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Research Article

Indigenous Knowledge as a Predictor of Green Practices among College Students in a Philippine Local College

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Abstract. Indigenous knowledge systems provide culturally grounded approaches to environmental sustainability, yet their relationship with college students' green practices remains understudied in Cagayan de Oro City. This study determined students' levels of indigenous knowledge and green practices, examined the relationships between these variables, and identified which dimensions of indigenous knowledge significantly predicted green practices. A quantitative cross-sectional correlational-predictive design was used. A researcher-developed questionnaire, reviewed by experts and pilot-tested, was administered to 372 college students enrolled in a local government-run higher education institution during the first semester of Academic Year 2025–2026 through total enumeration. Data were analyzed using means, standard deviations, Pearson product-moment correlation, and multiple linear regression. Students reported high levels of indigenous knowledge (M = 3.67, SD = 0.52) and green practices (M = 3.96, SD = 0.71). Indigenous Governance and Knowledge Transfer had the strongest overall correlation with green practices (r = .81) and was the only significant unique predictor in the reported regression model (coefficient = .56, t = 4.04, $p < .001$). The full model's adjusted R^2 was .68. These findings indicate that indigenous knowledge, particularly communal governance and intergenerational knowledge transmission, is associated with environmentally responsible behavior. Sustainability education may be strengthened through respectful, community-engaged integration of indigenous governance, collective responsibility, and knowledge-transfer practices.

Keywords: *College students; Green practices; Indigenous governance; Indigenous knowledge; Sustainability education.*

Higher education institutions are increasingly expected to develop learners who can translate sustainability knowledge into everyday environmental action. Universities influence such action through curriculum, campus systems, institutional policies, and opportunities for participation. Recent evidence shows that sustainability-oriented instruction and institutional practices can strengthen students' environmental intentions and behaviors, although knowledge alone does not always produce consistent action (Biancardi et al., 2023; Null & Asirvatham, 2023; Ankareddy et al., 2025; Chen et al., 2025). This knowledge–action gap makes it important to examine other cultural and social resources that may support responsible environmental behavior among students.

Indigenous knowledge is one such resource. It encompasses cumulative knowledge, practices, values, and beliefs developed through long-term relationships among communities, other living beings, and their environments

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(Berkes, 2018). Rather than treating nature only as a resource, many indigenous knowledge systems emphasize reciprocity, collective responsibility, stewardship, and the interdependence of ecological and social well-being. These systems contribute to biodiversity protection and climate adaptation, but they are also threatened by displacement, globalization, cultural erosion, and weakened intergenerational transmission (Whyte, 2017; Petzold et al., 2020; Fernández-Llamazares et al., 2021). Indigenous and local knowledge also provides important foundations for understanding ecological relationships, supporting environmental stewardship and advancing sustainability.

The sustainability value of indigenous knowledge is not limited to technical ecological practices. Governance arrangements, oral traditions, community norms, and knowledge transfer shape how responsibilities toward land, water, health, and shared resources are understood and practiced. Sharifian et al. (2022), for example, demonstrated that traditional ecological knowledge remains dynamic and supports resilience under changing social and environmental conditions. In education, culturally grounded approaches can help learners connect environmental concepts with lived community experience. However, integration must be undertaken ethically by centering Indigenous voices, avoiding appropriation, and treating elders and knowledge holders as partners rather than as sources to be extracted (Kayira et al., 2022). Emerging educational work also shows that indigenous culture can be connected with contemporary learning tools while preserving ecological and cultural meaning (Tarng & Hsu, 2024).

Studies of university students generally associate environmental knowledge, attitudes, and institutional support with pro-environmental behavior. Torroba Díaz et al. (2023) found that environmental knowledge and related psychological factors contributed to students' environmental behavior, while Zhang et al. (2024) showed that green knowledge was linked to green consumption through environmental concern. Nevertheless, Null and Asirvatham (2023) reported that favorable environmental attitudes may coexist with limited sustainability knowledge or inconsistent action. These mixed findings suggest that sustainable behavior is shaped not only by what students know but also by the social meanings, norms, and systems through which knowledge is shared and enacted.

This issue is particularly relevant in Cagayan de Oro City and the wider Northern Mindanao context, where Indigenous communities, including Higaonon, Manobo, and Bukidnon groups, sustain cultural traditions and ecological knowledge while urban institutions develop environmental programs. Despite this context, limited empirical work has examined whether college students' indigenous knowledge is associated with their routine green practices in a local government-run higher education institution. Addressing this gap can contribute locally grounded evidence to the international discussion on culturally responsive sustainability education.

Accordingly, this study determined students' indigenous knowledge in terms of Culture and Heritage, Environmental Stewardship, Traditional Health Practices, and Governance and Knowledge Transfer; assessed their green practices in energy conservation, water conservation, air quality actions, waste management and reduction, and noise pollution awareness and conduct; examined the relationships between the indigenous knowledge dimensions and green practices; and identified which indigenous knowledge dimensions significantly predicted overall green practices. The findings are intended to guide sustainability education and institutional environmental programs that are culturally responsive, community-oriented, and respectful of indigenous knowledge holders.

Methodology

Research Design

The study employed a quantitative cross-sectional correlational-predictive design. The descriptive component established the levels of indigenous knowledge and green practices, the correlational component examined the direction and strength of their relationships, and the predictive component determined the unique contribution of each indigenous knowledge dimension to overall green practices. The design was appropriate because the study examined naturally occurring variables without manipulating conditions (Creswell & Creswell, 2018). Consequently, the findings indicate association and statistical prediction rather than causation.

Participants and Sampling Technique

The participants were 372 college students enrolled in a local government-run higher education institution in

Cagayan de Oro City during the first semester of Academic Year 2025–2026. Because the institution was relatively new and had a limited population, total enumeration was used to invite all eligible students in the defined study population (Lohr, 2021). Students who were officially enrolled, voluntarily agreed to participate, and submitted sufficiently complete responses were included in the analysis; incomplete questionnaires were excluded.

Research Instrument

Data were collected using a researcher-developed questionnaire with two major scales. The Indigenous Knowledge Scale measured four dimensions: Indigenous Culture and Heritage, Indigenous Environmental Stewardship, Traditional Health Practices, and Indigenous Governance and Knowledge Transfer. The Green Practices Scale measured energy conservation, water conservation, air quality actions, waste management and reduction, and noise pollution awareness and conduct. Items were rated using a five-point Likert scale. The instrument underwent expert review and pilot testing before administration. Cronbach's alpha coefficients indicated good internal consistency for the Indigenous Knowledge Scale ($\alpha = .85$) and the Green Practices Scale ($\alpha = .83$).

Data Gathering Procedure

Institutional permission was secured before data collection. The purpose of the study and the questionnaire instructions were explained to eligible students during the first semester of Academic Year 2025–2026. Students were given an opportunity to decide whether to participate, after which the questionnaire was administered. Completed responses were screened, coded, and consolidated for statistical analysis. No intervention was introduced because the study measured existing knowledge and practices.

Data Analysis Procedure

Means and standard deviations were used to describe indigenous knowledge and green practices. Pearson product-moment correlation was used to assess the relationships between each indigenous knowledge dimension and each green-practice area. Multiple linear regression was used to examine the unique predictive contribution of the four indigenous knowledge dimensions to overall green practices. Statistical significance was evaluated at $\alpha = .05$; exact p-values are reported to three decimal places, while values below .001 are reported as $p < .001$. Consistent with the JIP reporting guide, statistical estimates are rounded to two decimal places.

Ethical Considerations

Participation was voluntary, and informed consent was obtained before students answered the questionnaire. Respondents were informed that participation or nonparticipation would not affect their academic standing and that they could discontinue at any time. The analytical dataset did not include personally identifying information. Responses were treated confidentially, reported only in aggregate form, and used solely for the stated research purpose.

Results and Discussion

Students' Indigenous Knowledge

Table 1. *Mean Distribution of Students' Indigenous Knowledge*

Indigenous Knowledge Dimension	*M*	*SD*	Interpretation
Culture and Heritage	3.73	0.60	High
Environmental Stewardship	3.73	0.55	High
Traditional Health Practices	3.53	0.41	High
Governance and Knowledge Transfer	3.70	0.53	High
Overall	**3.67**	**0.52**	**High**

Note. *M* = mean; *SD* = standard deviation.

Table 1 shows that students had a high overall level of indigenous knowledge (M = 3.67, SD = 0.52). Indigenous Culture and Heritage and Indigenous Environmental Stewardship obtained the highest means (M = 3.73 for both), followed by Indigenous Governance and Knowledge Transfer (M = 3.70). Traditional Health Practices received the lowest mean but remained high (M = 3.53). These results suggest that students recognized indigenous culture, stewardship, health knowledge, and governance as meaningful parts of cultural identity and environmental responsibility. The high ratings are consistent with the view that indigenous knowledge is a living system of relationships and practices rather than a fixed collection of historical facts. Fernández-Llamazares et al. (2021)

emphasized that the continuity of indigenous and local knowledge depends on cultural practice, stewardship rights, and intergenerational transmission. The comparatively lower rating for Traditional Health Practices may reflect differences in students' direct exposure to community-based healing knowledge. It may also signal the selective weakening of knowledge domains under modernization. The result supports educational approaches that connect cultural heritage with contemporary sustainability while recognizing indigenous communities' authority over how their knowledge is represented.

Students' Green Practices

Table 2. *Mean Distribution of Students' Green Practices*

Green-Practice Area	*M*	*SD*	Interpretation
Energy Conservation	3.95	0.71	High
Water Conservation	3.89	0.71	High
Air Quality Actions	3.94	0.71	High
Waste Management and Reduction	3.99	0.70	High
Noise Pollution Awareness and Conduct	3.98	0.71	High
Overall	**3.96**	**0.71**	**High**

Note. *M* = mean; *SD* = standard deviation.

As shown in Table 2, students reported a high overall level of self-reported of green practices (M = 3.96, SD = 0.71). Waste Management and Reduction received the highest mean (M = 3.99), closely followed by Noise Pollution Awareness and Conduct (M = 3.98). Energy Conservation (M = 3.95), Air Quality Actions (M = 3.94), and Water Conservation (M = 3.89) were also high. The narrow range of means suggests that reported environmentally responsible behavior was not confined to one area but extended across resource conservation, pollution prevention, and responsible conduct. These findings align with studies showing that students frequently express environmental responsibility through accessible daily behaviors such as conserving resources, disposing of waste properly, and reducing avoidable consumption. At the same time, self-reported behavior should not be assumed to represent consistent practice in every setting. Null and Asirvatham (2023) identified a possible gap between students' environmental orientation and their actual sustainability knowledge and behavior. Institutional context therefore remains important. Biancardi et al. (2023) and Chen et al. (2025) showed that sustainability-oriented courses, campus initiatives, and support systems can help turn environmental intentions into practice. The present results suggest that the institution can build upon an already favorable behavioral foundation by expanding organized environmental programs and participation opportunities.

Relationship between Indigenous Knowledge and Green Practices

Table 3. *Correlations between Indigenous Knowledge Dimensions and Green-Practice Areas*

Indigenous Knowledge Dimension	Energy	Water	Air Quality	Waste	Noise	Overall
Culture and Heritage	.67	.63	.65	.69	.67	**.70**
Environmental Stewardship	.75	.71	.75	.75	.75	**.78**
Traditional Health Practices	.75	.71	.74	.72	.75	**.77**
Governance and Knowledge Transfer	.84	.74	.74	.76	.76	**.81**

Note. Entries are Pearson correlation coefficients (*r*). All correlations are significant at $p < .001$.

Table 3 presents the correlations between the four indigenous knowledge dimensions and the five green-practice areas. All 24 reported correlations were positive and statistically significant ($p < .001$), with coefficients ranging from r = .63 to r = .84. The strongest specific relationship was between Indigenous Governance and Knowledge Transfer and Energy Conservation (r = .84). Across the overall green-practice measure, Indigenous Governance and Knowledge Transfer again showed the strongest relationship (r = .81), followed by Indigenous Environmental Stewardship (r = .78), Traditional Health Practices (r = .77), and Indigenous Culture and Heritage (r = .70). The null hypothesis of no significant association was therefore rejected. The consistent positive pattern indicates that students who reported stronger indigenous knowledge also tended to report stronger environmental practices. This relationship was evident across practical behaviors involving energy, water, air quality, waste, and noise. The result supports the proposition that environmental action is connected not only with ecological information but also with cultural values and shared norms. Traditional ecological knowledge develops through observation, practice, collective memory, and adaptation to social-ecological change (Petzold et al., 2020; Sharifian et al., 2022). Such characteristics may make environmental responsibility more personally and socially meaningful than decontextualized information alone.

This association also aligns with contemporary research on green knowledge. Torroba Díaz et al. (2023) found that environmental knowledge contributes to university students' environmental behavior through interconnected cognitive and attitudinal processes. Zhang et al. (2024) similarly showed that green knowledge was associated with green behavior through environmental concern. The present study extends this discussion by demonstrating that culturally situated knowledge was related to several forms of everyday environmental conduct. Nevertheless, the cross-sectional correlations do not establish that indigenous knowledge caused green practices. The direction of influence may be reciprocal, and both variables may also reflect unmeasured influences such as family socialization, community participation, or institutional culture.

Indigenous Knowledge Dimensions as Predictors of Green Practices

Table 4. *Multiple Regression of Indigenous Knowledge Dimensions Predicting Green Practices*

Predictor	Coefficient	*t*	*p*
Culture and Heritage	.16	1.90	.060
Environmental Stewardship	.20	1.42	.160
Traditional Health Practices	.23	1.28	.200
Governance and Knowledge Transfer	.56	4.04	< .001

Note. Full-model adjusted R^2 = .68; reduced-model adjusted R^2 = .65. Coefficients are reproduced from the source analysis.

The multiple regression results in Table 4 indicate that Indigenous Governance and Knowledge Transfer was the only dimension that uniquely predicted overall green practices when all four dimensions were considered simultaneously (coefficient = .56, t = 4.04, p < .001). Indigenous Culture and Heritage approached but did not reach the .05 significance level (coefficient = .16, p = .060), whereas Indigenous Environmental Stewardship (coefficient = .20, p = .160) and Traditional Health Practices (coefficient = .23, p = .200) were not significant unique predictors. The full model accounted for 68% of the variance in overall green practices based on the reported adjusted R^2. A reduced model retaining Governance and Knowledge Transfer accounted for 65%.

The finding does not mean that culture, stewardship, and health knowledge are unimportant. Their strong zero-order correlations with green practices suggest meaningful associations, but their shared variance with Governance and Knowledge Transfer reduced their unique statistical contributions in the simultaneous model. Governance and knowledge transfer may function as the social mechanism through which environmental values are reinforced: community decision-making, respect for elders, intergenerational learning, documentation, oral transmission, and collective accountability can turn knowledge into norms for action. This interpretation is consistent with scholarship describing indigenous knowledge as embedded in relationships, governance, and responsibilities rather than located only in individual cognition (Whyte, 2017; Fernández-Llamazares et al., 2021).

For sustainability education, the results point toward community-engaged learning rather than simply inserting indigenous examples into existing lessons. Kayira et al. (2022) cautioned that educational integration should privilege indigenous voices and ethical co-learning. Tarng and Hsu (2024) showed that carefully designed educational tools can connect learning experiences to indigenous culture and environmental conservation. In the present setting, potential applications include dialogues with recognized knowledge holders, community-based environmental documentation, intergenerational storytelling, and collaborative stewardship projects. These approaches should be co-designed with indigenous communities, with clear consent and respect for culturally restricted knowledge.

Conclusion

This study contributes evidence that indigenous knowledge is closely associated with college students' green practices in a local government-run higher education institution. Its central contribution is identifying Indigenous Governance and Knowledge Transfer as the strongest correlate and the only unique predictor of overall green practices. The finding foregrounds the social character of sustainability: environmentally responsible behavior may be reinforced when knowledge is transmitted through collective responsibility, intergenerational learning, community norms, and shared stewardship. For educational practice, institutions may strengthen sustainability programs by developing respectful partnerships with indigenous communities and incorporating community-led learning, oral history, ecological stewardship, and collective decision-making into relevant courses and campus activities. Such initiatives should protect indigenous intellectual and cultural rights and avoid treating indigenous knowledge as material that can be separated from its holders.

At the policy level, institutional sustainability plans can recognize indigenous knowledge holders as partners in program design and evaluation, with clear procedures for consultation, participation, and accountability throughout the sustainability planning cycle. These may include mechanisms for prior informed consent, appropriate attribution, ethical knowledge sharing, and protection of indigenous intellectual and cultural rights. Policies may also require sustainability initiatives to reflect environmental priorities identified in consultation with indigenous communities and include indicators of cultural appropriateness, participation, and community responsiveness. This approach recognizes indigenous knowledge as a living knowledge system rather than merely an institutional resource, ensuring that its use in sustainability initiatives remains grounded in community ownership, cultural context, and shared responsibility.

The findings should be interpreted within the limits of a cross-sectional, self-report study conducted in one institution. They cannot establish causation or be generalized automatically to other institutions or Indigenous communities. Future research may use multi-institutional, longitudinal, or mixed-methods designs; include behavioral observations or institutional records; and engage indigenous elders and community representatives in interpreting how governance and knowledge-transfer practices shape environmental action. These steps can deepen understanding while ensuring that sustainability education remains culturally grounded, ethically responsible, and locally relevant.

Contributions of Authors

Author 1: conceptualization, proposal development, data gathering, data analysis, manuscript writing and revision, and response to reviewers
Author 2: data analysis, data gathering
Author 3: proposal writing, data gathering

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Conflict of Interests

The authors declare no conflict of interest in this research undertaking.

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