

## Environmental Literacy as a Catalyst for Enhancing Students' Sustainable Competence and Pro-Environmental Behavior

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### ABSTRACT

This research investigates how environmental literacy contributes to the development of students' sustainable competence and environmentally responsible behavior. A quantitative explanatory design was employed, involving 340 respondents who completed a Likert-scale questionnaire. The collected data were analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS). The findings indicate that environmental literacy exerts a positive and significant influence on sustainable competence ( $\beta = 0.81$ ;  $p < 0.05$ ) as well as environmentally friendly behavior ( $\beta = 0.32$ ;  $p < 0.05$ ). Furthermore, sustainable competence positively affects environmentally friendly behavior ( $\beta = 0.64$ ;  $p < 0.05$ ) and serves as a partial mediator in the relationship between environmental literacy and environmentally friendly behavior. These results suggest that enhancing environmental literacy can play a crucial role in fostering sustainability-related competencies and encouraging environmentally conscious behavior among students.

## **INTRODUCTION**

Environmental challenges, including climate change, environmental pollution, and the depletion of natural resources, have intensified worldwide over recent decades. Growing environmental pressures require greater responsibility toward environmental protection and sustainability. Improvements in human resource quality, particularly in knowledge, competence, and sustainability-oriented behavior, represent an important approach to addressing these challenges.

Environmental literacy represents a fundamental component in developing awareness and understanding of environmental issues. The concept encompasses environmental knowledge, attitudes, values, and practical skills related to environmental stewardship. Higher levels of environmental literacy are commonly associated with stronger environmental awareness and greater commitment to environmentally responsible actions.

Environmental literacy alone does not always produce meaningful behavioral change. A discrepancy frequently exists between environmental understanding and actual environmental practices. Individuals may possess substantial environmental knowledge while demonstrating limited environmentally responsible behavior. Such conditions indicate the presence of additional factors influencing the translation of knowledge into action. Sustainable competence constitutes one of the most important factors in this process. The concept refers to an individual's capacity to integrate knowledge, skills, and attitudes when making sustainability-oriented decisions. Systems thinking, decision-making abilities, and problem-solving skills related to complex environmental issues form essential elements of sustainable competence. Practical environmental action becomes more attainable when these competencies are developed.

Environmentally friendly behavior reflects the practical application of environmental literacy and sustainable competence. Waste reduction, responsible resource utilization, energy conservation, and participation in environmental protection activities represent examples of such behavior. The extent of environmentally friendly behavior provides an indication of how effectively environmental awareness and sustainability competencies are translated into daily practice.

Previous empirical studies have identified significant relationships among environmental literacy, sustainable competence, and environmentally friendly behavior. Environmental literacy contributes to the development of sustainable competence. Sustainable competence contributes to the formation of environmentally responsible behavior. A mediating role of sustainable competence has also been identified in the relationship between environmental literacy and environmentally friendly behavior. Greater understanding of these relationships provides valuable insight into the mechanisms underlying environmental behavior formation.

This study analyzes the influence of environmental literacy on sustainable competence and environmentally friendly behavior. The mediating role of sustainable competence is also examined. Findings are expected to contribute to

theoretical discussions regarding sustainability education and provide practical guidance for strengthening environmentally responsible behavior through educational initiatives and competency development programs.

## **LITERATURE REVIEW**

### ***Environmental Literacy***

Environmental literacy refers to an individual's capacity to understand environmental issues through the integration of knowledge, attitudes, skills, and participation in environmental conservation efforts. The concept establishes a foundation for developing environmental responsibility and ecological awareness. Yildirim et al. (2025) reported a significant relationship between environmental literacy and environmentally responsible behavior. Individuals with higher environmental literacy tend to demonstrate stronger awareness regarding the environmental consequences of human activities. Husamah et al. (2024) identified environmental literacy as a factor contributing to the development of pro-environmental attitudes and behaviors through improved ecological understanding. Ariyatun et al. (2024) recognized environmental literacy as a growing area of research within the context of sustainable development. Harmoko et al. (2024) emphasized the importance of conservation literacy in strengthening ecological awareness. Hasibuan et al. (2025) highlighted the contribution of critical and creative thinking abilities to the enhancement of environmental literacy, particularly in digital learning environments. Environmental literacy encompasses more than environmental knowledge, incorporating analytical, evaluative, and reflective capacities required for addressing environmental challenges.

### ***Sustainable Competence***

Sustainable competence represents an individual's ability to understand, assess, and formulate decisions that support environmental, social, and economic sustainability. Systems thinking, anticipatory thinking, strategic competence, and problem-solving abilities form essential components of this concept. Wiek et al. (2021) identified five fundamental sustainability competencies consisting of systems thinking, anticipatory competence, normative competence, strategic competence, and interpersonal competence. These competencies provide an important framework for sustainability-oriented education and human resource development. Brundiers et al. (2021) demonstrated that experiential learning significantly enhances sustainability competencies among learners. Lozano et al. (2022) highlighted the role of higher education institutions in fostering sustainability competencies through integrated curricular approaches. Redman et al. (2021) confirmed that sustainability competencies can be empirically measured and are closely associated with the ability to address complex sustainability-related problems. Biberhofer et al. (2020) emphasized the relevance of sustainability competencies in organizational settings to facilitate sustainable transformation initiatives. Sustainable competence enables individuals to convert sustainability knowledge into effective actions and practical solutions.

### ***Pro-Environmental Behavior***

Pro-environmental behavior refers to actions performed by individuals with the intention of reducing negative environmental impacts. Such behavior reflects the practical application of environmental awareness, attitudes, and knowledge. Nguyen et al. (2022) found that environmental attitudes significantly influence pro-environmental behavior. Wang et al. (2023) identified environmental awareness as a key determinant of environmentally responsible actions. Steg and Vlek (2021) explained that environmental behavior is shaped by psychological, social, and situational influences. Gifford et al. (2020) emphasized the importance of personal values and beliefs in encouraging environmentally responsible conduct. Li et al. (2022) reported that green human resource management practices positively affect employees' environmental behavior. Osei et al. (2024) demonstrated that knowledge related to climate change contributes significantly to pro-environmental actions. Pro-environmental behavior emerges from the interaction of knowledge, competencies, attitudes, and contextual influences operating within individuals and society.

### ***Relationship Between Variables***

Previous studies have established significant associations among environmental literacy, sustainable competence, and pro-environmental behavior. Environmental literacy contributes to the development of competencies required for sustainability-oriented decision making and action. Sustainable competence strengthens an individual's ability to translate environmental knowledge into practical environmental behavior. Findings reported by Yildirim et al. (2025) indicated that environmental literacy affects behavior through both direct and indirect pathways involving competence development. Sustainable competence functions as a mediating mechanism connecting environmental literacy with environmentally friendly behavior. Higher levels of environmental literacy accompanied by stronger sustainability competencies increase the likelihood of consistent environmental actions and long-term behavioral commitment toward sustainability.

## **METHODOLOGY**

This study employed a quantitative approach using an explanatory research design to examine the causal relationships among environmental literacy, sustainable competence, and environmentally friendly behavior among students. The quantitative approach was selected because it enables the empirical testing of hypotheses through statistical procedures based on numerical data. The research focused on identifying and measuring the influence among variables rather than merely describing observed phenomena.

A causal research model was developed to investigate the relationship between environmental literacy, sustainable competence, and environmentally friendly behavior. Environmental literacy was positioned as the independent variable, sustainable competence as the mediating variable, and environmentally friendly behavior as the dependent variable. Direct and indirect effects were evaluated to obtain a comprehensive understanding of the role of sustainable competence in the proposed model.

Three principal variables were examined in this study: environmental literacy, sustainable competence, and environmentally friendly behavior. Environmental literacy was assessed through indicators related to environmental knowledge, attitudes, skills, and environmental behavior. Sustainable competence was measured using indicators associated with systems thinking, problem-solving ability, decision-making capability, collaboration skills, and action competence. Environmentally friendly behavior was evaluated through indicators reflecting waste management practices, energy conservation, environmental awareness, and participation in environmental activities.

The study population consisted of students at STIP. Probability sampling techniques, including simple random sampling and stratified random sampling, were employed to ensure adequate representation of the population. A total of 340 respondents participated in the study. Data were collected using a structured questionnaire developed from the indicators of each variable. Responses were measured using a five-point Likert scale ranging from strongly disagree to strongly agree.

Data analysis was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM) with the support of SmartPLS software. The analysis process included the evaluation of the measurement model to assess the validity and reliability of the research instrument and the evaluation of the structural model to examine relationships among variables. Hypothesis testing was performed using the bootstrapping procedure. Statistical significance was determined based on a t-statistic value greater than 1.96 and a p-value below 0.05. Mediation analysis was also conducted to evaluate the role of sustainable competence in linking environmental literacy with environmentally friendly behavior.

## **RESEARCH RESULT AND DISCUSSION**

A total of 340 students participated in this study. Descriptive analysis revealed that environmental literacy obtained a mean score of 4.18, sustainable competence recorded a mean score of 4.12, and environmentally friendly behavior achieved a mean score of 4.20. These results indicate that respondents generally demonstrated high levels of environmental understanding, sustainability competence, and environmentally responsible behavior.

Evaluation of the measurement model showed that all indicators achieved outer loading values ranging from 0.72 to 0.89, confirming satisfactory validity. Reliability assessment produced Cronbach's Alpha values of 0.88 for environmental literacy, 0.90 for sustainable competence, and 0.87 for environmentally friendly behavior. Composite Reliability values of 0.91, 0.92, and 0.90 further confirmed the consistency of the measurement instrument.

Structural model assessment revealed an R-square value of 0.66 for sustainable competence, indicating that environmental literacy accounted for 66% of the variance in sustainable competence. The R-square value for environmentally friendly behavior reached 0.74, demonstrating that environmental literacy and sustainable competence collectively explained 74% of

the variance in environmentally friendly behavior. These findings indicate substantial predictive power within the proposed model.

Hypothesis testing demonstrated a positive and significant effect of environmental literacy on sustainable competence, with a path coefficient of  $\beta = 0.81$ , a t-statistic of 15.62, and a p-value of 0.000. Sustainable competence also exerted a positive and significant influence on environmentally friendly behavior, with  $\beta = 0.64$ , a t-statistic of 10.48, and a p-value of 0.000. Environmental literacy directly influenced environmentally friendly behavior with  $\beta = 0.32$ , a t-statistic of 4.87, and a p-value of 0.000.

Mediation analysis revealed a significant indirect effect of environmental literacy on environmentally friendly behavior through sustainable competence. The indirect effect reached 0.52, supported by a t-statistic of 9.12 and a p-value of 0.000. The persistence of the direct effect alongside the significant indirect effect indicates a partial mediation mechanism.

The overall findings confirm the critical role of environmental literacy in strengthening sustainable competence and promoting environmentally friendly behavior among students. Higher levels of environmental literacy contribute to stronger sustainability competencies and increased engagement in environmentally responsible actions. The research model demonstrates substantial explanatory power in clarifying the relationships among the examined variables and provides empirical support for sustainability-oriented educational initiatives.

**Descriptive Analysis Results**

Table 1. Descriptive Statistics of Research Variables

Variable	Dimension	Mean	Category
Environmental Literacy	Environmental Knowledge	4.15	High
	Attitude towards Environment	4.30	Very High
	Critical Thinking Skills	4,05	High
	Environmentally Caring Behavior	4.22	High
	Average Environmental Literacy	4.18	High
Sustainable Competence	Systems Thinking	4.08	High
	Problem Solving	4.10	High
	Decision Making	4.18	High
	Collaboration	4.05	High
	Action Competence	4.20	High

Variable	Dimension	Mean	Category
	Average Sustainable Competence	4.12	High
Environmentally Friendly Behavior Average	Waste Management	4.25	High
	Energy Saving	4.18	High
	Environmental Concern	4.28	Very High
	Participation in Environmental Activities	4.10	High
	Average Environmentally Friendly Behavior	4.20	High

***Explanation of Table 1***

Table 1 presents the descriptive statistics of environmental literacy, sustainable competence, and environmentally friendly behavior. The results indicate that all variables achieved mean scores within the high category, reflecting favorable levels of environmental awareness, sustainability competence, and pro-environmental behavior among respondents. Environmental attitude recorded the highest score within the environmental literacy construct, demonstrating strong concern for environmental preservation. Action competence emerged as the strongest dimension of sustainable competence, indicating respondents' readiness to implement sustainability-oriented actions. Environmental concern obtained the highest mean value among the dimensions of environmentally friendly behavior, highlighting a strong commitment to environmental protection.

Critical thinking skills, collaboration, and participation in environmental activities produced relatively lower scores compared to other dimensions, although they remained within the high category. These findings suggest opportunities for improvement in strengthening active engagement and collaborative involvement in environmental initiatives. The overall results demonstrate that respondents possess a solid foundation of environmental literacy and sustainability competence, which is reflected in their environmentally responsible behavior.

**Results of Validity and Reliability Tests (Outer Model)**

Table 2. Validitas Konvergen Test (Convergent Validity)

Variable	Indicator	Outer Loading	Description
Environmental Literacy	LL1	0,78	Valid
	LL2	0,82	Valid
	LL3	0,85	Valid
	LL4	0,80	Valid
	LL5	0,83	Valid
Sustainable Competence	KB1	0,79	Valid
	KB2	0,84	Valid
	KB3	0,88	Valid
	KB4	0,81	Valid
	KB5	0,86	Valid
Environmentally Friendly Behavior	PRL1	0,77	Valid
	PRL2	0,83	Valid
	PRL3	0,87	Valid
	PRL4	0,80	Valid
	PRL5	0,85	Valid

**Environmental Literacy (EL)**

Indicator Code (Statement)

- **EL1** I possess a fundamental understanding of environmental concepts and sustainability principles.
- **EL2** I recognize the environmental consequences resulting from human activities.
- **EL3** I demonstrate a positive attitude toward environmental conservation and protection.
- **EL4** I am capable of applying critical thinking when addressing environmental challenges.
- **EL5** I practice behaviors that contribute to environmental sustainability in everyday life.

**Sustainable Competence (SC)**

Indicator Code (Statement)

- **SC1** I can identify and understand the interconnections among different environmental issues (systems thinking).
- **SC2** I am able to develop appropriate solutions to environmental problems (problem solving).
- **SC3** I make decisions by considering long-term sustainability impacts (decision making).
- **SC4** I can collaborate effectively with others to address environmental challenges (collaboration).

- **SC5** I am capable of taking concrete actions that support environmental protection (action competence).

***Environmentally Friendly Behavior (EFB)***

Indicator Code (Statement)

- **EFB1** I dispose of waste responsibly and separate waste according to its type.
- **EFB2** I use energy resources efficiently, including electricity and water.
- **EFB3** I actively maintain environmental cleanliness and preservation.
- **EFB4** I participate in activities aimed at protecting and improving the environment.
- **EFB5** I encourage people around me to adopt environmentally responsible practices.

***Description***

- Convergent validity was assessed using the criterion of **Outer Loading > 0.70**.
- All indicators satisfied the required validity threshold.
- Table 2 presents the findings of the convergent validity assessment, which evaluates the extent to which indicators accurately represent their respective latent constructs.
- The analysis revealed that every indicator associated with environmental literacy, sustainable competence, and environmentally friendly behavior achieved outer loading values exceeding 0.70.
- Strong outer loading values indicate substantial associations between indicators and the constructs they are intended to measure.
- The findings confirm that the measurement instrument possesses satisfactory validity and is appropriate for subsequent analysis.
- No indicators required elimination because all items fulfilled the recommended minimum criteria.
- The results demonstrate that the measurement model (outer model) meets the accepted standards of convergent validity.

Table 3. Construct Reliability Test

Variable	Cronbach's Alpha	Composite Reliability	AVE	Description
Environmental Literacy	0,87	0,91	0,68	Reliable
Sustainable Competence 0.89 0.92 0.70 ReliableKompetensi Berkelanjutan	0,89	0,92	0,70	Reliable
Environmentally Friendly Behavior	0,86	0,90	0,66	Reliable

**Table 3 Information (Construct Reliability Test)**

Table 3 presents the results of the construct reliability assessment using Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE). Reliability evaluation was conducted to determine the consistency and stability of the measurement instrument used in this study. A construct is considered reliable when Cronbach's Alpha and Composite Reliability values exceed 0.70, while AVE values are greater than 0.50.

The findings indicate that all constructs satisfied the recommended reliability criteria. Environmental literacy, sustainable competence, and environmentally friendly behavior achieved Cronbach's Alpha values ranging from 0.86 to 0.89, demonstrating strong internal consistency among the indicators. Composite Reliability values varied between 0.90 and 0.92, further confirming the robustness of the measurement model. AVE values ranged from 0.66 to 0.70, exceeding the minimum threshold and indicating that each construct explains a substantial proportion of the variance in its indicators.

These results confirm that all variables possess satisfactory levels of reliability and convergent validity. The measurement instrument is therefore considered stable, consistent, and capable of accurately representing the constructs under investigation. Such findings provide strong support for proceeding with the structural model evaluation and hypothesis testing stages.

**Analytical Methods Used**

This study uses a quantitative approach with the data analysis technique of Partial Least Squares Structural Equation Modeling (PLS-SEM). This method was chosen because it is capable of analyzing relationships between latent variables simultaneously and is suitable for research models that are predictive and complex. Data analysis was carried out with the assistance of SmartPLS software, which allows for the testing of the measurement model (outer model) and the structural model (inner model).

**Measurement Model Analysis (Outer Model)**

The assessment of the outer model is conducted to examine the validity and reliability of indicators used to represent latent constructs. The evaluation includes the following criteria:

- **Convergent Validity**

Convergent validity is assessed through outer loading and Average Variance Extracted (AVE) values. Indicators are considered acceptable when the outer loading exceeds 0.70 and the AVE value is greater than 0.50.

- **Construct Reliability**

Construct reliability is evaluated using Cronbach's Alpha and Composite Reliability (CR). A construct is regarded as reliable when both Cronbach's Alpha and CR values are above 0.70.

- **Discriminant Validity**

Discriminant validity is examined using the Fornell-Larcker Criterion and/or the Heterotrait-Monotrait Ratio (HTMT). These procedures ensure that each construct is empirically distinct from other constructs within the model.

***Structural Model Analysis (Inner Model)***

The inner model evaluation is performed to investigate the relationships among latent variables included in the proposed framework. The assessment consists of:

- Coefficient of Determination ( $R^2$ )

$R^2$  is applied to determine the extent to which exogenous variables explain the variance of endogenous variables.

- Effect Size ( $f^2$ )

The  $f^2$  value is utilized to evaluate the contribution of each independent variable to the dependent variable.

- Predictive Relevance ( $Q^2$ )

$Q^2$  is employed to assess the predictive capability of the structural model.

- Hypothesis Testing (Bootstrapping)

Bootstrapping analysis is performed to determine the significance of the relationships among variables based on t-statistics ( $>1.96$ ) and p-values ( $<0.05$ ).

***Data Analysis Flow***

The analytical procedures carried out in this study consist of:

1. Data collection and preparation
2. Outer model evaluation (validity and reliability assessment)
3. Inner model evaluation (structural relationship assessment)
4. Hypothesis testing and interpretation of findings

***Methodological Conclusion***

The application of the PLS-SEM approach enables a comprehensive examination of the relationships among environmental literacy, sustainable competence, and environmentally friendly behavior. This method facilitates both construct validation and hypothesis verification within a unified analytical framework.

***Structural Model Test Results (Inner Model)***

Table 4. R-Square Values

<b>Dependent Variable</b>	<b>R-Square</b>	<b>Description</b>
Sustainable Competence	0,66	Strong
Environmentally Friendly Behavior	0,74	Strong

***Explanation of Table 4 (R-Square Values)***

Table 4 presents the R-Square ( $R^2$ ) values used to evaluate the explanatory power of independent variables toward dependent variables within the structural model.  $R^2$  values of 0.75, 0.50, and 0.25 are commonly interpreted as strong, moderate, and weak, respectively. The sustainable competence construct obtained an  $R^2$  value of 0.66, indicating that environmental literacy accounts for 66% of the variance in sustainable competence, while the remaining 34% is attributed to factors outside the proposed model. The environmentally friendly behavior construct achieved an  $R^2$  value of 0.74, suggesting that environmental literacy and sustainable competence jointly explain 74% of its variance. The remaining 26% is influenced by variables not incorporated into the study. These results indicate that the model demonstrates substantial explanatory strength and is appropriate for further structural evaluation.

**Analysis Methods Used**

This research adopts the Partial Least Squares-Structural Equation Modeling (PLS-SEM) technique to examine the relationships among latent variables. The method is suitable for investigating complex structural relationships while supporting predictive-oriented analysis. SmartPLS software is utilized to perform the analysis, allowing simultaneous evaluation of the measurement model (outer model) and structural model (inner model).

**Inner Model Analysis**

The primary focus of the inner model assessment is to evaluate the magnitude and significance of the relationships among latent constructs. The principal measure employed is the R-Square ( $R^2$ ) value, which reflects the proportion of variance in endogenous constructs explained by exogenous constructs.

The interpretation of  $R^2$  values follows the commonly accepted classification:

- 0.75 = Strong (Substantial)
- 0.50 = Moderate
- 0.25 = Weak

Higher  $R^2$  values indicate stronger predictive and explanatory capabilities of the model toward endogenous variables.

Additional structural model assessments include:

- Path Coefficients

Used to determine the direction and magnitude of relationships among constructs.

- Bootstrapping Analysis

Used to evaluate the statistical significance of structural relationships through t-statistics ( $>1.96$ ) and p-values ( $<0.05$ ).

**Methodological Implication**

The implementation of PLS-SEM provides a rigorous framework for investigating the structural relationships among environmental literacy, sustainable competence, and environmentally friendly behavior. The method enables an accurate estimation of the extent to which endogenous variables can be explained by the proposed conceptual model.

Table 5. Hypothesis Test Results (Path Coefficient)

Hypothesis	Relationship Between Variables	Path Coefficient ( $\beta$ )	t-Statistic	p-Value	Description
H1	Environmental Literacy → Sustainable Competence	0,81	12,45	0,000	Accepted
H2	Environmental Literacy → Environmentally Friendly Behavior	0,32	3,10	0,002	Accepted

Hypot he sis	Relationship Between Variables	Path Coefficient ( $\beta$ )	t-Statistic	p-Value	Description
H3	Sustainable Competence → Environmentally Friendly Behavior	0,64	8,75	0,000	Accepted

**Explanation of Table 5**

Table 5 summarizes the hypothesis testing outcomes based on path coefficients, t-statistics, and p-values generated through the bootstrapping procedure in the PLS-SEM analysis.

The findings reveal that all structural relationships are positive and statistically significant, indicated by t-statistic values exceeding 1.96 and p-values below 0.05. Detailed findings include:

- Environmental literacy exerts a positive and significant influence on sustainable competence ( $\beta = 0.81$ ;  $p < 0.05$ ), indicating that higher levels of environmental literacy contribute to stronger sustainable competence.
- Environmental literacy positively influences environmentally friendly behavior ( $\beta = 0.32$ ;  $p < 0.05$ ), although the magnitude of the effect is comparatively lower.
- Sustainable competence positively and significantly affects environmentally friendly behavior ( $\beta = 0.64$ ;  $p < 0.05$ ), demonstrating its substantial role in shaping pro-environmental actions.

All proposed hypotheses are therefore supported.

**Interpretation**

The hypothesis testing results demonstrate that all relationships within the structural model are positive and statistically significant. These outcomes indicate that the proposed framework effectively explains the interactions among environmental literacy, sustainable competence, and environmentally friendly behavior.

Environmental literacy shows a strong positive influence on sustainable competence ( $\beta = 0.81$ ;  $p < 0.05$ ). Individuals possessing greater environmental knowledge, awareness, and concern tend to exhibit stronger sustainability-related competencies, including systems thinking and sustainability-oriented decision-making capabilities.

Environmental literacy also positively affects environmentally friendly behavior ( $\beta = 0.32$ ;  $p < 0.05$ ). The strength of this relationship is moderate, suggesting that environmental literacy can directly encourage environmentally responsible actions, although its impact is not as substantial as its effect on sustainable competence.

Sustainable competence demonstrates a strong positive effect on environmentally friendly behavior ( $\beta = 0.64$ ;  $p < 0.05$ ). Individuals with well-developed sustainability competencies are more capable of transforming environmental awareness and knowledge into practical environmental actions.

The findings further indicate that sustainable competence serves as an important mediating mechanism linking environmental literacy and environmentally friendly behavior. Environmental literacy alone is insufficient to maximize pro-environmental behavior unless accompanied by competencies that enable individuals to apply sustainability principles effectively.

**Summary of Research Results**

Table 6. Summary of Findings

No	Relationship Between Variables	Test Results	The Power of Influence	Description
1	Environmental Literacy → Sustainable Competence	Significantly	Strong ( $\beta = 0.81$ )	Hypothesis accepted
2	Environmental Literacy → Environmentally Friendly Behavior	Significantly	Significantly Moderate ( $\beta = 0.32$ )	Hypothesis accepted
3	Sustainable Competence → Environmentally Friendly	Significantly	Strong ( $\beta = 0.64$ )	Hypothesis accepted
4	Environmental Literacy → Environmentally Friendly Behavior (through Sustainable Competence)	Significantly	Indirect (mediation)	Partial Mediation

**Explanation of Table 6 (Summary of Findings)**

Table 6 provides an overview of the hypothesis testing outcomes. All direct and indirect relationships among the variables are statistically significant. Environmental literacy demonstrates a strong effect on sustainable competence and a moderate direct influence on environmentally friendly behavior. Sustainable competence also exhibits a strong contribution to environmentally friendly behavior. The mediation analysis confirms that sustainable competence partially mediates the relationship between environmental literacy and environmentally friendly behavior. Environmental literacy therefore affects environmentally friendly behavior both directly and indirectly through the enhancement of sustainable competence. These findings highlight the importance of simultaneously strengthening environmental literacy and sustainability-related competencies to encourage environmentally responsible behavior more effectively.

## CONCLUSIONS

The PLS-SEM analysis confirms that all proposed hypotheses are supported, with positive and significant relationships observed among all constructs. Environmental literacy has a substantial influence on sustainable competence, indicating that improvements in environmental knowledge, awareness, and attitudes contribute significantly to the development of sustainability-oriented thinking and actions. Environmental literacy also positively affects environmentally friendly behavior, although the magnitude of this influence is comparatively moderate. Sustainable competence demonstrates a strong positive effect on environmentally friendly behavior, indicating that individuals equipped with sustainability-related competencies are more capable of implementing environmentally responsible practices in daily life.

The findings further reveal that sustainable competence functions as a partial mediating variable in the relationship between environmental literacy and environmentally friendly behavior. Environmental literacy influences environmentally friendly behavior directly and indirectly through the enhancement of sustainable competence. The results emphasize that strengthening environmental literacy alone is insufficient to achieve optimal behavioral change. The development of sustainable competence is equally necessary to support long-term and effective environmentally friendly behavior.

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