

Management of Climate Change Resilient Public Elementary Schools in Calapan City, Oriental Mindoro

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ABSTRACT

This study examined the management practices for climate-resilient education in public elementary schools in Calapan City, Oriental Mindoro, and their influence on learners' climate change awareness. Specifically, it assessed school management practices in terms of planning and preparedness, resource management, response and recovery, stakeholder and community partnerships, and monitoring and evaluation. It also evaluated the extent of Climate Change Education (CCE) integration through curriculum content, instructional strategies, learning materials and resources, and school-based environmental activities. Furthermore, the study measured learners' climate change awareness in cognitive, affective, and behavioral dimensions. A quantitative-correlational research design was employed. Data were collected using researcher-made

questionnaires and lesson plan audit tools administered to public elementary school teachers and Grade 5 and Grade 6 learners from selected coastal, lowland, upland, and urban schools. Teachers from Science, Araling Panlipunan, and Edukasyon sa Pagpapakatao (EsP) provided data on school management practices and CCE integration, while learners assessed their level of climate change awareness. Statistical tools used included weighted mean, standard deviation, and multiple regression analysis. The findings revealed that public elementary schools demonstrated high to very high levels of climate-resilient management practices and Climate Change Education integration. Likewise, learners exhibited high levels of cognitive, affective, and behavioral awareness regarding climate change and environmental protection. Results further showed that both school management practices and Climate Change Education integration significantly influenced and predicted learners' climate change awareness. Based on these findings, the study proposed a School Climate Profile Scorecard for Climate-Resilient Education. This tool is designed to help schools assess, monitor, and strengthen climate resilience initiatives, environmental education programs, and sustainability-focused practices, particularly in climate-vulnerable communities frequently exposed to typhoons, flooding, heavy rainfall, and other climate-related hazards.

Keywords: *Climate-resilient education, Climate Change Education, environmental awareness, elementary learners, Calapan City*

INTRODUCTION

Climate-resilient education and Climate Change Education (CCE) have become increasingly important as climate change threatens school stability, learner safety, and continuity of instruction. Public elementary schools are increasingly being called upon to respond to flooding, strong storms, extreme heat, and disrupted infrastructure caused by climate-related disasters that interrupt normal learning routines and diminish school capacity. UNICEF (2023) reported that nearly 242 million children in 85 countries experienced one or more school interruptions in

one year due to climate-related hazards. The Philippines is one of the country's most vulnerable to climate change because of its archipelagic geography and frequent exposure to typhoons and other hazards, with an average of 20 tropical cyclones entering the Philippine Area of Responsibility each year (PAGASA, 2023).

To address these challenges, the government institutionalized Climate Change Education through Republic Act No. 9729 and strengthened its implementation through DepEd policies, programs, and the MATATAG Curriculum (Department of Education, 2023). An example of localized vulnerability is Calapan City, Oriental Mindoro, where communities frequently experience flooding, storm surges, and coastal erosion (Mines and Geosciences Bureau, 2022). Research shows that early exposure to climate-related education helps children develop environmental values and adaptive behaviors (Anderson, 2019), yet inconsistencies in curriculum delivery, inadequate teacher training, and limited localized instructional materials continue to hinder its effective implementation (Garcia & de Guzman, 2020). Given these conditions, this study aimed to examine the management practices for climate-resilient education in public elementary schools in Calapan City and the extent of Climate Change Education integration as reflected through a Lesson Plan Audit and documented school-based environmental activities, and to determine how these factors relate to learners' climate change awareness in its cognitive, affective, and behavioral dimensions, providing empirical evidence for strengthening climate-resilient education in climate-vulnerable school settings.

Literature Review

Climate change has increasingly been recognized as a global crisis with significant impacts on basic education, particularly through disruptions caused by floods, tropical cyclones, heat waves, and other hazards that affect school operations, infrastructure, and instructional continuity (UNESCO, 2021). Elementary schools are especially vulnerable due to learners' need for stable environments, with school closures, damaged facilities, and transport disruptions leading to lost instructional time and reduced academic performance (UNICEF, 2023). Beyond academic disruption, climate change also affects learners' health, safety, and psychosocial well-being, contributing to absenteeism, stress, and anxiety that further hinder learning outcomes (World Bank, 2025). These impacts are more severe in low- and middle-income countries where schools often lack resilient infrastructure, adequate resources, and trained personnel for disaster preparedness and response, resulting in widened educational inequalities and increased dropout risks. International literature also highlights that many schools adopt reactive rather than proactive approaches, with limited long-term climate resilience planning in education systems.

Climate Change Education (CCE) has been recognized as a key response to this crisis, aiming to equip learners with knowledge, values, and skills for climate mitigation and adaptation (UNESCO, 2021). Effective CCE goes beyond scientific content and promotes interdisciplinary, learner-centered, and context-based approaches that integrate environmental issues into multiple subject areas (UNESCO, 2023). Instructional strategies such as inquiry-based learning, collaboration, and experiential activities are emphasized to strengthen learners' engagement and understanding. However, barriers such as limited instructional resources, inadequate teacher training, and insufficient institutional support continue to affect the consistent implementation of CCE in schools. School-based environmental activities further reinforce classroom learning by allowing learners to apply knowledge in real-life contexts, helping develop environmental responsibility and awareness (UNICEF, 2023).

In the Philippine context, climate change significantly affects basic education due to frequent exposure to typhoons, flooding, storm surges, and other hazards that damage school infrastructure and disrupt classes (UNICEF, 2022). Repeated class suspensions reduce instructional time and force teachers to adjust lesson pacing, affecting learning quality and continuity (Alarte, 2024). Schools located in coastal, upland, and lowland areas experience varying levels of vulnerability, highlighting the need for context-specific climate resilience strategies (Antonio & Villanueva, 2023). Studies also show that Filipino learners experience psychosocial effects such as anxiety and stress due to repeated disasters and uncertain school schedules, further affecting their participation and performance (UNICEF, 2022). While Climate Change Education is integrated into the curriculum through

subjects such as Science and Araling Panlipunan, its implementation remains inconsistent due to differences in teacher preparedness, resource availability, and institutional support (Garcia & Lorenzo, 2023).

Overall, both foreign and local literature emphasize that climate change has multifaceted effects on basic education, affecting instructional continuity, learner well-being, and educational equity. Although Climate Change Education and school-based resilience practices are recognized as essential responses, gaps remain in consistent implementation, teacher capacity, and localized instructional support. These gaps highlight the need for further investigation into how school management practices and CCE integration influence learners' climate change awareness in Philippine public elementary schools, particularly in climate-vulnerable contexts.

Theoretical and Conceptual Framework

The research is anchored on Constructivist Learning Theory (Piaget, 1952) and Environmental Literacy Theory (Roth, 1992), which together explain how Climate Change Education (CCE) influences environmental awareness and resilience among elementary learners. Constructivist Learning Theory posits that learners construct knowledge through experiences and interaction with their environment. At the elementary level, learners are in the Concrete Operational Stage, where understanding is strengthened through hands-on activities and real-life experiences that make abstract concepts more meaningful. In this context, CCE aligns with constructivist principles by providing experiential learning opportunities such as community-based projects, environmental activities, and problem-solving tasks that allow learners to apply knowledge in real-world situations. Thus, CCE is best implemented as an integrated approach across learning areas rather than a separate subject, enabling learners to construct meaning from their environmental experiences (Piaget, 1952).

Environmental Literacy Theory further supports this by emphasizing the development of knowledge, skills, attitudes, and behaviors necessary for responsible environmental decision-making (Roth, 1992). Environmental literacy includes understanding environmental concepts, awareness of issues, attitudes of responsibility, and behaviors that support environmental sustainability. In the Philippine context, the UNESCO framework for Education for Sustainable Development (ESD) reinforces the integration of sustainability, climate change, disaster risk reduction, and responsible citizenship in education, highlighting the need to prepare learners as active contributors to climate-resilient communities (UNESCO, 2021). These theoretical perspectives guide the study in examining the integration of Climate Change Education in elementary schools and its effect on learners' environmental awareness, while also informing the development of a Climate Resilience Education Framework grounded in learners' cognitive development and the socio-geographic context of Calapan City as a climate-vulnerable community.

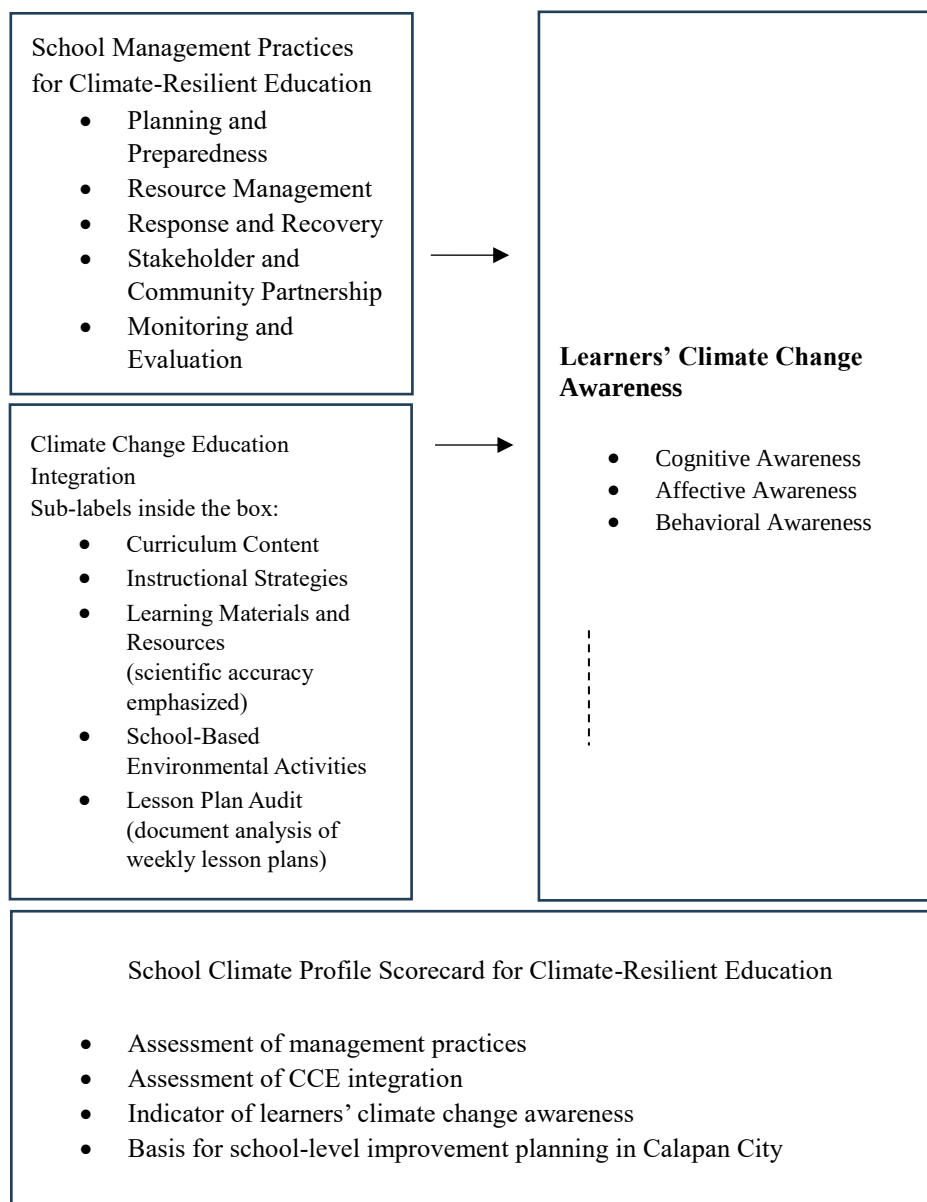


Figure 1. *Hypothesized Directional Relationships among Variables*

Significance of the Study

This study is anchored on the rationale that climate-resilient education management practices and the integration of Climate Change Education (CCE) play a significant role in developing learners' climate change awareness in public elementary schools. The approach of the study focuses on examining school management practices, CCE integration, and learners' awareness in terms of cognitive, affective, and behavioral dimensions to determine their relationships and predictive influence. The possible outcomes of this study may reveal the level of effectiveness of school planning and preparedness, resource management, response and recovery, stakeholder partnerships, and monitoring and evaluation, as well as the extent of CCE integration in curriculum content,

instructional strategies, learning materials, and school-based environmental activities, and how these collectively influence learners' climate change awareness. The study may benefit elementary learners by improving their climate change understanding, environmental concern, and responsible practices through enhanced school-based learning experiences; teachers by providing clear indicators for improving CCE integration in lesson planning, instructional strategies, and environmental activities aligned with the MATATAG curriculum; school heads by serving as a basis for strengthening decision-making in planning, preparedness, resource management, response systems, partnerships, and monitoring and evaluation using the proposed school climate profile scorecard; education supervisors and policymakers by providing evidence-based and location-specific data that can guide the development of programs, technical support, policy enhancement, and capacity-building initiatives for climate-resilient education; and future researchers by offering structured variables, indicators, and methodologies that may be replicated or further developed in studies related to climate change education, school resilience, and learner outcomes in basic education.

Statements of the Problem

The study aimed to determine the management practices for climate-resilient education in public elementary schools in Calapan City.

Specifically, the study sought to:

1. Determine the level of management practices for climate change–resilient education in public elementary schools in Calapan City when schools are categorized as coastal, lowland, upland, and urban, in terms of planning and preparedness, resource management, response and recovery, stakeholder and community partnership, and monitoring and evaluation.
2. Evaluate the extent is Climate Change Education integrated in public elementary schools as reflected in the Lesson Plan Audit in terms of curriculum content, instructional strategies, learning materials and resources, and school-based environmental activities.
3. Determine the level of climate change awareness among elementary learners in terms of cognitive awareness, affective awareness, and behavioral awareness.
4. Investigate whether school management practices and Climate Change Education integration significantly predict learners' climate change awareness.
5. **Develop** a School Climate Profile Scorecard that may be used to assess the effectiveness of school management practices and Climate Change Education integration in promoting learners' climate change awareness.

METHODS

This chapter explains all the techniques used throughout this project. It discusses how research design, location of research, respondents of research, sampling methods, instruments for research, scoring and quantifying of data collection methods and statistical tools were utilized to accomplish this goal.

Study Design

The study employed a descriptive-correlational and predictive research design to determine the level of school management practices for climate-resilient education, the extent of Climate Change Education (CCE) integration, and their relationship with learners' climate change awareness. The quantitative method was used to gather numerical data and analyze relationships among variables without manipulation. The correlational design examined the relationship between school management practices, CCE integration, and learners' climate change awareness. A comparative analysis was also conducted to determine differences in practices across school types (coastal, upland, lowland, and urban), considering varying exposure to climate risks. Multiple regression analysis was used to determine the predictive influence of school management practices and CCE integration on learners'

climate change awareness. The results served as basis for the development of a School Climate Profile Scorecard for Climate-Resilient Education.

Sample/Population of the Study

The respondents consisted of two groups: teacher respondents and learner respondents. Teacher respondents were public elementary school teachers responsible for school management practices such as planning, resource management, response and recovery, partnerships, and monitoring and evaluation, as well as CCE integration in instruction. Learner respondents were Grade 5 and Grade 6 students who assessed their cognitive, affective, and behavioral climate change awareness. Lesson plans and instructional materials were also reviewed to determine the extent of CCE integration in classroom instruction and school-based activities.

Data Gathering Tools

Three instruments were used in the study, namely the Management of Climate-Resilient Education Questionnaire, the Learners' Climate Change Awareness Scale, and the Lesson Plan Audit Rubric. The Management of Climate-Resilient Education Questionnaire measured planning and preparedness, resource management, response and recovery, stakeholder partnership, and monitoring and evaluation. The Learners' Climate Change Awareness Scale assessed learners' cognitive, affective, and behavioral awareness of climate change. The Lesson Plan Audit Rubric evaluated the integration of Climate Change Education (CCE) in terms of curriculum content, instructional strategies, learning materials, and school-based environmental activities. All instruments utilized a 5-point Likert scale and were validated by experts in educational management, environmental education, and research methodology to ensure clarity, relevance, and alignment with the objectives of the study.

Data Gathering Procedure

Permission was obtained from the Schools Division Office of Calapan City and school heads. Questionnaires were administered to teachers and learners with informed consent and confidentiality assurance. Lesson plan audits were conducted using stratified random sampling and evaluated by three independent raters. All data were collected, organized, tabulated, and prepared for statistical analysis.

Treatment of Data

Weighted mean and standard deviation were used to describe school management practices, CCE integration, and learner awareness. Pearson's r was used to determine relationships among variables. Multiple regression analysis was used to determine predictive influence. A 0.05 level of significance was used. Results with $p \leq 0.05$ were considered significant.

Ethical Consideration

Ethical approval was secured from the Schools Division Office of Calapan City and participating schools. Participation was voluntary, and informed consent and assent were obtained. Confidentiality and anonymity were strictly observed. Data were stored securely and used only for academic purposes. No harm was caused to participants, and data collection was conducted without disrupting school activities. The study ensured respect, voluntary participation, confidentiality, and protection of all respondents throughout the research process.

RESULTS AND DISCUSSIONS

This chapter provides a presentation, analysis, and interpretation of the data obtained to explore the management practices in place for climate-change-resilient education, the degree to which Climate Change

Education is integrated into teaching and learning experiences, and the level of awareness of climate change among learners attending public elementary schools in Calapan City.

The descriptive statistics used to ascertain the degree to which these variables exist are weighted means and standard deviations, while multiple regression analyses were conducted to determine which indicators significantly predicted learners' awareness of climate change. In interpreting the data, special consideration was given to the geographical and environmental realities of Calapan City where public elementary schools are located in coastal, lowland, upland, and urban environments and experience different climate-related problems. The results serve as empirical bases for creating a proposed School Climate Profile Scorecard for Climate-Resilient Education.

Level of Management Practices for Climate Change–Resilient Education in Public Elementary Schools in Calapan City When Schools are Categorized as Coastal, Lowland, Upland, and Urban, in Terms of Planning and Preparedness, Resource Management, Response and Recovery, Stakeholder and Community Partnership, and Monitoring and Evaluation.

Table 1 presents the overall level of management practices for climate change–resilient education in public elementary schools in Calapan City as High, with a weighted mean of 4.32 and a standard deviation of 0.22, indicating consistent implementation across domains. Planning and Preparedness obtained the highest mean (4.73, Very High), signifying strong disaster planning, risk assessments, and orientations for teachers and learners. This reflects proactive preparedness and supports Antonio and Villanueva (2023), who emphasized its importance in climate-resilient school management, as well as the Department of Education (2024), which highlighted institutionalized preparedness for instructional continuity.

Resource Management was rated High ($M = 4.18$), showing effective resource use but with a need for improved funding and updated instructional materials, consistent with Cruz and Ramos (2023) and Mendoza and Flores (2024). Response and Recovery also rated High ($M = 4.43$), indicating strong mechanisms to sustain learning during emergencies, aligning with Paragas and Reyes (2024), who stressed the importance of clear recovery systems.

Although still High, Stakeholder and Community Partnership was the lowest-rated indicator ($M = 4.12$). This implies limited collaboration with parents, local government, NGOs, and community groups, despite their crucial role in sustaining climate-resilient education. The finding supports Garcia and Mendoza (2023) and Lopez and Rivera (2024), who emphasized stakeholder collaboration as vital for resilience.

Finally, Monitoring and Evaluation was rated High ($M = 4.26$), reflecting effective accountability systems. This supports Rogers and Castillo (2023) and Villanueva and Torres (2024), who highlighted the need for continuous improvement and evidence-based practices.

Overall, the findings indicate that schools in Calapan City demonstrate strong climate-responsive management practices, with preparedness as their greatest strength. However, reinforcing resource management, monitoring systems, and especially stakeholder collaboration remains essential to achieve a more comprehensive and sustainable climate change–resilient education system.

Table 1. *Level of Management Practices for Climate Change–Resilient Education in Public Elementary Schools in Calapan City*

Indicator	Mean	SD	Description	Rank
Planning and Preparedness	4.73	0.41	Very High	1
Resource Management	4.18	0.62	High	4
Response and Recovery	4.43	0.61	High	2
Stakeholder and Community Partnership	4.12	0.67	High	5
Monitoring and Evaluation	4.26	0.61	High	3

Weighted Mean: 4.34 SD: 0.22 Description: High

Extent of Climate Change Education Integrated in Public Elementary Schools as Reflected in the Lesson Plan Audit in Terms of Curriculum Content, Instructional Strategies, Learning Materials and Resources, and School-Based Environmental Activities.

The data in Table 2 reveal that the overall extent of Climate Change Education integration in public elementary schools in Calapan City was High (WM = 4.15, SD = 0.09). This indicates consistent integration of climate concepts and environmental practices into classroom instruction and school-based activities, as confirmed by lesson plan audits and documentary analysis.

Among the indicators, Instructional Strategies and School-Based Environmental Activities obtained the highest weighted mean (M = 4.23, High). For instructional strategies, teachers commonly employed learner-centered and participatory approaches such as collaborative learning, inquiry-based activities, and contextualized instruction. This corroborates Garcia and Lorenzo (2023), who emphasized that contextualized strategies enhance learner engagement, and Shepardson et al. (2011), who noted that participatory approaches strengthen comprehension of climate concepts.

School-based environmental activities also rated high, reflecting active implementation of tree planting, waste segregation, disaster drills, and sustainability campaigns. This supports Mendoza (2025), who highlighted the role of environmental activities in fostering climate-responsive behavior, and UNICEF (2023), which stressed their importance in providing authentic contexts for learning.

Curriculum Content obtained a mean of 4.13 (High), showing substantial integration of climate-related concepts into lesson objectives and competencies. This supports Castillo and Rabanal (2023), who emphasized embedding climate competencies into curriculum content, and UNESCO (2023), which advocated mainstreaming sustainability across learning areas.

Finally, Learning Materials and Resources received the lowest mean (M = 4.02, High), implying limitations in access to updated and localized resources. This confirms Regio (2023), who reported challenges in accessing localized materials, and Garcia and Lorenzo (2023), who noted that insufficient resources may limit instructional depth.

Overall, the findings indicate that Climate Change Education is substantially integrated in Calapan City schools through curriculum content, instructional strategies, learning resources, and environmental activities. The consistently high ratings suggest strong recognition of climate-responsive education.

Table 2. *Extent of Climate Change Education Integrated in Public Elementary Schools as Reflected in the Lesson Plan Audit in Terms of Curriculum Content, Instructional Strategies, Learning Materials and Resources, and School-Based Environmental Activities*

Indicator	Mean	SD	Description	Rank
Curriculum Content	4.13	0.73	High	3
Instructional Strategies	4.23	0.79	High	1
Learning Materials and Resources	4.02	0.67	High	4
School-Based Environmental Activities	4.23	0.72	High	1

Weighted Mean: 4.15 SD: 0.09 Description: High

Level of Climate Change Awareness among Elementary Learners in Terms of Cognitive Awareness, Affective Awareness, and Behavioral Awareness.

The data in Table 3 reveal that the overall level of climate change awareness among elementary learners in Calapan City was High (WM = 4.12, SD = 0.24). This indicates that Grade 5 and Grade 6 learners generally possess substantial understanding, concern, and environmentally responsible behaviors related to climate change and environmental protection.

Among the three dimensions, Affective Awareness obtained the highest mean (M = 4.42, High), showing that learners strongly demonstrate emotional concern, empathy, and positive attitudes toward environmental issues. This supports Tang (2022), who emphasized the role of affective engagement in fostering environmental responsibility, and UNICEF (2024), which explained that meaningful climate education strengthens learners' emotional attachment to environmental protection.

Cognitive Awareness garnered a mean of 3.83 (High), indicating substantial knowledge of climate concepts, disaster risks, and human impacts on the environment. This supports Anderson (2019), who noted that early exposure enhances climate literacy, and Monroe et al. (2019), who stressed that contextualized lessons deepen comprehension.

Behavioral Awareness obtained a mean of 4.11 (High), reflecting frequent environmentally responsible practices such as waste segregation, conservation, and participation in school programs. This corroborates Hungerford and Volk (1990), who emphasized that environmental education becomes meaningful when learners demonstrate responsible behavior.

Overall, the findings indicate that elementary learners in Calapan City demonstrate a high level of climate change awareness, particularly in emotional concern and environmental values. The integration of Climate Change Education and school-based environmental activities has positively contributed to learners' literacy and climate-responsive behavior.

Table 3. *Level of Climate Change Awareness among Elementary Learners in Terms of Cognitive Awareness, Affective Awareness, and Behavioral Awareness.*

Statement	Mean	SD	Description	Rank
Cognitive Awareness	3.83	0.74	High	3
Affective Awareness	4.42	0.61	High	1
Behavioral Awareness	4.11	0.70	High	2

Weighted Mean: 4.12 SD: 0.24 Description: High

Predictive Influence of School Management Practices on Learners' Climate Change Awareness

School Management Practices

Results show that all dimensions significantly predicted learners' climate change awareness. Stakeholder and Community Partnership had the highest beta ($\beta = 0.35$, $p = 0.000$), indicating the strongest influence on learners' awareness through active involvement of parents, LGUs, and community organizations. Planning and Preparedness ($\beta = 0.32$, $p = 0.000$), Monitoring and Evaluation ($\beta = 0.31$, $p = 0.000$), and Response and Recovery ($\beta = 0.29$, $p = 0.000$) also significantly predicted awareness. Resource Management had the lowest beta ($\beta = 0.27$, $p = 0.000$) but remained significant. These findings reflect climate-related disruptions in Calapan City and emphasize the need for strong school management systems and stakeholder collaboration. This supports Li and Tan (2023) and UNESCO (2024), highlighting that climate-resilient management strengthens environmental awareness and resilience among learners.

To sum, the results of this research indicate that effective school management practices must be expanded in order to produce environmentally aware and climate-responsive learners in the public elementary schools in Calapan City. The results also demonstrate that schools, which maintain effective partnerships with stakeholders, preparedness systems, monitoring of activities and management of climate-responsive educational practices will be considered to be capable of enhancing the development of environmental literacy, sustainability consciousness and climate resiliency in their learners.

Table 4. *Regression Analysis on the Predictive Influence of School Management Practices on Learners' Climate Change Awareness*

Predictor Variables	Beta Coefficient	t-value	p-value	Decision	Interpretation
Planning and Preparedness	0.32	4.88	0.000	Reject Ho	Significant Predictor
Resource Management	0.27	4.21	0.000	Reject Ho	Significant Predictor
Response and Recovery	0.29	4.46	0.000	Reject Ho	Significant Predictor
Stakeholder and Community Partnership	0.35	5.13	0.000	Reject Ho	Significant Predictor
Monitoring and Evaluation	0.31	4.75	0.000	Reject Ho	Significant Predictor

Climate Change Education Integration

All indicators significantly predicted awareness. School-Based Environmental Activities was the strongest predictor ($\beta = 0.49$), followed by instructional strategies, curriculum content, and learning materials. These findings reflect the realities in Calapan City, where learners are exposed to climate-related hazards, emphasizing the importance of hands-on and contextualized Climate Change Education. This supports Monroe et al. (2019) and UNESCO (2024), which highlight that experiential, integrated climate education strengthens environmental awareness and sustainability behavior among learners, consistent with Environmental Literacy Theory.

The findings indicated that strengthening Climate Change Education integration is essential in developing environmentally aware and climate-responsive learners in public elementary schools in Calapan City. The results further imply that schools may strengthen climate-resilient education by prioritizing sustainability-oriented school activities, participatory environmental programs, contextualized instructional strategies, and experiential learning opportunities alongside classroom instruction.

Table 5. *Regression Analysis on the Predictive Influence of Climate Change Education Integration on Learners' Climate Change Awareness*

Predictor Variables	Beta Coefficient	t-value	p-value	Decision	Interpretation
Curriculum Content	0.41	5.92	0.000	Reject Ho	Significant Predictor
Instructional Strategies	0.46	6.44	0.000	Reject Ho	Significant Predictor
Learning Materials and Resources	0.38	5.57	0.000	Reject Ho	Significant Predictor
School-Based Environmental Activities	0.49	6.88	0.000	Reject Ho	Significant Predictor

Among the variables under Climate Change Education integration, School-Based Environmental Activities obtained the highest beta coefficient of 0.49, making it the strongest predictor of learners' climate change awareness among public elementary schools in Calapan City. This means that experiential and participatory environmental activities contributed approximately 49% predictive influence toward strengthening learners' environmental awareness compared with the other indicators included in the regression model, implying that learners develop stronger climate-responsive attitudes and behaviors when they actively participate in environmental programs, ecological campaigns, clean-up drives, waste segregation activities, tree planting, and school-based sustainability initiatives. This finding supports Environmental Literacy Theory, which explains that environmental knowledge, attitudes, and responsible behavior are strengthened through experiential learning and active environmental engagement, and is further supported by UNESCO (2024) and Monroe et al. (2019), which emphasize that participatory and experiential environmental education improves environmental responsibility, climate literacy, and climate-responsive behavior among learners.

The findings further imply that public elementary schools may strengthen climate-resilient education by prioritizing sustainability-oriented school activities and experiential environmental programs alongside classroom instruction. These activities provide learners with opportunities to practice environmental responsibility, collaboration, and climate-responsive decision-making.

5. Proposed School Climate Profile Scorecard for Climate-Resilient Education

Research findings indicated that School Management and Climate Change Education Integration are related to students' Climate Change Awareness. The study also found that most public elementary schools in Calapan City exhibit Climate-Resilient Education Management, Climate Change Education Integration, and Climate Change Awareness at a high to very high level; however, Climate-related Risk Assessments, Resource Mobilization, updating of instructional materials, and sustainability-oriented student behaviors rated lower than other measures. Therefore, there is a need for a structured tool to assess and monitor Climate-Resilient Education Management Practices and Climate Change Education Integration on an ongoing basis.

A proposed School Climate Profile Scorecard was developed to serve as an assessment, monitoring, and planning tool for school administrators, teachers, and stakeholders. It includes four key dimensions: School Management Practices, Climate Change Education Integration, Learners' Climate Change Awareness, and Institutional Sustainability and Innovation. School Management Practices covers Planning and Preparedness, Resource Management, Response and Recovery, Stakeholder and Community Partnership, and Monitoring and Evaluation. Climate Change Education Integration includes Curriculum Content, Instructional Strategies, Learning Materials and Resources, and School-Based Environmental Activities. Learners' Climate Change Awareness includes Cognitive, Affective, and Behavioral Awareness, while Institutional Sustainability and Innovation covers Sustainability Mechanisms and Innovation and Best Practices.

The scorecard provides a structured evaluation framework, performance rating scale (1–5), school profiling section, scoring system, and interpretation of results ranging from Climate-Vulnerable to Excellent Climate-Resilient Schools. It also includes sections for identifying strengths and priority areas for improvement, and a School Improvement Action Plan that translates findings into targeted interventions with assigned responsibilities, timelines, resources, and success indicators. A quality assurance decision framework supports classification and recognition, while implementation notes guide annual use, evidence-based assessment, contextualization, and policy application.

Discussion of the Proposed Output

The proposed School Climate Profile Scorecard for Climate-Resilient Education was developed based on the study's findings, which showed that school management practices and Climate Change Education integration significantly influence learners' climate change awareness, with Stakeholder and Community Partnership and School-Based Environmental Activities emerging as the strongest predictors. The scorecard was designed as an evidence-based, continuous quality improvement tool anchored on systematic planning, stakeholder collaboration, monitoring, and sustainability, and includes four dimensions: School Management Practices, Climate Change Education Integration, Learners' Climate Change Awareness, and Institutional Sustainability and Innovation. These components reflect the need to assess and strengthen climate-resilient education in public elementary schools in Calapan City. The tool is context-sensitive, considering the environmental realities of schools exposed to flooding, typhoons, and other climate-related hazards. It supports Environmental Literacy Theory and Constructivist Learning Theory, emphasizing that environmental awareness develops through experiential, contextualized, and participatory learning.

CONCLUSION

Public elementary schools in Calapan City demonstrated strong implementation of climate change–resilient educational management practices, particularly in Planning and Preparedness and Response and Recovery, supported by effective resource management, stakeholder partnerships, and monitoring and evaluation. Climate Change Education was substantially integrated into classroom instruction and school activities through curriculum content, instructional strategies, learning materials, and school-based environmental activities, reflecting strong support for environmental literacy and sustainability-oriented learning.

Elementary learners demonstrated high levels of cognitive, affective, and behavioral awareness toward climate change and environmental protection, indicating that they possess environmental knowledge, positive attitudes, concern for environmental issues, and responsible environmental behaviors developed through school-based learning experiences. School management practices and Climate Change Education integration significantly influenced learners' climate change awareness, with Climate Change Education integration emerging as the stronger predictor, highlighting the importance of direct environmental instruction and learning experiences.

Overall, the findings support the development of the proposed School Climate Profile Scorecard for Climate-Resilient Education as a framework for assessing, monitoring, and strengthening climate-resilient

education practices, Climate Change Education integration, and environmental awareness initiatives in public elementary schools in Calapan City.

Recommendations

Public elementary schools in Calapan City may further strengthen climate change–resilient educational management practices by enhancing risk assessment, preparedness planning, resource mobilization, response and recovery systems, stakeholder collaboration, and monitoring and evaluation, along with stronger partnerships with LGUs and community stakeholders.

Teachers and school administrators may further enhance Climate Change Education integration by using localized climate issues, contextual discussions, inquiry-based approaches, updated instructional materials, and technology-supported learning resources to strengthen environmental literacy.

Learners' climate change awareness may be continuously developed through experiential learning, environmental advocacy programs, sustainability projects, and active participation in school and community environmental initiatives.

School administrators and teachers may continue strengthening both school management practices and Climate Change Education integration, given their significant influence on learners' environmental awareness, with emphasis on sustainability-oriented instruction and programs.

The proposed School Climate Profile Scorecard for Climate-Resilient Education may be used as an assessment and planning tool for monitoring school performance in climate resilience, guiding improvement planning, technical assistance, and benchmarking across coastal, lowland, upland, and urban schools in Calapan City.

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