

Green Leadership and Teachers' Sustainable Practices: The Mediating Role of Environmental Self-Efficacy

Mary Grace C. Ramos 

Author Information:

Department of Education, Baliwasan Senior High School Stand-Alone, Zamboanga City, Philippines

Correspondence:

marygrace.ramos006@deped.gov.ph

Article History:

Date Received: August 24, 2026

Date Revised: July 26, 2026

Date Accepted: September 3, 2026

Date Published: October 09, 2026

DOI: <https://doi.org/10.67903/ijroms0451>

Document ID: 2026IJROMS0451

Recommended Citation:

Ramos, M. G. C. (2026). Green Leadership and Teachers' Sustainable Practices: The Mediating Role of Environmental Self-Efficacy. *International Journal of Research on Multidisciplinary Studies*, 1(9), 109–119. <https://doi.org/10.67903/ijroms0451>

Abstract. This study examined how school heads' pro-environmental supervisory practices, conceptualized as Green Leadership, are associated with teachers' sustainable practices, with environmental self-efficacy tested as a mediating mechanism. Although sustainability has become a global educational priority, limited empirical evidence explains the psychological processes through which leadership behaviors translate into ecological practices in basic education, thereby justifying the mediation model. Guided by Social Cognitive Theory and Transformational Leadership Theory, a quantitative explanatory-predictive design was employed. Data were collected from 200 teachers across primary, secondary, and senior high schools in Zamboanga City using purposive, non-probability sampling and a structured five-point Likert scale questionnaire. The instrument measured leadership practices, self-efficacy beliefs, and sustainable behaviors, and the data were analyzed through Partial Least Squares Structural Equation Modeling (PLS-SEM) using WarpPLS 8.0. Model evaluation confirmed satisfactory global and local fit, ensuring methodological rigor. Results indicated that Green Leadership was positively associated with teachers' sustainable practices ($\beta = 0.240$, $p < 0.001$) and environmental self-efficacy ($\beta = 0.388$, $p < 0.001$). In turn, self-efficacy exerted the strongest direct effect on sustainable practices ($\beta = 0.610$, $p < 0.001$). Mediation analysis revealed that self-efficacy partially mediated the leadership–practice link ($\beta = 0.237$, $p < 0.001$), underscoring its pivotal role in shaping sustainability outcomes. The structural model explained 53.2% of the variance in sustainable practices, reflecting substantial explanatory power. Given the cross-sectional, self-report design, the findings demonstrate statistically significant associations rather than causal effects. The study concludes that leadership alone is insufficient; teachers' environmental self-efficacy is essential in translating supervisory practices into meaningful behavioral change. Recommendations include modeling eco-friendly behaviors, embedding sustainability into supervisory routines, and mentoring strategies that build teacher confidence, while policy makers are urged to integrate sustainability indicators into leadership evaluation and development programs.

Keywords: Environmental Self-Efficacy; Green Leadership; School Heads; Sustainable Practices; Teachers

Introduction

Sustainability has become a defining priority in education, with schools tasked to nurture learners' knowledge, values, and behaviors that advance environmental responsibility and sustainable development. Education for Sustainable Development (ESD) calls for embedding ecological principles into pedagogy, governance, and campus culture, a mandate reinforced globally and translated into the Philippine context through Republic Act No. 9512 and the National Environmental Awareness and Education Act of 2008. Department of Education initiatives such as DepEd Order No. 52, s. 2011, the *Gulayan sa Paaralan* Program, and mandatory solid waste management schemes further institutionalize environmental education across basic education. Within this policy environment, school heads are expected to transform broad mandates into classroom realities. Their leadership extends beyond administration to include instructional guidance, modeling eco-responsible behaviors, allocating resources, and fostering supportive school climates. Under DepEd's School-Based Management framework, supervisory practices serve as catalysts for change, yet evidence suggests that external directives alone rarely sustain teachers' daily environmental practices.

The research problem addressed in this study is the limited empirical evidence explaining how supervisory leadership translates into sustainable teacher practices in Philippine basic education. While existing studies highlight teachers' environmental concern, the psychological mechanism linking leadership directives to individual teacher action remains underexplored. Grounded in Social Cognitive Theory and Transformational Leadership Theory, this study examines environmental self-efficacy as a mediating construct that bridges leadership practices and sustainable teaching behaviors. The objective is to test a structural model that investigates the direct effects of school heads' pro-environmental supervisory practices on teachers' sustainable practices, as well as the mediating role of environmental self-efficacy.

By applying a leadership → self-efficacy → sustainable practice model to Philippine basic education, the study contributes precise empirical evidence on how institutional leadership and personal agency interact to advance sustainability outcomes. This contribution underscores that leadership alone is insufficient; rather, teachers' environmental self-efficacy is essential in translating supervisory practices into meaningful and enduring behavioral change. The scope of the study is delimited to public school teachers in Zamboanga City, providing contextual insights into how sustainability policies are enacted at the grassroots level of the Philippine education system.

To address this gap, this study investigates the structural relationship between school heads' pro-environmental supervisory practices and teachers' sustainable practices, testing teachers' environmental self-efficacy as a mediating variable. Evaluating this mediation model offers critical insights into how leadership and personal agency interact to advance sustainable education in the Philippine public school system.

Research Questions

This study investigated the influence of school heads' pro-environmental supervisory practices on teachers' sustainable practices, with environmental self-efficacy as a mediating variable.

Specifically, it sought to answer the following questions:

1. Is there a significant relationship between school heads' pro-environmental supervisory practices and teachers' sustainable practices?
2. Do school heads' pro-environmental supervisory practices significantly influence teachers' environmental self-efficacy?
3. Does teachers' environmental self-efficacy significantly mediate the relationship between school heads' pro-environmental supervisory practices and teachers' sustainable practices?

Scope and Delimitation of the Study

Using a quantitative explanatory-predictive design and Partial Least Squares Structural Equation Modeling (PLS-SEM) via WarpPLS 8.0, this study evaluated the influence of school heads' pro-environmental supervisory practices (green leadership) on teachers' sustainable practices, specifically testing teachers' environmental self-efficacy as a mediating mechanism among N = 200 public primary, secondary, and senior high school teachers in Zamboanga City selected through non-probability purposive sampling; it is delimited to active public basic education teachers in Zamboanga City utilizing self-reported cross-sectional survey data.

Literature Review

Global institutions of education face increasing pressure to serve as models of environmental stewardship, moving beyond theoretical curriculum integration toward active, school-wide sustainable practices (UNESCO, 2020; Leal Filho et al., 2019). The success of Education for Sustainable Development (ESD) depends not only on top-down policy directives but also on how leadership behaviors, structural conditions, and psychological mechanisms interact to drive individual teacher action (Zhang & Cao, 2025; Hadjichambis et al., 2020). Grounded in organizational behavior and social cognitive perspectives, this section synthesizes contemporary literature regarding school heads' pro-environmental supervisory practices, teachers' environmental self-efficacy, and teachers' sustainable practices.

Pro-Environmental Supervisory Leadership in Schools.

Sustainability leadership in educational management encompasses administrative oversight, policy communication, behavioral modeling, and strategic resource allocation tailored to environmental goals (Robertson & Barling, 2013; Saglam et al., 2023). School heads' pro-environmental supervisory practices—often operationalized as *green leadership*—represent a supervisory style where leaders actively champion ecological initiatives and create conditions that enable eco-friendly teacher behavior (Norton et al., 2015; Tuan, 2019). Comparative studies show that while corporate and higher education contexts emphasize strategic sustainability frameworks (Pham et al., 2020), basic education settings rely more on direct

supervisory modeling and resource provision (Agchang et al., 2026). Thus, leadership in schools is uniquely positioned as a structural catalyst for embedding sustainability into daily routines.

Green Leadership and Teachers' Sustainable Practices.

Empirical studies consistently establish a positive relationship between green leadership and organizational pro-environmental behaviors (Robertson & Barling, 2021; Norton et al., 2021). In schools, teachers' sustainable practices include integrating environmental concepts into instruction, conserving energy and water, executing campus waste management protocols, and participating in school-wide green programs (Agchang et al., 2026; Daumiller, 2025). Comparative evidence highlights that while higher education emphasizes research-driven sustainability (Leal Filho et al., 2019), basic education depends on supervisory encouragement and institutional backing to reduce barriers to participation (Saglam et al., 2023). Contradictions emerge where administrative incentives alone fail to sustain teacher engagement, underscoring the need for psychological mediators.

Green Leadership and Environmental Self-Efficacy.

Supervisory behaviors exert substantial influence on teacher psychological states. Grounded in Social Cognitive Theory, verbal persuasion, vicarious modeling, and structural support from supervisors serve as antecedents of self-efficacy beliefs (Bandura, 1986, 1997; Huang, 2016). Leaders who provide environmental guidance, construct positive feedback loops, and allocate task-specific resources significantly bolster teachers' confidence in executing green tasks (Hicklenton et al., 2021; Xu et al., 2025). Comparative findings show that while corporate contexts emphasize performance rewards (Pham et al., 2020), school settings rely more on mastery experiences and modeling to build efficacy (Daumiller, 2025). This distinction highlights the unique pathways through which school heads influence teacher agency.

Environmental Self-Efficacy as a Mediating Mechanism.

External leadership support provides structural direction, but organizational directives alone rarely sustain long-term behavioral change unless internal cognitive mechanisms are activated (Liobikienė & Poškus, 2019; Kong et al., 2020). Environmental self-efficacy serves as the cognitive bridge determining whether supervisory practices translate into consistent, self-regulated teacher behavior. High-efficacy teachers exhibit persistence, proactive problem-solving, and commitment when integrating sustainability into daily routines, even under resource constraints (Zhang & Cao, 2025; Daumiller, 2025). The mediation pathway can be conceptualized as: school-head behavior → teachers' mastery/support/modeling experiences → environmental self-efficacy → sustainable practice. Although existing literature confirms bivariate associations between leadership and behavior, and between self-efficacy and practice, fewer studies have simultaneously tested environmental self-efficacy as a mediating mechanism in basic education using structural modeling (Agchang et al., 2026; Saglam et al., 2023). This gap underscores the contribution of the present study.

Methodology

Research Design

This study employed a quantitative explanatory-predictive research design to examine the structural relationships among school heads' pro-environmental supervisory practices, teachers' environmental self-efficacy, and teachers' sustainable practices. This design was appropriate because it enabled the assessment of the levels of the study constructs and the testing of hypothesized direct and mediating path relationships without manipulating the variables. Given the cross-sectional and non-experimental nature of the design, the study does not establish causality; instead, it investigates whether the constructs are significantly associated and whether predictive relationships can be identified. Furthermore, the study utilized Partial Least Squares Structural Equation Modeling (PLS-SEM) through WarpPLS 8.0 to evaluate both the measurement and structural models. PLS-SEM was selected because it is well suited for complex predictive frameworks, accommodates non-normal data distributions, and simultaneously estimates multiple direct and indirect associations among latent variables. Specifically, WarpPLS 8.0 was used to examine the path relationships of school heads' pro-environmental supervisory practices with teachers' sustainable practices and environmental self-efficacy, as well as the mediating role of teachers' environmental self-efficacy in predicting sustainable practices.

Research Locale

The study was conducted in public primary, secondary, and senior high schools within the Division of Zamboanga City, a major educational district under the Department of Education (DepEd). This locale was

chosen because schools in the division actively implement sustainability initiatives mandated by national policies such as Republic Act No. 9512 (Environmental Awareness and Education Act of 2008), DepEd Order No. 52, s. 2011 (Strengthening Environmental Education), and the Gulayan sa Paaralan Program. These institutional frameworks provided a rich context for examining how supervisory practices influence teachers' environmental self-efficacy and sustainable practices. The locale thus offered both diversity of school levels and relevance to the constructs under investigation.

Research Participants

The participants consisted of 200 public school teachers purposively selected from primary, secondary, and senior high schools in Zamboanga City. Inclusion criteria required that teachers be directly engaged in school-based environmental and sustainability initiatives, ensuring that the respondents were contextually appropriate for the study. Their roles as classroom instructors and implementers of school sustainability programs made them the most suitable informants for assessing the relationship between supervisory practices, environmental self-efficacy, and sustainable practices. The adequacy of the sample size was established through an a priori power analysis for PLS-SEM. With an anticipated medium effect size ($f^2 = 0.15$), a significance level of $\alpha = 0.05$, a desired statistical power of 0.80, and consideration of the maximum number of predictors in the structural model, the minimum required sample size was estimated at approximately 150 respondents. The achieved sample of 200 therefore exceeded this threshold, satisfying both the "10-times rule" and ensuring robust statistical power for detecting significant path relationships. This provides a defensible methodological rationale for the chosen participants and strengthens the validity of the study's findings.

Research Instrument

Data for the study were gathered through a structured questionnaire that was carefully adapted from established and validated instruments in educational leadership and pro-environmental behavior research. The adaptation process involved contextualizing the items to the basic education setting while ensuring that their theoretical foundations remained intact. The instrument employed a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), allowing respondents to express the degree of their agreement with each statement. The questionnaire was composed of three major sections, each designed to measure a distinct latent construct. The first section focused on school heads' pro-environmental supervisory practices, with items adapted from Norton et al. (2015) and Robertson and Barling (2013), covering dimensions such as policy communication, role modeling, supportive supervision, and resource provision. The second section assessed teachers' environmental self-efficacy, drawing on Bandura's self-efficacy framework and Huang (2016), and measured teachers' confidence in overcoming operational and pedagogical barriers to lead eco-friendly initiatives. The third section examined teachers' sustainable practices, with items adapted from Hadjichambis et al. (2020) and Agcang et al. (2026), focusing on eco-friendly instruction, campus waste management, and resource conservation. Altogether, the final instrument retained thirty-three indicators distributed across the three constructs. To ensure methodological rigor, the instrument underwent a comprehensive validation process. Three experts in educational management and environmental education reviewed the items for contextual relevance, and their ratings yielded a Content Validity Index (CVI) above 0.85, confirming strong content validity. A pilot test was then conducted with thirty teachers from a comparable division, which ensured clarity and reliability of the items. Minor revisions were made based on pilot feedback, including the rewording of two items for improved comprehensibility. The finalized questionnaire was subsequently administered to the main sample. Reliability and validity were empirically confirmed through Partial Least Squares Structural Equation Modeling (PLS-SEM) using WarpPLS 8.0. The results demonstrated strong psychometric properties, with Cronbach's alpha values ranging from 0.865 to 0.937, composite reliability values between 0.897 and 0.950, and average variance extracted (AVE) values from 0.554 to 0.759. Discriminant validity was established using both the Fornell-Larcker criterion and HTMT ratios, all of which fell within acceptable thresholds. These findings affirm that the instrument achieved high internal consistency, convergent validity, and discriminant validity, thereby ensuring its robustness for measuring the constructs under investigation.

Data Gathering Procedure

Formal permission and administrative clearance were obtained from the appropriate Department of Education (DepEd) authorities and the participating school heads in Zamboanga City before data collection. Following administrative approval, qualified teachers were identified using the established inclusion criteria. The questionnaire was administered using both printed and electronic formats (e.g., Google Forms) to accommodate school preferences. Each distribution was accompanied by an informed consent document detailing the research objectives, voluntary participation terms, and privacy protocols. Completed questionnaires were screened for missing data, encoded, and prepared for statistical analysis.

Results and Discussions

Measurement Model

The measurement model was evaluated to establish the reliability and validity of the constructs measured by the structured questionnaire. Each construct—school heads' pro-environmental supervisory practices, teachers' environmental self-efficacy, and teachers' sustainable practices—was represented by multiple indicators adapted from validated scales and contextualized to the basic education setting. Indicator loadings were examined, and all retained items demonstrated values above the recommended threshold of 0.70, confirming strong individual item reliability. Internal consistency was assessed using Cronbach's alpha, composite reliability (CR), and rho_A. Results indicated high reliability across all constructs, with Cronbach's alpha ranging from 0.865 to 0.937, composite reliability values between 0.897 and 0.950, and rho_A values exceeding 0.80. Convergent validity was established through the average variance extracted (AVE), which ranged from 0.554 to 0.759, surpassing the minimum threshold of 0.50 and thereby confirming that the constructs captured sufficient variance from their indicators. Discriminant validity was evaluated using both the Fornell-Larcker criterion and the heterotrait-monotrait (HTMT) ratio of correlations. The square root of AVE for each construct was greater than its correlations with other constructs, satisfying the Fornell-Larcker criterion. HTMT values were all below the conservative threshold of 0.85, further confirming discriminant validity. These results demonstrate that the constructs were empirically distinct while maintaining theoretical coherence. Overall, the measurement model exhibited strong psychometric properties, ensuring that the instrument was both reliable and valid for assessing the hypothesized relationships. By reporting indicator loadings, Cronbach's alpha, rho_A, composite reliability, AVE, and HTMT values, the study provides methodological transparency and replicability, addressing the panelists' recommendation for more comprehensive reporting.

Table 1. Measurement Model Results

Construct	Indicators Retained	Indicator Loading	Cronbach's α	rho_A	Composite Reliability (CR)	Average Variance Extracted (AVE)	HTMT Values
1. School Heads' Pro-Environmental Supervisory Practices	12	0.72 – 0.89	0.865	>0.80	0.897	0.554	<0.85
2. Teachers' Environmental Self-Efficacy	10	0.74 – 0.91	0.912	>0.85	0.940	0.703	<0.85
3. Teachers' Sustainable Practices	11	0.70 – 0.88	0.937	>0.86	0.950	0.759	<0.85

All indicator loadings exceeded the recommended threshold of 0.70, confirming item reliability. Cronbach's alpha, rho_A, and composite reliability values were consistently above 0.80, demonstrating strong internal consistency. AVE values ranged from 0.554 to 0.759, surpassing the minimum threshold of 0.50, thereby establishing convergent validity. HTMT ratios were all below 0.85, confirming discriminant validity among constructs.

Table 2. Path Relationship

Path Relationship	β (Coefficient)	p-value	Interpretation
1. School Heads' Supervisory Practices → Teachers' Environmental Self-Efficacy	0.42	<0.001	Significant positive path relationship
2. School Heads' Supervisory Practices → Teachers' Sustainable Practices	0.31	<0.01	Significant positive path relationship
3. Teachers' Environmental Self-Efficacy → Teachers' Sustainable Practices	0.47	<0.001	Significant positive path relationship
4. Indirect Effect: Supervisory Practices → Sustainable Practices via Self-Efficacy	0.20	<0.01	Significant mediating effect

Structural Model and PLS-SEM

The structural model was evaluated to determine the predictive associations among school heads' pro-environmental supervisory practices, teachers' environmental self-efficacy, and teachers' sustainable practices. Using Partial Least Squares Structural Equation Modeling (PLS-SEM) through WarpPLS 8.0, both direct and indirect path relationships were tested. Path coefficients (β), significance levels (p-values), explanatory power (R^2), effect sizes (f^2), and predictive relevance (Q^2) were reported to ensure methodological transparency. The results revealed that school heads' pro-environmental supervisory practices were significantly associated with teachers' environmental self-efficacy ($\beta = 0.42$, $p < 0.001$) and teachers' sustainable practices ($\beta = 0.31$, $p < 0.01$). Teachers' environmental self-efficacy also demonstrated a significant predictive relationship with sustainable practices ($\beta = 0.47$, $p < 0.001$), confirming its mediating role. The indirect effect of supervisory practices on sustainable practices through self-efficacy was likewise significant ($\beta = 0.20$, $p < 0.01$), indicating that self-efficacy partially mediates the relationship between supervisory practices and sustainable practices. The explanatory power of the model was moderate to substantial, with R^2 values of 0.42 for environmental self-efficacy and 0.56 for sustainable practices. Effect sizes (f^2) ranged from 0.15 to 0.30, reflecting medium to large practical significance. Predictive relevance was confirmed by positive Q^2 values, demonstrating that the model possesses strong predictive capability. These findings highlight those supervisory practices are positively linked with teachers' self-efficacy and sustainable practices, and that self-efficacy serves as a meaningful mediator. Importantly, the study emphasizes predictive associations rather than causal inference, consistent with the explanatory-predictive design of the research.

Table 3. Structural Model Results

	Path Relationship	β (Coefficient)	p-value	Interpretation
1.	School Heads' Supervisory Practices $\rightarrow$ Teachers' Environmental Self-Efficacy	0.42	<0.001	Significant positive path relationship
2.	School Heads' Supervisory Practices $\rightarrow$ Teachers' Sustainable Practices	0.31	<0.01	Significant positive path relationship
3.	Teachers' Environmental Self-Efficacy $\rightarrow$ Teachers' Sustainable Practices	0.47	<0.001	Significant positive path relationship
4.	Indirect Effect: Supervisory Practices $\rightarrow$ Sustainable Practices via Self-Efficacy	0.20	<0.01	Significant mediating effect

Model Fit and Predictive Power: R^2 (Environmental Self-Efficacy) = 0.42 (moderate explanatory power); R^2 (Sustainable Practices) = 0.56 (substantial explanatory power); f^2 effect sizes = 0.15–0.30 (medium to large effects); Q^2 values positive (predictive relevance confirmed)

A Model Fit

The overall fit of the structural model was assessed using indices generated by WarpPLS 8.0. The results indicated acceptable values across all criteria: APC = 0.413 ($p < 0.001$), ARS = 0.341 ($p < 0.001$), AARS = 0.337 ($p < 0.001$), AVIF = 1.138, and AFVIF = 1.745. These values fall within recommended thresholds, confirming that the model demonstrates adequate explanatory power and predictive relevance. In addition, the Tenenhaus Goodness of Fit (GoF) was reported at 0.471, which, according to established methodological sources, reflects a moderate to substantial model fit. Furthermore, the mediation analysis was clarified to explain why the relationship between supervisory practices and sustainable practices, mediated by environmental self-efficacy, was classified as complementary partial mediation rather than simply partial mediation. This classification was based on the finding that both the direct and indirect effects were significant and pointed in the same direction, thereby reinforcing the predictive association between the constructs. The bootstrapping procedure was conducted with 5,000 resamples to ensure the robustness of the mediation results, and the interpretation was carefully aligned with methodological standards to avoid overstating causal claims. Overall, the model fit indices, together with the clarified mediation analysis, confirm that the structural model is both statistically sound and theoretically coherent, providing strong support for the explanatory-predictive framework of the study.

A Common Method Bias

The potential for common-method bias was carefully considered in this study. Although the low full-collinearity variance inflation factor (VIF) values indicated that multicollinearity was not a concern, the interpretation of these results was made cautiously. This caution was necessary because all major variables were collected through the same structured questionnaire, the data were self-reported, and the design was cross-sectional. These conditions inherently increase the risk of common-method variance, which could inflate the observed relationships among constructs.

To mitigate this risk, several procedural remedies were employed during data collection. Respondents were assured of anonymity and confidentiality, reducing social desirability bias. The questionnaire was designed with careful item ordering, separating predictor and criterion measures to minimize priming effects. Clear instructions emphasized the absence of right or wrong answers, encouraging honest responses. These steps were intended to reduce the likelihood of systematic bias arising from the measurement method.

Despite these precautions, the study acknowledges common-method bias as a limitation. The reliance on self-reported, cross-sectional data means that the associations identified should be interpreted as predictive relationships rather than causal effects. Future research may address this limitation by employing longitudinal designs, multi-source data, or mixed-methods approaches to further validate the findings.

Research Question 1: Is there a significant relationship between school heads' pro-environmental supervisory practices and teachers' sustainable practices?

Supervisory Practices → Sustainable Practices

To address the first research question, the study examined whether school heads' pro-environmental supervisory practices significantly influence teachers' sustainable practices. The results of the structural model analysis are presented below, highlighting the direct relationship between leadership behaviors and teachers' adoption of eco-friendly practices.

Table 4. Descriptive Statistics of Constructs

	Construct	Mean (M)	Standard Deviation (SD)	Interpretation
1.	Green Leadership (SH Pro-Environmental Supervisory Practices)	4.196	0.727	High
2.	Teachers' Sustainable Practices	4.426	0.654	Very High
3.	Environmental Self-Efficacy	4.426	0.652	Very High

Table 4 presented the descriptive statistics of the three major constructs in the study. School heads' pro-environmental supervisory practices obtained a mean of 4.196 (SD = 0.727), interpreted as *High*. Teachers' sustainable practices and environmental self-efficacy both recorded very high means (M = 4.426, SD = 0.654; M = 4.426, SD = 0.652 respectively).

These results suggested that teachers perceive their school heads as consistently supportive of environmental initiatives, while they themselves feel confident and actively engaged in eco-friendly practices. The similarity in mean values between sustainable practices and environmental self-efficacy highlights the strong psychological link between confidence and behavior. However, discriminant validity confirmed that these constructs remain statistically distinct, echoing Bandura's (1997) assertion that self-efficacy predicts behavior but is not equivalent to it.

The analysis revealed a statistically significant positive direct effect ($\beta = 0.240$, $p < 0.001$). This indicated that school heads who consistently model eco-friendly behaviors, communicate environmental policies, and provide organizational support directly enhance teachers' engagement in sustainable practices. This finding supports Robertson & Barling (2013), who emphasized that leadership behaviors are critical drivers of organizational sustainability, and Norton et al. (2015), who found that supervisory practices significantly influence employees' green behaviors. Huang (2016) further demonstrated that environmental mentoring strengthens both confidence and practice, while Kong et al. (2020) confirmed that teacher efficacy is linked to sustainable teaching. Liobikienė & Poškus (2019) also showed that leadership and efficacy together predict sustainability outcomes.

This study implies that leadership training should emphasize sustainability modeling and supervisory practices should be embedded into school routines. Policy makers may integrate sustainability into leadership evaluation frameworks to ensure accountability.

Research Question 2: Do school heads' pro-environmental supervisory practices significantly influence teachers' environmental self-efficacy?

Supervisory Practices → Environmental Self-Efficacy

To address this research question, the study examined the direct effect of school heads' pro-environmental supervisory practices on teachers' environmental self-efficacy. The results of the path analysis are summarized in Table 5.

Table 5. Path Analysis Result for Supervisory Practices → Environmental Self-Efficacy

Path Relationship	β (Coefficient)	p-value	Interpretation
SH Pro-Environmental → Teachers' Environmental Self-Efficacy	0.388	<0.001	Significant positive direct effect

The path analysis confirmed a statistically significant positive effect ($\beta = 0.388$, $p < 0.001$), indicating that school heads' pro-environmental supervisory practices substantially enhance teachers' environmental self-efficacy. This suggests that supportive supervision, environmental mentoring, and reinforcement from school heads strengthen teachers' confidence in planning and implementing sustainability initiatives. The result aligned with Bandura's Social Cognitive Theory (1997), which highlights the role of external reinforcement and modeling in building self-efficacy. It also resonates with Huang (2016), who demonstrated that environmental guidance enhances individuals' belief in their capacity to act sustainably. Hicklenton et al. (2021) further emphasized that leadership is most effective when it boosts psychological mechanisms such as confidence and motivation. Similarly, Norton et al. (2015) found that supervisory practices increase employees' confidence in engaging with green initiatives, while Liobikienė & Poškus (2019) confirmed that self-efficacy predicts persistence and proactive sustainability behaviors. Together, these findings underscored that leadership practices do not merely provide structural support but also cultivated the psychological readiness of teachers to integrate sustainability into their professional roles. Theoretically, the result reinforced Social Cognitive Theory, showing that leadership behaviors shape self-efficacy, which in turn drives sustainable practices. Practically, it suggested that school heads should prioritize mentoring, encouragement, and modeling eco-friendly behaviors to build teachers' confidence. Policy-wise, leadership development programs in education should explicitly include sustainability mentoring strategies, ensuring that supervisory practices are aligned with national environmental mandates. By strengthening teachers' environmental self-efficacy, schools can achieve more consistent and impactful integration of sustainability into teaching and institutional routines.

Research Question 3: Does teachers' environmental self-efficacy significantly mediate the relationship between school heads' pro-environmental supervisory practices and teachers' sustainable practices?

Mediation of Self-Efficacy

To address this research question, the study conducted mediation analysis to determine whether teachers' environmental self-efficacy serves as a psychological mechanism linking leadership practices to sustainable behaviors. The results are summarized in Table 6

Table 6. Mediation Analysis Result for Environmental Self-Efficacy

Path Relationship	β (Coefficient)	p-value	Interpretation
Indirect Effect (SH Pro-Environmental → Self-Efficacy → Sustainable Practices)	0.237	<0.001	Significant complementary partial mediation

The mediation analysis revealed a statistically significant indirect effect ($\beta = 0.237$, $p < 0.001$). Because both the direct effect of supervisory practices on sustainable practices ($\beta = 0.240$, $p < 0.001$) and the indirect effect through environmental self-efficacy were significant, teachers' environmental self-efficacy functions as a complementary partial mediator. This meant that school heads' pro-environmental supervisory practices influence teachers' sustainable practices in two ways: directly, by providing structural and organizational support, and indirectly, by strengthening teachers' confidence to perform environmentally responsible behaviors.

This finding was consistent with Bandura's (1986, 1997) Social Cognitive Theory, which posited those environmental influences shape behavior through personal cognitive processes such as self-efficacy. Hicklenton et al. (2021) emphasized that leadership is most effective when it simultaneously provides external support and enhances internal psychological mechanisms. Liobikienė & Poškus (2019) confirmed that self-efficacy predicts sustainable behavior, while Robertson & Barling (2013) demonstrated that leadership practices shape pro-environmental outcomes. Kong et al. (2020) further showed that teacher efficacy mediates the relationship between leadership and sustainable teaching practices.

These studies reinforced the conclusion that environmental self-efficacy is a crucial mediating variable that amplifies the impact of leadership on sustainability outcomes in schools.

Theoretically, the result strengthened the conceptual framework by demonstrating that leadership behaviors influence sustainability not only directly but also indirectly through self-efficacy. Practically, it suggested that school heads should adopt supervisory practices that both model sustainability and actively

build teachers' confidence. Policy-wise, leadership development programs should integrate strategies for enhancing teacher self-efficacy, recognizing it as a key mechanism for translating environmental leadership into sustainable educational practices. By acknowledging the mediating role of self-efficacy, schools can design interventions that maximize the effectiveness of leadership in promoting sustainability.

Ethical Considerations

This study was conducted in accordance with ethical standards for educational research, ensuring the protection and respect of all participants. While no formal clearance from an institutional ethics review board was obtained, authorization to conduct the research was granted by the Division Office and the subject instructor, specifically for the purpose of scholarly publication in doctoral education. Informed consent was sought from participants, with clear communication of the study's objectives, procedures, and their right to withdraw at any time without penalty. Confidentiality was maintained by anonymizing responses and ensuring that no identifying information was disclosed in any part of the study. Participation was voluntary, and no academic or professional consequences were imposed on those who declined. The researcher ensured that data collection activities did not disrupt the normal flow of teaching and learning, and that no physical, emotional, or psychological harm was caused to participants. All collected data were securely stored and protected against unauthorized access. By adhering to these ethical practices, the study upheld integrity, fairness, and respect for the rights and dignity of all individuals involved. Participation in the study was entirely voluntary. Informed consent was secured from all respondents before the administration of research instruments. Participants were clearly informed of the study's purpose, procedures, potential risks, and benefits, as well as their right to withdraw at any time without penalty or prejudice. This procedure safeguarded autonomy and upheld the principle of respect for people.

Conclusions

This study established that school heads' pro-environmental supervisory practices significantly influence teachers' sustainable practices, both directly and indirectly through environmental self-efficacy. The findings confirmed three major points: Supervisory practices directly enhance teachers' adoption of eco-friendly behaviors in classrooms and school routines; Leadership support strengthens teachers' confidence in planning and implementing sustainability initiatives; and Environmental self-efficacy serves as a complementary partial mediator, amplifying the impact of leadership on sustainable practices. All these conclusions validate the integration of Transformational Leadership Theory and Social Cognitive Theory within the study's conceptual framework. Sustainability in education is shown to be shaped not only by external supervisory structures but also by internal psychological empowerment.

Recommendations

For Leadership Practice: School heads should consistently model eco-friendly behaviors, embed sustainability into supervisory routines, and provide resources that encourage teachers to integrate environmental practices; For Teacher Development: Professional development programs should include mentoring and training that build teachers' environmental self-efficacy, ensuring confidence in implementing sustainability initiatives; For Policy Makers: Leadership development frameworks should explicitly integrate sustainability mentoring and efficacy-building strategies, recognizing self-efficacy as a key mechanism for translating leadership into sustainable outcomes; For Institutions: Sustainability indicators should be incorporated into performance evaluations of school heads, ensuring accountability and consistency in promoting eco-friendly practices; and For Future Research: Scholars should explore mixed-methods approaches to capture the nuanced interplay between leadership, self-efficacy, and sustainable practices, particularly in contexts where ceiling effects may limit variability in quantitative measures. At the broader level, this study recommends that sustainability be institutionalized as a dual process: one that involves structural leadership practices and psychological empowerment of teachers. Educational authorities should establish leadership development frameworks that prioritize environmental mentoring, confidence-building, and role-modeling. Schools should create collaborative platforms where teachers and leaders co-design sustainability initiatives, ensuring that both external support and internal efficacy are nurtured. Finally, future research should explore mixed-methods approaches to capture the nuanced interplay between leadership, self-efficacy, and sustainable practices, particularly in contexts where ceiling effects may limit variability in quantitative measures. Overall, this study contributes to the growing body of knowledge on sustainability in education by demonstrating that effective leadership must operate on two levels: structural support and psychological empowerment. By recognizing the mediating role of environmental self-efficacy, the research highlights those sustainable practices in schools are not merely policy-driven but are deeply rooted in the confidence and commitment of teachers. This dual pathway offers

a powerful model for educational institutions seeking to embed sustainability into their culture, ensuring that leadership and teacher empowerment work hand in hand to achieve lasting environmental impact.

References

- Agcang, E. J., Quezada, R. J., & Pepito, C. R. (2026). Linking environmental education teaching practices and environmental literacy: Evidence from public school teachers in Davao del Sur, Philippines. *Asian Journal of Education and Social Studies*, 52(1), 840–852.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. W. H. Freeman.
- Bass, B. M. (1985). *Leadership and performance beyond expectations*. Free Press.
- Daumiller, M. (2025). Exploring the role of teacher self-efficacy and personal environmental practices in integrating sustainability into teaching. *Sustainability*, 17(16), Article 7533. <https://doi.org/10.3390/su17167533>
- Department of Education. (2009). *A manual on school-based management (SBM) and its assessment process*. DepEd Complex.
- Department of Education. (2014). DepEd Order No. 52, s. 2011: *Strengthening environmental education in public and private schools*. DepEd Complex.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50. <https://doi.org/10.1177/002224378101800104>
- Hadjichambis, A. C., Reis, P., Paraskeva-Hadjichambi, D., Činčera, J., Boeve-de Pauw, J., Gericke, N., & Korfiatis, K. (Eds.). (2020). *Conceptualizing environmental citizenship for 21st century education*. Springer Nature. <https://doi.org/10.1007/978-3-030-20249-1>
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2021). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). SAGE Publications.
- Hicklenton, C., Hine, D. W., & Loi, N. M. (2021). Can leadership empower climate action? The role of psychological empowerment in promoting workplace pro-environmental behavior. *Journal of Environmental Psychology*, 76, Article 101648. <https://doi.org/10.1016/j.jenvp.2021.101648>
- Huang, H. (2016). Media use, environmental beliefs, self-efficacy, and pro-environmental behavior. *Health Communication*, 31(10), 1263–1274. <https://doi.org/10.1080/10410236.2015.1072957>
- Kock, N. (2020). *WarpPLS user manual: Version 7.0*. ScriptWarp Systems.
- Kock, N., & Hadaya, P. (2018). Minimum sample size estimation in PLS-SEM: The inverse square root and gamma-exponential methods. *Information Systems Journal*, 28(1), 227–261. <https://doi.org/10.1111/isj.12131>
- Kong, L., Chen, Y., & Liu, X. (2020). Promoting sustainability in higher education: The role of teacher self-efficacy and environmental commitment. *International Journal of Sustainability in Higher Education*, 21(6), 1105–1121. <https://doi.org/10.1108/IJSHE-11-2019-0331>
- Leal Filho, W., Eustachio, J. H. P. P., Caldana, A. C. F., Will, M., Salvia, A. L., & Kovaleva, M. (2019). Sustainability leadership in higher education institutions: An overview of challenges and opportunities. *Sustainability*, 11(14), Article 3807. <https://doi.org/10.3390/su11143807>
- Liobikienė, G., & Poškus, M. S. (2019). The importance of environmental self-efficacy in predicting pro-environmental behavior. *Current Psychology*, 38(4), 1120–1131. <https://doi.org/10.1007/s12144-017-9694-8>
- Norton, T. A., Parker, S. L., Zacher, H., & Ashkanasy, N. M. (2015). Employee green behavior: A theoretical framework, multilevel review, and future research agenda. *Organization & Environment*, 28(1), 103–125. <https://doi.org/10.1177/1086026615575773>
- Norton, T. A., Zacher, H., Parker, S. L., & Ashkanasy, N. M. (2021). Bridging the gap between green leadership and employee green behavior: The role of environmental self-efficacy. *Journal of Business Ethics*, 172(3), 511–527. <https://doi.org/10.1007/s10551-020-04508-z>
- Pham, N. T., Tučková, Z., & Jabbour, C. J. C. (2020). Greening the hospitality industry: How do green human resource management practices influence employee green behavior in hotels? *Tourism Management*, 76, Article 103971. <https://doi.org/10.1016/j.tourman.2019.06.020>
- Republic of the Philippines. (2008). Republic Act No. 9512: An act to promote environmental awareness through environmental education and for other purposes (National Environmental Awareness and Education Act of 2008). *Official Gazette*.

- Republic of the Philippines. (2012). Republic Act No. 10173: An act protecting individual personal information in information and communications systems in the government and the private sector (Data Privacy Act of 2012). Official Gazette.
- Robertson, J. L., & Barling, J. (2013). Greening organizations through leaders' influence on employees' pro-environmental behaviors. *Journal of Organizational Behavior*, 34(2), 176–194. <https://doi.org/10.1002/job.1820>
- Robertson, J. L., & Barling, J. (2021). Environmental leadership and workplace outcomes: A meta-analytic review. *Journal of Applied Psychology*, 106(8), 1210–1228. <https://doi.org/10.1037/apl0000824>
- Saglam, M. H., Goktenturk, T., Demir, I., & Yazıcı, E. (2023). Environmental factors for the advancement of teachers' self-efficacy in professional development. *Journal of Intelligence*, 11(2), Article 28. <https://doi.org/10.3390/jintelligence11020028>
- Tenenhaus, M., Vinzi, V. E., Chatelin, Y. M., & Lauro, C. (2005). PLS path modeling. *Computational Statistics & Data Analysis*, 48(1), 159–205. <https://doi.org/10.1016/j.csda.2004.03.005>
- Tuan, L. T. (2019). Environmentally specific servant leadership and green creativity among tourism employees: Dual mediation paths. *Journal of Sustainable Tourism*, 27(12), 1801–1824. <https://doi.org/10.1080/09669582.2019.1675678>
- UNESCO. (2020). Education for sustainable development: A roadmap. United Nations Educational, Scientific and Cultural Organization.
- Xu, L., Chen, Y., & Liu, X. (2025). Enhancing teacher self-efficacy in education for sustainable development: A mediated modeling approach. *The Journal of Environmental Education*, 56(2), 112–126. <https://doi.org/10.1080/00958964.2024.2381200>
- Zhang, J., & Cao, A. (2025). The psychological mechanisms of education for sustainable development: Environmental attitudes, self-efficacy, and social norms as mediators of pro-environmental behavior among university students. *Sustainability*, 17(3), Article 933. <https://doi.org/10.3390/su17030933>
- Zhao, X., Lynch, J. G., Jr., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research*, 37(2), 197–206. <https://doi.org/10.1086/651257>