework to explore environmental awareness among academic community members. Previous research shows that knowledge, attitudes, and behavior are significantly related (Hamidah et al., 2017; Manalo & Manalo, 2023). By examining knowledge, attitudes, and behaviors related to various environmental issues, this research aims to bridge the gap in our understanding of environmental awareness in the Indonesian higher education context.

The objectives of this research are to (1) measure the level of environmental knowledge; (2) measure the level of environmental concern; (3) evaluate environmentally friendly behavior of academic community members; and (4) analyze relationships between dimensions of environmental awareness. Through these four objectives, this research will contribute to the growing literature on environmental awareness in higher education. Findings from this research are expected to provide valuable insights for policymakers, university officials, and educators in Indonesia with similar contexts, to help shape more effective strategies for promoting environmental sustainability issues and best practices among higher education academic community members.

Method

This research uses a mixed method approach. Data collection methods were conducted in two ways: using closed questions through online questionnaires and open questions through interview techniques. Quantitative data was obtained from online surveys using Google Form, while qualitative data was obtained through interviews to deepen survey results. This research was conducted from March to August 2024. The research population was 14,251 people, consisting of active students, lecturers, and educational staff at Universitas Sanata Dharma (USD), a private university in the Special Region of

Yogyakarta Province, Indonesia. Sampling used the Slovin formula with a 5% error rate, resulting in a sample size that should have involved 400 people. The number of respondents who participated was 458 people, and after validation, 442 valid data were used for further analysis. Respondent demographic data is presented in the following Table 1.

Table 1. Respondents of the research

Respondent	n	Male (%)	Female (%)	Age Range	Average
Students	380	139 (37)	241 (63)	18 – 25	21.5
Lecturers	42	30 (71)	12 (29)	29 – 55	41.2
Educational Staff	20	17 (85)	3 (15)	30 - 71	49.6

Based on the table above, total sample size (N) is 442. Demographic of each group of respondents as follow. In the student group 37% respondents are males, and 63% are females, with an age range of 18-25 years and an average age of 21.5 years. In the lecturer group, 71 % respondents are males and females are 29%, with an age range of 29-55 years and an average age of 41.2 years. Meanwhile, in the educational staff group, 85% respondents are males and 15 % are females, with an age range of 30-71 years and an average age of 49.6 years. Overall, the respondent profile reflects diversity in terms of gender, age, and length of affiliation with the university. This provides diverse representation from the academic community, which can provide broader perspectives regarding environmental awareness and behavior among respondents. The Likert scale data obtained was then followed by descriptive analysis. Likert score analysis uses the following criteria (Table 2).

Table 2. Assessment categories for Likert scale scores

Criteria	Score Range
Low	1 – 2.33
Medium	2.34 – 3.67
High	3.68 - 5

Data analysis used SPSS 25. For quantitative data analysis, ANOVA tests were used to determine whether there were significant differences between respondent groups (students, lecturers, and educational staff) in the dimensions of knowledge, attitudes, and environmentally friendly behavior. After ANOVA tests showed significant differences, they were followed by post-hoc Tukey HSD to specifically identify which groups had significant differences in each variable. This analysis allowed researchers to see detailed differences among respondent groups across the three dimensions of environmental awareness. These quantitative analysis results were combined with interview data to gain a more comprehensive understanding of environmental awareness among the academic community. Pearson correlation tests were used for inferential analysis to determine relationships between dimensions ('knowledge and behavior', 'knowledge and attitudes', and 'attitudes and behavior'). If the r-calculated value is greater than t-table or the significance value is less than 0.05, then there is a correlation between two variables. This correlation indicates that these variables influence each other.

Survey data collection used an instrument developed by researchers referring to the three dimensions of environmental awareness proposed by a study in China (He et al., 2011). Instrument validation results to ensure internal consistency of the instrument were conducted using reliability tests. The following Table 3 shows the reliability test results of the survey instrument.

Table 3. Internal consistency of the instrument

	Knowledge	Attitude	Behavior
Students	0.79	0.70	0.74
Lecturers	0.80	0.70	0.82
Educational Staff	0.79	0.71	0.88

A reliability test using Cronbach's Alpha was conducted to assess the internal consistency of the instrument. Cronbach's Alpha values above 0.7 indicate good reliability, where items in the scale correlate well with each other. The analysis results show that all dimensions—knowledge, awareness, and environmentally friendly behavior have values above 0.7. This indicates that the instrument is reliable and suitable for measuring environmental attitudes, knowledge, and behavior among the academic community with adequate consistency.

To ensure informed participation, a consent form was provided to respondents, outlining the research objectives and ensuring their willingness to participate. Respondents were also briefed on the study's requirements and the confidentiality of the collected data. A formal communication letter was submitted to obtain approval from higher authorities to administer the questionnaire. Upon approval, the researcher coordinated with the department's secretary to schedule the questionnaire administration, distributed the

questionnaires, and collected the completed responses. The gathered data underwent verification, scoring, and analysis using weighted mean calculations. Moreover, the interview data underwent thematic analysis to identify emerging patterns and themes.

Results and Discussion

Knowledge of environmental issues

The first dimension of environmental awareness is the level of respondents' environmental knowledge. The following Table 4 presents the knowledge levels of students, lecturers, and educational staff on seven main environmental issues: climate, water, food, energy, mineral resources, biodiversity, and waste management.

Table 4. Likert scale scores for environmental knowledge dimension

Respondent	A. Knowledge							Mean
	Climate	Water	Food	Energy	Mineral Resources	Bio diversity	Waste	
Students	4.20	4.61	4.40	3.80	3.93	4.65	4.66	4.32
Lecturers	4.64	4.82	4.71	4.07	4.36	4.79*	4.79	4.60*
Educational Staff	4.30	4.68	4.15	3.75	3.60	4.55	4.60	4.23

Values marked with (*) indicate a significant difference at the 0.05 significance level based on the Tukey HSD post-hoc test.

The data above shows differences in knowledge levels across seven environmental issues among the three respondent groups. The average scores of all three groups on the environmental knowledge dimension are categorized as high. Among the three respondent groups, the average score of lecturers differs significantly, while there is no difference between students and educational staff. The lecturers' knowledge score range is between 4.07 – 4.82. These scores fall within the high category. Compared to the other two respondent groups, lecturers consistently recorded the highest scores in almost all aspects, with the highest values in water issues (4.82) and biodiversity (4.79). The high scores in this knowledge dimension may be related to their access to broader scientific information and direct experience in teaching and conducting research in environmental fields (Lualhati, 2019). One lecturer respondent demonstrated a very good and deep understanding of climate change issues, and was able to connect consumption patterns with potential carbon footprints generated.

> "*In my opinion, the biggest issue is the carbon footprint ... from the consumption patterns of lecturers, educational staff, and students ... the total amount of greenhouse gases, especially CO_2 and CH_4, generated from our activities ... is still high.*" *(D6)*

Student respondent groups demonstrate a high level of understanding with score ranges between 3.80 (energy) and 4.66 (waste). Students show strong concern for biodiversity (4.65) and waste (4.66) issues. One student informant from East Kalimantan described the impact of palm oil cultivation on their environmental sustainability.

> *"Palm oil plantations damage the soil a lot. They quickly deplete nutrients... Roads get damaged, there's a lot of dust, and palm oil plantations are everywhere. It feels unsafe, and it also makes it hot." (M244)*

Students' high scores on biodiversity waste issues may reflect an emphasis on these topics in the environmental education curriculum organized by the university. The integration of environmental issues in formal education can be used to increase knowledge of environmental problems occurring in the surroundings (Feio et al., 2022). Among the seven environmental issues, students have relatively less concern about energy issues (3.80). Energy issues are among the issues that frequently intersect with daily life routines. However, the knowledge score on this issue is still low. This indicates the need for improvement in understanding sustainable energy efficiency to build awareness of this issue.

> *"I don't really care much about energy yet. But when it comes to water and waste, I do observe and notice that many people throw trash carelessly. And now, there's a lot of stagnant water, which means the water is not returning to the water cycle." (M17)*

Among the three respondent groups, educational staff have a relatively low mean score (4.23) across all environmental issues. Nevertheless, this score still falls within the high category. Among the seven environmental issues, educational staff have high concern for water issues (4.68). The following quote

from one respondent illustrates that they have a deep understanding of water issues, particularly on the importance of maintaining water quantity and quality.

> "*Of course, we should avoid wasting water... when using water, we shouldn't be wasteful. In terms of water cleanliness, we strive to prevent pollution". (T11)*

The lowest score in the educational staff group is for mineral resources (3.60). This score falls into the medium category. This data suggests that educational staff are not too concerned about mineral resource issues. The frequency of exposure to this issue may be lower compared to the other six issues. Based on the data above, this research finds that all three respondent groups have high levels of knowledge on water and waste issues, and they have special attention to these issues. However, respondents' knowledge of the other five environmental issues is also important to improve.

The knowledge dimension is one way to build environmental awareness among academic community members. Knowledge about environmental issues serves as an initial foundation for fostering pro-environmental attitudes and behaviors. Research shows that a strong understanding of environmental concepts significantly influences individual attitudes toward the environment, as seen in studies involving urban residents and students, where knowledge is associated with positive environmental attitudes and practices (Dopelt et al., 2024; Erwinsyah, 2022; Wang & Zhang, 2021).

Strong environmental knowledge contributes significantly to the formation of positive attitudes toward environmental issues, while environmental care values play an important role in motivating sustainable pro-environmental actions (Kukkonen et al., 2018). Furthermore, a research reveals that the combination of environmental knowledge and environmental care values has a synergistic effect in shaping. Individuals with high levels of environmental knowledge and strong care values tend to be more active in campus sustainability initiatives and are more likely to adopt environmentally friendly lifestyles in their daily lives.

Attitudes of academic community members toward environmental issues

This dimension measures the understanding of academic community members' attitudes toward environmental issues. Measuring the attitude dimension becomes an important component in efforts to build environmental awareness on campus. The measurement of respondents' attitudes toward environmental issues uses seven environmental issues as previously used in the knowledge dimension. The scores shown in Table 5 reflect the extent to which individuals are engaged and feel responsible for environmental sustainability. The following Table 5 presents survey results showing differences in perspectives among academic community members on seven main environmental issues. This data can then be used to map potential areas that need further improvement.

Table 5. Likert scale scores for environmental attitude dimension

Respondent	B. Attitude							Mean
	Climate	Water	Food	Energy	Mineral Resources	Bio diversity	Waste	
Students	4.01	4.31	3.98	4.04	4.22	3.85	4.39	4.12
Lecturers	4.43*	4.71*	4.26	4.31	4.60*	4.19*	4.55*	4.44*
Educational Staff	3.85	4.45	4.00	4.10	4.30	3.80	4.35	4.12

Values marked with (*) indicate a significant difference at the 0.05 significance level based on the Tukey HSD post-hoc test

The mean scores of respondent groups across seven environmental issues show that lecturers (4.44*) have significantly different attitudes toward environmental issues compared to the other two respondent groups. The student group (4.12) and educational staff (4.12) do not differ significantly. The score range for each environmental issue across the three respondent groups varies between 3.80 and 4.71. These scores fall within the high category.

Analysis shows that lecturers have the highest scores on most issues. This finding indicates that lecturers' level of concern for environmental issues is stronger compared to students and educational staff. The high attitude scores among lecturers are likely due to this group having high access to information from reliable and current sources. Researchers suspect that this high attitude dimension among lecturers is related to the knowledge dimension. Additionally, lecturers' view of their profession as needing to provide examples in daily practices is also a strong reason. The internalization of these professional values as lecturers makes their perspective in acting on environmental issues more profound.

> *"My profession is a lecturer... this means I need to set an example for my environment, including my students, by being a role model in daily life." (D6)*

The range of mean attitude scores among student groups across seven environmental issues varies from 3.85 (biodiversity) to 4.39 (waste). This range still falls within the high category. The data indicates that students have good environmental attitudes. Two environmental issues that scored high among student groups are water (4.31) and waste (4.39). Both issues are frequently encountered in daily life. This could also be due to their high level of knowledge about water and waste issues and the proximity of these issues to their daily routines. For the educational staff group, the attitude dimension scores range between (3.80) and (4.45). This range still falls within the high category. As in previous findings, water (4.45) and waste (4.35) issues remain important to educational staff.

Overall, water issues received the highest attitude assessment scores across all respondent groups, with lecturers recording the highest score (4.71), followed by educational staff (4.45), and students (4.31). This shows that all three respondent groups have high concern for water management. The attitude of all respondents regarding the importance of water resources is strongly embedded within the academic community.

The issue that received low attitude scores across all respondent groups is biodiversity. The low attitude scores on this issue are presumably because they don't directly interact with biodiversity issues. This differs from water and waste issues which are closely tied to daily routines. To improve attitude scores on biodiversity issues, enhancement through more intensive environmental education and campaigns among the academic community is needed. This research confirms findings from previous studies reporting that targeted environmental campaigns in universities can increase awareness levels across all academic groups (Lualhati, 2019; Mapotse & Mashiloane, 2017). Additionally, a study emphasize that student involvement in practical environmental projects is crucial in improving their understanding of less popular environmental issues (Manolis & Manoli, 2021).

Environmentally friendly behaviors dimension

The dimensions of environmentally friendly behavior among the academic community were measured through several aspects such as selection of energy-efficient equipment, water conservation actions, food waste reduction, as well as awareness of biodiversity conservation and waste management. The results of this analysis are detailed in Table 6, which shows the average scores of environmentally friendly behaviors for each group and significant differences between groups. This comparison provides insight into the extent to which environmentally friendly behavior has been implemented by various groups in the academic environment.

Table 6. Likert scale scores of behaviors

Respondent	Behavior										Mean
	Selection of Energy-Saving Appliances	Energy Conservation Actions	Water Conservation Actions	Food Waste Reduction Actions	Passive Energy Awareness	Awareness of Ethical Mineral Products	Concern for Biodiversity Conservation	Waste Reduction	Waste-Reuse	Waste-Recycle	
Students	3.52	4.58	4.28	4.42	3.25	3.04	3.32	3.47	3.99	3.28	3.73*
Lecturers	4.29*	4.76*	4.62*	4.79*	3.52	3.43*	3.67*	4.14*	4.33*	4.24*	4.18**
Educational Staff	4.20	4.55	4.45	4.60	3.50	3.05	3.45	3.80	3.95	3.95	3.95**

Values with (*) indicate significant differences at the 0.05 significance level based on Tukey HSD post-hoc test.

The analysis results generally show that the mean behavior dimension score of the lecturer group (4.18**) differs significantly from students (3.73*), but does not differ when compared to the educational staff group (3.95**). The overall behavior score range varies between 3.04 (awareness of ethical mineral products) and 4.79 (food waste reduction actions). When analyzed across each respondent group, lecturers consistently recorded the highest scores in various aspects of environmentally friendly behavior. For example, in the categories of energy-saving actions and food waste reduction, lecturers recorded the highest average scores (4.76 and 4.79 respectively), which were significantly higher than students (4.58 and 4.42). Significant differences were also found in water-saving action behavior, where lecturers recorded a score of 4.62 compared to 4.28 for students.

From the interviews, an informant with a strong commitment to environmentally friendly living was identified. The interview revealed that this informant often reminds students in their study program to care for the environment by taking small and easily implementable steps, such as conserving electricity and water.

> *"In broad terms, it's a bit difficult, so I start within my own department. Small actions, like not using something and then turning it off. Also, in the restroom, sometimes I turn off the water taps in the women's restroom. So far, I can only (remind students) myself." (D32)*

Meanwhile, education staff show relatively higher behavior compared to students in several aspects such as energy-saving actions (4.55) and water-saving actions (4.45), although not always statistically

significant. Regarding awareness of environmentally ethical products related to mining natural resources, lecturers also recorded higher scores (3.43) compared to students (3.04), showing a significant difference. In terms of waste management, all groups show fairly good awareness levels, with relatively high scores in the reuse and recycle waste categories. Lecturers again recorded the highest scores in both categories (4.33 and 4.24 respectively), indicating that they are more likely to implement recycling and waste reduction practices compared to students (3.99 and 3.38) and educational staff (3.95 and 3.95).

Overall, these results indicate that lecturers tend to have better and more consistent environmentally friendly behavior compared to students and educational staff, especially in terms of energy use and waste management. However, there is still room for improvement in several aspects, especially for students and educational staff, to achieve higher levels of environmentally friendly behavior.

These research findings align with previous studies showing that educators (lecturers) generally demonstrate higher levels of pro-environmental behavior compared to other groups in academic settings, largely due to their role in promoting sustainable lifestyles (Hansmann & Binder, 2020; Lapuz & Fulgencio, 2020). Additionally, the emphasis on integrating environmental education into the curriculum has proven to positively influence the implementation of environmentally friendly practices (Bergman, 2016). These findings further reinforce the need for targeted interventions to improve environmentally friendly behavior among students and educational staff.

Correlations between dimensions of environmental awareness

The Pearson correlation analysis results show significant positive relationships between all three dimensions of environmental awareness, see Table 7.

Table 7. Correlations between dimensions of environmental awareness

Correlation Between Dimensions	r	p	Strength of Relationship
Knowledge - Attitude	0.61	p < 0.01	Strong
Knowledge - Behavior	0.36	p < 0.01	Weak
Attitude - Behavior	0.53	p < 0.01	Moderate

N = 442. Interpretation of Pearson correlation coefficient values: 0.00-0.19 (very weak), 0.20-0.39 (weak), 0.40-0.59 (moderate), 0.60-0.79 (strong), 0.80-1.00 (very strong)

The strongest relationship was found between knowledge and environmental attitudes ($r = 0.61$, $p < 0.01$), followed by the relationship between attitudes and behavior ($r = 0.53$, $p < 0.01$). Meanwhile, the relationship between knowledge and behavior shows a weak correlation ($r = 0.36$, $p < 0.01$). These findings indicate that increased environmental knowledge strongly correlates with positive attitudes toward the environment, which in turn has a moderate relationship with environmentally friendly behavior. This analysis shows that increased environmental knowledge plays an important role in shaping positive attitudes toward the environment (Erwinsyah, 2022). This finding aligns with social learning theory which states that knowledge serves as a cognitive foundation that influences attitude formation (Kaiser & Lange, 2021).

The relationship between attitudes and behavior also shows a moderate correlation ($r = 0.53$, $p < 0.01$). This data confirms that positive attitudes toward the environment tend to be reflected in environmentally friendly behavior, although the relationship is not entirely linear. Interestingly, the relationship between knowledge and behavior shows a weak correlation ($r = 0.36$, $p < 0.01$). The weak relationship between these two dimensions suggests that increased environmental knowledge is not automatically followed by concrete actions (Dagiliūtė et al., 2018; Ramstetter & Habersack, 2020). This can be explained by the existence of a knowledge-behavior gap commonly found in environmental behavior studies (Janmaimool & Khajohnmanee, 2019; Kollmuss & Agyeman, 2002; Paço et al., 2019), where factors such as structural barriers, habits, and workplace busyness can influence the realization of environmentally friendly behavior, regardless of the level of knowledge possessed.

> *"My main challenge is not being able to manage my time well, because I'm busy at work and also busy at home... it's sometimes hard to adjust my time... even though this is important for the environment we live in. The main obstacle is within myself. Actually, I'm not lazy. My strong desire is still being overshadowed by other activities." (T11)*

The findings in this research confirm that there are still challenges in implementing environmentally friendly actions consistently on a daily basis. The variability in program effectiveness and institutional support indicates the need for appropriate strategies (Hamidah et al., 2017; Jusuf et al., 2020). Barriers such as resource allocation and resistance to change need to be anticipated through strategic and collaborative planning. Some researchers suggested that universities need to integrate theoretical and practical aspects in efforts to improve environmentally friendly behavior among the academic community,

particularly with policy support from university leadership (Lozano et al., 2015; Trencher et al., 2014).

Recommendations

Based on the research results, there are four main recommendations to increase environmental awareness and behavior among the academic community. First, strengthening environmental education programs with an experiential approach is crucial to bridge the gap between knowledge and action. This is supported by findings of a moderate correlation between knowledge and behavior (r = 0.36), indicating the need to strengthen the relationship between these two aspects. Learning should not only focus on theory but needs to involve direct practices such as plastic waste management demonstrations and programs for reusing used items.

Second, strengthening infrastructure and monitoring systems for environmentally friendly program implementation. Although basic facilities like sorted waste bins are available, consistent supervision is needed to ensure optimal utilization. Programs such as waste banks and reward systems for environmentally friendly behavior need to be considered to increase participation from the academic community.

Lastly, comprehensive socialization to build shared perception and commitment. The strong correlation between knowledge and attitudes (r = 0.61), and attitudes with behavior (r = 0.53) shows the importance of building comprehensive understanding to drive behavioral change. Campaigns and practical activities such as waste management and energy conservation need to be held regularly to provide opportunities for direct involvement in environmental action.

Conclusion

This research shows that the academic community has a high level of knowledge and positive attitudes towards environmental sustainability, particularly on water and waste management issues. Correlation analysis indicates a strong relationship between knowledge and attitudes (r = 0.61), and a moderate relationship between attitudes and behaviors (r = 0.53). However, the correlation between knowledge and behaviors remains weak (r = 0.36), indicating a gap in practical implementation. This is reflected in qualitative findings that show low participation of respondents in waste sorting. Increased awareness is still needed on issues such as energy and natural resources, especially among students and educators. To bridge this gap, a comprehensive approach is needed, including experiential learning, strengthening infrastructure and supervision, thorough socialization, and consistent support from higher education leadership in implementing environmentally friendly programs.

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Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Author Contributions

L. D. Handoyo: methodology, **H. M. Aquan**.: analysis; **H. M. Aquan** and **A. T. Priantoro**: writing original draft preparation, and **A. T. Priantoro**, and **L. D. Handoyo:** review and editing.

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