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The Effect of Climate Change Literacy on Pro-Environmental Behavior Intention of Teachers

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Abstract

Climate change poses significant environmental and social risks, particularly in developing countries such as Indonesia. Education plays a strategic role in strengthening climate awareness and encouraging pro-environmental behavior, with teachers serving as key agents in shaping students' knowledge, attitudes, and daily practices. This study examined the relationship between climate change literacy and pro-environmental behavior intention among teachers at the Al-Ashriyyah Nurul Iman Islamic Boarding School Foundation in Bogor. A quantitative cross-sectional survey design was employed involving 120 active teachers from elementary, junior high, and senior high school levels. Climate change literacy was measured through three dimensions: knowledge of causes, knowledge of impacts, and knowledge of actions/mitigation, while pro-environmental behavior intention was measured through items related to energy saving, water conservation, waste management, paper reduction, and recycling practices. Data were analyzed using descriptive statistics, Pearson correlation, and multiple linear regression. The findings show that teachers demonstrated stronger agreement with direct causes of climate change, locally perceived impacts, and low-cost mitigation actions. Correlation analysis indicated that all dimensions of climate change literacy were positively associated with pro-environmental behavior intention, with knowledge of actions/mitigation showing the strongest relationship, followed by knowledge of impacts and knowledge of causes. Regression analysis further showed that knowledge of actions/mitigation and knowledge of impacts significantly predicted pro-environmental behavior intention, while knowledge of causes was not a significant predictor when the other dimensions were included in the model. These findings suggest that climate change education for teachers should move beyond scientific explanations of causes and emphasize contextual impacts and applicable mitigation practices.

Introduction

Climate change has become one of the most urgent global environmental challenges, with broad impacts on ecological systems, human health, food security, water availability, and social life (Iqbal et al., 2025; Toromade et al., 2024; Usman et al., 2024). Its causes are closely linked to human activities, particularly the accumulation of greenhouse gas emissions such as carbon dioxide, methane, and nitrous oxide in the atmosphere (Forster et al., 2024; Jones et al., 2023). Developing countries, including Indonesia, are especially vulnerable because of their

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geographical, social, and economic conditions. In Indonesia, climate-related risks such as weather anomalies, flooding, landslides, increasing temperatures, and environmental degradation have become increasingly relevant, including in Bogor and the surrounding areas of West Java (Rahayu et al., 2024; Silalahi et al., 2019). These conditions indicate the need for stronger public understanding and more practical responses to climate change at the local level (Baldwin et al., 2023; Andre et al., 2024).

Education is widely recognized as a strategic pathway for strengthening climate awareness and encouraging environmentally responsible behavior (Shiwani & Kumar, 2025; Mendes et al., 2025; Miao & Nduneseokwu, 2025). Through education, individuals can develop not only scientific knowledge about climate change but also the capacity to translate such knowledge into daily practices (Adom, 2024). This is also in line with the Sustainable Development Goals (SDGs), which emphasize the importance of education for sustainable development, global citizenship, and climate action (Wati et al., 2024). In the school context, teachers play a central role because they act as knowledge facilitators, role models, and agents of school culture. Their understanding of climate change can influence how environmental issues are introduced in learning activities, how students are guided to develop environmental responsibility, and how sustainable practices are promoted in the school environment (Djuwita & Benyamin, 2019; Makrooni et al., 2025).

Climate change literacy is an important component of environmental education because it helps individuals understand the causes, consequences, and possible responses to climate change (Rushton et al., 2026; Jiglau et al., 2026; Trott et al., 2023). Previous studies have shown that climate and environmental knowledge can be associated with pro-environmental behavior and behavioral intention (Colombo et al., 2023; De Leeuw et al., 2015). However, empirical findings remain inconsistent. Some studies suggest that knowledge alone has a weak relationship with actual behavior, indicating the existence of a knowledge–behavior gap (Buttazzoni et al., 2024; De Leeuw et al., 2015; Zsóka et al., 2013). Meanwhile, other studies show that increasing knowledge can still support environmental responsibility, especially when knowledge is connected to concrete actions and contextual experiences (M. Jaime et al., 2022; Salazar et al., 2024). These mixed findings indicate that climate change literacy should not be treated only as a general or single construct.

A more specific understanding is needed regarding which dimensions of climate change literacy are most closely related to pro-environmental behavior intention. Climate change literacy may include knowledge about the causes of climate change, knowledge about its impacts, and knowledge about possible actions or mitigation strategies. Distinguishing these dimensions is important because knowing the scientific causes of climate change may not automatically lead to behavioral intention, while understanding local impacts and applicable mitigation actions may be more directly connected to practical decision-making (Chan et al., 2025; Juma-Michilena et al., 2023; Tolppanen et al., 2022). Therefore, educational interventions should not merely focus on delivering scientific information, but also strengthen contextual, action-oriented, and applicable knowledge that can guide individuals toward environmentally responsible choices (Nuryadin et al., 2023; Mongar et al., 2023; Weinberg et al., 2026).

The context of boarding schools is particularly important in climate change education because teachers are not only involved in classroom instruction but also contribute to shaping students' daily habits and institutional culture (Salabi, 2026; Juliana et al., 2026; Kartiko et al., 2026). In an Islamic boarding school environment, pro-environmental behavior can be integrated into both academic learning and everyday practices, such as saving electricity and water, reducing

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waste, using resources responsibly, and maintaining cleanliness. Teachers in this setting have the potential to connect climate literacy with moral responsibility, collective discipline, and sustainable school routines. Therefore, examining teachers' climate change literacy and pro-environmental behavior intention in a boarding school context provides important insights for designing more relevant environmental education programs and school-based sustainability policies.

Based on this background, this study focuses on teachers at the Al-Ashriyyah Nurul Iman Islamic Boarding School Foundation in Bogor. The study aims to examine the relationship between climate change literacy and pro-environmental behavior intention by distinguishing climate literacy into three dimensions: knowledge of causes, knowledge of impacts, and knowledge of actions or mitigation. This distinction is expected to provide a clearer explanation of which literacy dimension is most strongly associated with teachers' intention to engage in pro-environmental practices.

Specifically, this study seeks to answer the following research questions:

1. What are the levels of climate change literacy and pro-environmental behavior intention among teachers at the Al-Ashriyyah Nurul Iman Islamic Boarding School Foundation?
2. What is the relationship between each dimension of climate change literacy and teachers' pro-environmental behavior intention?
3. Which dimension of climate change literacy contributes most strongly to teachers' pro-environmental behavior intention?

The findings of this study are expected to contribute theoretically and practically to the development of climate change education in school and boarding school contexts. Theoretically, this study clarifies the role of different dimensions of climate change literacy in shaping pro-environmental behavior intention. Practically, the findings can serve as a basis for designing teacher professional development programs, teaching materials, and school policies that emphasize not only climate knowledge but also contextual understanding and applicable mitigation actions. In this way, climate education can move beyond awareness-building and contribute to the formation of sustainable practices in the school environment.

Methods

This study employed a quantitative cross-sectional survey design to examine the relationship between climate change literacy and pro-environmental behavior intention among teachers at the Al-Ashriyyah Nurul Iman Islamic Boarding School Foundation in Bogor, Indonesia. The unit of analysis was active teachers working at the foundation during the current academic year. This design was considered appropriate because the study aimed to describe teachers' climate change literacy, examine its relationship with pro-environmental behavior intention, and assess the contribution of each literacy dimension to the formation of intention.

Climate change literacy was treated as the independent variable and was divided into three dimensions: knowledge about the causes of climate change, knowledge about the impacts of climate change, and knowledge about climate change actions or mitigation. Pro-environmental behavior intention was treated as the dependent variable. In this study, pro-environmental behavior intention refers to teachers' stated willingness to perform environmentally responsible actions in school and daily contexts, such as saving electricity and water, reducing paper use, sorting waste, using digital learning materials, and supporting recycling practices.

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Population and Sample

The population of this study consisted of active teachers at the Al-Ashriyyah Nurul Iman Islamic Boarding School Foundation in Bogor. The respondents included teachers from elementary, junior high, and senior high school levels under the foundation. The inclusion criteria were teachers who had actively taught for at least one semester and were willing to participate voluntarily in the study.

A total of 120 teachers participated in the survey. This number was considered sufficient for descriptive analysis, correlation analysis, and multiple linear regression involving three main predictor variables, namely knowledge of causes, knowledge of impacts, and knowledge of actions/mitigation. The sample size was also adequate for identifying moderate relationships between climate change literacy and pro-environmental behavior intention.

Instrument

Data were collected using a structured questionnaire developed to measure teachers' climate change literacy and pro-environmental behavior intention. The instrument consisted of two main parts. The first part measured climate change literacy through 15 items divided into three dimensions: five items on the causes of climate change, five items on the impacts of climate change, and five items on climate change actions or mitigation. The second part measured pro-environmental behavior intention through nine items.

All items were measured using a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. Items on climate change literacy focused on teachers' agreement with factual and conceptual statements related to climate change, while items on pro-environmental behavior intention focused on teachers' willingness to perform environmentally responsible actions. Higher scores indicated stronger climate change literacy or stronger pro-environmental behavior intention.

The questionnaire items were developed based on the conceptual dimensions of climate change literacy and pro-environmental behavior intention. The causes dimension included statements related to fossil fuel burning, motor vehicle use, electricity consumption, water treatment, and single-use plastic use. The impacts dimension included statements related to extreme weather, seasonal shifts, flooding, drought, forest fires, hotter weather, and sea-level rise. The action/mitigation dimension included statements related to walking or cycling, saving electricity, saving water, recycling, and reducing paper use. The intention items included behaviors such as turning off lights, turning off taps, using recycling bins, reducing water use, using both sides of paper, and donating or selling unused items for recycling.

Before data collection, the instrument was reviewed to ensure clarity, relevance, and consistency with the research objectives. The items were written positively to make them easier for respondents to understand and to minimize confusion during completion.

Table 1. Constructs, Number of Items, and Sample Statements of the Instrument

Construct	Dimension	Number of Items	Sample Statement	Scale
Climate change literacy	Knowledge about the causes of climate change	5	"The burning of fossil fuels is one of the main sources of carbon dioxide emissions."	Likert scale 1–5

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Climate change literacy	Knowledge about the impacts of climate change	5	"Climate change increases the risk of extreme weather, such as floods and heat waves."	Likert scale 1–5
Climate change literacy	Knowledge about climate change actions/mitigation	5	"Saving electricity in classrooms is a simple action to reduce environmental impact."	Likert scale 1–5
Pro-environmental behavior intention	Intention to perform pro-environmental practices	9	"I intend to turn off lights and electronic devices after class."	Likert scale 1–5

All items were measured using a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. Climate change literacy consisted of three dimensions: knowledge of causes, knowledge of impacts, and knowledge of actions/mitigation. Pro-environmental behavior intention was measured using items related to energy saving, water conservation, waste management, paper reduction, and recycling behavior.

Data Collection Procedure

Data were collected through an online questionnaire distributed to teachers at the Al-Ashriyyah Nurul Iman Islamic Boarding School Foundation. Prior to completing the questionnaire, respondents received information about the purpose of the study, voluntary participation, confidentiality, and anonymity of their responses. Only teachers who agreed to participate continued to complete the questionnaire.

The data collection process was conducted over approximately two weeks after obtaining permission from the institution. Respondents were asked to answer each item based on their own understanding, perception, and intention regarding climate change and pro-environmental practices.

Data Analysis

The collected data were analyzed using SPSS version 25. The analysis was conducted in several stages. First, the data were screened to check completeness, consistency of responses, and potential input errors. Since all items were positively worded, no reverse scoring was applied. Composite scores were calculated for each dimension of climate change literacy by averaging the relevant items. A composite score for pro-environmental behavior intention was also calculated from the nine intention items.

Second, descriptive statistics were used to describe the distribution of teachers' responses. Frequency and percentage were presented for each questionnaire item to show the level of agreement among respondents. Mean and standard deviation were also used to describe the general tendency of climate change literacy and pro-environmental behavior intention.

Third, Pearson correlation analysis was used to examine the relationship between each dimension of climate change literacy and pro-environmental behavior intention. The analysis included the correlation between knowledge of causes, knowledge of impacts, knowledge of actions/mitigation, composite climate change literacy, and pro-environmental behavior intention. The strength of the correlation was interpreted based on the correlation coefficient, while statistical significance was determined using a significance level of 0.05.

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Fourth, multiple linear regression analysis was conducted to examine the predictive contribution of the three dimensions of climate change literacy to pro-environmental behavior intention. In this model, knowledge of causes, knowledge of impacts, and knowledge of actions/mitigation were entered as independent variables, while pro-environmental behavior intention was entered as the dependent variable. The regression results were interpreted using unstandardized coefficients, standardized beta coefficients, t-values, p-values, R, R^2, adjusted R^2, and F-test values. Multicollinearity was checked using tolerance and variance inflation factor values to ensure that the predictor variables did not overlap excessively.

Results and Discussion

Descriptive analysis maps the distribution of teachers' responses across three literacy domains, namely: causes, impacts, and actions/mitigation of pro-environmental behavior. In line with the literature, teachers more readily agreed with items related to direct causes (fossil fuel combustion, vehicles) and locally perceptible impacts (hotter weather, flooding), while indirect contributions (electricity/water consumption via the carbon footprint of energy systems) required more explicit causal explanations. In the action domain, simple pro-environmental practices (saving electricity/water, reducing paper use, walking/cycling) received high support, while the intention to donate/sell used goods was relatively lower and appeared to be sensitive to the availability of facilities.

The findings indicate the importance of strengthening the causal chain from consumption to emissions (e.g., carbon intensity per kWh, device efficiency) in teacher professional development, as well as local contextualization in Bogor/Greater Jakarta for the impact dimension. On the institutional side, the provision of supporting facilities (separate waste collection points, energy/water saving SOPs, waste bank partnerships) is needed so that intentions can be translated into actual behavior in schools (Aulia et al., 2024; Marcinkowski & Reid, 2019; Masciangelo et al., 2024).

Table 2. Distribution of teachers' responses on the causes of climate change (n = 120)

Statement	Strongly Disagree	Disagree	Somewhat Disagree	Agree	Strongly Agree
Burning fossil fuels (coal, gasoline/diesel)	6 (5.0%)	6 (5.0%)	10 (8.3%)	32 (26.7%)	66 (55.0%)
Use of motor vehicles	5 (4.2%)	7 (5.8%)	12 (10.0%)	38 (31.7%)	58 (48.3%)
Excessive use of electrical appliances	8 (6.7%)	18 (15.0%)	40 (33.3%)	36 (30.0%)	18 (15.0%)
Water treatment/purification process	18 (15.0%)	34 (28.3%)	38 (31.7%)	22 (18.3%)	8 (6.7%)
Use of single-use plastic bags	12 (10.0%)	18 (15.0%)	26 (21.7%)	40 (33.3%)	24 (20.0%)

Table 2 presents teachers' responses regarding knowledge about the causes of climate change. The results show that most teachers agreed that fossil fuel combustion and motor vehicle use are major contributors to climate change, as indicated by the high percentages of respondents who selected "agree" and "strongly agree." However, lower agreement was found for indirect contributors, such as excessive electricity use and water treatment or purification processes. This suggests that teachers have stronger understanding of direct emission sources, while their understanding of indirect consumption-related causes still needs to be strengthened.

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Table 3. Distribution of teachers' responses on the impact of climate change (n = 120)

Statement	Strongly Disagree	Disagree	Somewhat Disagree	Agree	Strongly Agree
Increased frequency of storms	12 (10.0%)	24 (20.0%)	34 (28.3%)	38 (31.7%)	12 (10.0%)
Earlier monsoon & difficult to predict	8 (6.7%)	12 (10.0%)	20 (16.7%)	56 (46.7%)	24 (20.0%)
Floods/droughts/forest fires are increasing	6 (5.0%)	6 (5.0%)	10 (8.3%)	46 (38.3%)	52 (43.3%)
The weather is getting hotter	4 (3.3%)	4 (3.3%)	6 (5.0%)	26 (21.7%)	80 (66.7%)
Sea level rise (polar ice melt)	6 (5.0%)	6 (5.0%)	10 (8.3%)	38 (31.7%)	60 (50.0%)

Table 3 shows teachers' responses regarding the impacts of climate change. The findings indicate that teachers were more likely to agree with climate change impacts that are locally observable, such as hotter weather, changes in seasonal patterns, floods, droughts, and forest fires. In contrast, the item related to the increased frequency of storms received relatively lower agreement. This pattern suggests that teachers' climate impact literacy is stronger when the impacts are connected to familiar local experiences and environmental conditions.

Table 4. Distribution of teachers' responses to actions/mitigation (n = 120)

Statement	Strongly Disagree	Disagree	Somewhat Disagree	Agree	Strongly Agree
Walking/cycling for short distances	4 (3.3%)	4 (3.3%)	6 (5.0%)	36 (30.0%)	70 (58.3%)
Saving electricity in daily life	4 (3.3%)	4 (3.3%)	8 (6.7%)	42 (35.0%)	62 (51.7%)
Saving water in daily life	4 (3.3%)	6 (5.0%)	12 (10.0%)	48 (40.0%)	50 (41.7%)
Recycling	4 (3.3%)	4 (3.3%)	8 (6.7%)	30 (25.0%)	74 (61.7%)
Reducing paper usage (double-sided/digital)	4 (3.3%)	6 (5.0%)	10 (8.3%)	44 (36.7%)	56 (46.7%)

Table 4 describes teachers' responses to climate change actions and mitigation practices. The majority of respondents showed strong agreement with simple and practical mitigation actions, such as walking or cycling for short distances, saving electricity and water, recycling, and reducing paper use. Among these actions, recycling and walking or cycling received particularly high support. These results indicate that teachers generally recognize low-cost and daily mitigation practices as relevant actions to reduce environmental impacts.

Table 5. Distribution of teachers' pro-environmental behavior intentions (n = 120)

Statement	Strongly Disagree	Disagree	Somewhat Disagree	Agree	Strongly Agree
Turn off the lights when leaving the room	4 (3.3%)	4 (3.3%)	8 (6.7%)	30 (25.0%)	74 (61.7%)
Turning off the tap while brushing teeth	4 (3.3%)	6 (5.0%)	12 (10.0%)	34 (28.3%)	64 (53.3%)

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Disposing of waste in recycling bins	6 (5.0%)	10 (8.3%)	20 (16.7%)	34 (28.3%)	50 (41.7%)
Turn off the fan when leaving the room	4 (3.3%)	4 (3.3%)	8 (6.7%)	28 (23.3%)	76 (63.3%)
Reducing shower duration	10 (8.3%)	12 (10.0%)	20 (16.7%)	44 (36.7%)	34 (28.3%)
Using both sides of paper/digital materials	4 (3.3%)	8 (6.7%)	12 (10.0%)	42 (35.0%)	54 (45.0%)
Turn off audiovisual devices when not in use	6 (5.0%)	8 (6.7%)	14 (11.7%)	32 (26.7%)	60 (50.0%)
Turning off the shower while soaping up	10 (8.3%)	12 (10.0%)	26 (21.7%)	34 (28.3%)	38 (31.7%)
Donating/selling unused items for recycling	12 (10.0%)	16 (13.3%)	28 (23.3%)	26 (21.7%)	38 (31.7%)

Table 5 presents teachers' pro-environmental behavior intentions. The results show that teachers had strong intentions to perform simple energy- and water-saving behaviors, such as turning off lights, turning off fans, closing taps, and turning off audiovisual devices when not in use. However, relatively lower intention was found for behaviors that require additional facilities or external support, such as donating or selling unused items for recycling and consistently using recycling bins. This indicates that teachers' pro-environmental intentions are stronger for behaviors that are easy to perform individually, while actions requiring structural support may need better school facilities and institutional encouragement.

Based on the data above, the majority of teachers affirm that direct sources of emissions, such as the burning of fossil fuels and the use of motor vehicles, are the main drivers of climate change (total agree + strongly agree >80%). Conversely, indirect contributors such as electricity consumption and water utility processes received lower approval ratings, indicating the need to strengthen teachers' professional development in understanding the causal chain from consumption to energy to emissions.

Then, in terms of impact, according to the locally prominent impact points, such as increasingly hot weather, seasonal shifts, and an increase in hydrometeorological events, which received high approval. Conversely, phenomena that are rarely experienced in Bogor (e.g., tropical storms) tend to be less agreed upon. This emphasizes the importance of location-based contextualization (Bogor/Jabodetabek weather data, school energy/water audits) so that the concept of impact is more grounded (Masciangelo et al., 2024; Purnama et al., 2025).

Then, in terms of action/mitigation, this can be seen through low-cost pro-environmental practices, such as saving electricity/water, walking, cycling, reducing paper use, and recycling waste. This receives the strongest support, in line with the idea of effectiveness knowledge, which is the belief that actions produce tangible benefits, including savings on utility costs (Alshehri, 2024; Djuwita & Benyamin, 2019).

Meanwhile, in terms of intention, the highest intention appears in energy/water-saving behaviors that are easy to do, such as turning off lights/computer devices and closing water taps. Relatively lower intentions are recorded in donating or selling used items for recycling, and those that are sensitive to the availability of facilities. This implies that in addition to improving literacy, schools need to reduce structural barriers (M. Jaime et al., 2022). Furthermore, the transformation of intentions into actual behavior can be observed through separate waste collection points, regular transportation schedules, and waste bank partnerships (Aulia et al., 2024; Wati et al., 2024).

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Based on the research results, the main findings are: (a) literacy regarding direct causes and local impacts is already strong; (b) understanding of indirect contributors still needs to be sharpened; (c) support for low-cost actions is high; (d) intention to take actions that require structural support is lower. Meanwhile, the implications based on the research data are that it is necessary to combine strengthening causal literacy (consumption–energy–emissions), local contextualization, and improvement of the school support ecosystem so that intentions become actual behavior in the school environment.

The relationship between climate change literacy and pro-environmental behavioral intentions

Zero-order correlation tests show that climate change literacy—both as a composite score and by dimension (causes, impacts, actions/mitigation)—is positively and significantly correlated with teachers' pro-environmental behavioral intentions. Referring to the criteria of Schober et al. (Schober et al., 2018), r values in the range of 0.10–0.39 are categorized as weak, but still practically meaningful when consistent across dimensions. In the research data, the strongest correlation appeared in knowledge of action/mitigation ($r \approx .36$), followed by composite knowledge ($r \approx .34$) and knowledge of impact ($r \approx .29$), while knowledge of causes remained significant but was the smallest ($r \approx .21$). This pattern implies that the more teachers understand what can be done (the effectiveness of actions, pro-environmentalism, and how to implement them in schools), the stronger their intention to practice them (Djuwita & Benyamin, 2019).

Substantively, these findings support the integration of comprehensive climate education in teacher professional development, not only in scientific aspects (mechanisms, trends, and evidence), but also in the causal bridge between energy consumption and emissions and concrete action exercises (energy/water conservation, waste reduction, low-carbon transportation) (Buttazzoni et al., 2024; M. Jaime et al., 2022; Salazar et al., 2024). Learning strategies that link real action in schools (classroom energy audits, turning off electronic devices, and waste bank projects) with measurable impacts have the potential to strengthen intentions and facilitate translation into everyday behavior.

Table 6. Correlation between climate change literacy (by dimension and composite) and pro-environmental behavior intention (n = 120)

Variable (predictor)	r with PEB Intention	p-value	Description
Knowledge of causes	.21**	.015	Positive, weak, significant
Knowledge of impact	.29**	.002	Positive, weak, significant
Knowledge of action/mitigation	.36**	< .001	Positive, weak–moderate (approaching), significant
Composite literacy (combined)	.34**	< .001	Positive, weak–moderate (approaching), significant

Note: ** $p < .01$. r interpreted according to Schober et al.: 0.10–0.39 = weak (but practically relevant if consistent).

PEB = *pro-environmental behavior intention*.

Based on the research findings, the implications for Al-Ashriyyah Nurul Iman Foundation Junior High School in Bogor are as follows:

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Prioritize the action/mitigation dimension

Develop modules that emphasize the effectiveness of actions (how much impact there is on electricity/water savings, paper reduction, and recycling) accompanied by performance indicators (e.g., reduction in kWh/class, liters of water/dormitory).

Strengthen causal links

Link consumption to energy mix and emissions with local examples (such as school electricity usage profiles, audiovisual equipment procedures, peak load management).

Contextualize the impact

Use data and case studies from the Bogor region (such as rainfall patterns, flooding, and hot weather) to make the "impact" dimension more relevant, thereby encouraging the intention to take pro-environmental actions.

Design a supportive environment

Install eco-friendly defaults, such as double-sided printers, light/air conditioner *timers*, visual prompts on switches/faucets, easily accessible recycling collection points, and regular feedback (utility dashboard) to turn intentions into practice.

Multiple regression

Regression analysis was used to assess the extent to which each dimension of climate literacy—causes, impacts, and actions/mitigation—predicts teachers' pro-environmental behavior intentions. The multicollinearity assumption test showed adequate conditions, with tolerance in the range of 0.707–0.813 and VIF at 1.231–1.414, indicating no correlation issues between predictors that could interfere with coefficient estimation.

The estimated regression model is significant and suitable for use, with $R^2 = 0.172$ (≈ 17.2% of the variation in pro-environmental intentions is explained by the three predictors). Specifically, knowledge of the impacts ( ) and knowledge of actions/mitigation measures emerged as significant predictors, while knowledge of the causes did not show a meaningful contribution when the other two predictors were already in the model. In other words, teachers' understanding of what is happening (impact) and what can be done (action/mitigation) has a stronger relationship with pro-environmental behavioral intentions than simply knowing why (causes).

The regression coefficients confirm this pattern: mitigation has the greatest contribution to intention ($B = 0.334$; $p < 0.001$), followed by impact ($B = 0.159$; $p < 0.05$), while cause is not significant ($B = 0.074$; $p = 0.273$). Practically, these results suggest that professional development for teachers at Al-Ashriyyah Nurul Iman Islamic Boarding School Bogor should prioritize actionable strategies, such as energy/water conservation, waste reduction, and low-carbon transportation, complete with contextual examples at school, as well as indicators of success, such as a reduction in kWh/class, liters of water/school, and volume of paper waste. Knowledge about local impacts, such as hot weather, rainfall, and flooding, should be used as triggers for relevance so that awareness can bridge the gap to intention and transform into stronger practices.

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Table 7. Regression between knowledge (causes, impacts, mitigation) and pro-environmental behavior intentions

Variable	Unstandardized coefficient B	SE	Beta	t	p
(Constant)	1.643	0.306	—	5.362	0.000
Impact of climate change	0.159	0.064	0.152	2.443	0.015
Causes of climate change	0.074	0.067	0.065	1.097	0.273 (n.s.)
Climate change mitigation	0.334	0.065	0.296	5.113	0.000***

Model summary: $R = 0.415$; $R^2 = 0.172$; Adjusted $R^2 = 0.164$; $F(3, 307) = 21.11$; $p < 0.001$.

Note: *p < 0.05; **p < 0.01; ***p < 0.001; n.s. = not significant.

Based on the research findings, the implications for Al-Ashriyyah Nurul Iman Foundation Junior High School in Bogor are as follows:

Prioritize mitigation and impact modules.

Emphasize specific *how-to*'s (such as standard operating procedures for turning off devices, *default* double-sided printing, light/AC *timers*, and paper waste management) and measure their impact (utility dashboard).

Use local context as an anchor for relevance.

Link mitigation steps to data or events in the Bogor area to strengthen teachers' motivation and intent.

Supplement with knowledge of the causes as a foundation

Although not significant in the full model, understanding the causes remains important so that mitigation practices are based on sound scientific reasoning.

Conclusion

This study concludes that climate change literacy is positively associated with teachers' pro-environmental behavior intention at the Al-Ashriyyah Nurul Iman Islamic Boarding School Foundation in Bogor. The findings show that teachers have stronger understanding and agreement regarding direct causes of climate change, locally perceived impacts, and simple mitigation actions, such as saving electricity and water, reducing paper use, walking or cycling for short distances, and recycling. However, understanding of indirect contributors, such as electricity consumption and water treatment processes, still needs to be strengthened.

Among the three dimensions of climate change literacy, knowledge of actions/mitigation showed the strongest relationship with pro-environmental behavior intention, followed by knowledge of impacts. Regression analysis also confirmed that knowledge of actions/mitigation and knowledge of impacts significantly contributed to teachers' pro-environmental behavior intention, while knowledge of causes did not show a significant contribution when the other dimensions were included in the model. This indicates that teachers' intention to engage in pro-environmental behavior is more strongly shaped by their understanding of what actions can be taken and how climate change affects their local environment than by knowledge of causes alone.

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Climate change education for teachers should not only emphasize scientific explanations of climate change causes, but also strengthen contextual impact awareness and practical mitigation strategies that can be applied in the school environment. Teacher professional development programs, teaching materials, and school policies need to prioritize action-oriented climate literacy, including energy saving, water conservation, waste management, paper reduction, and recycling practices. In the context of boarding schools, these efforts can support the formation of sustainable habits and strengthen teachers' role as agents of pro-environmental school culture.

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