Research Article

Administrative and Supervisory Insights on Implementing Climate Change Education in Basic Education

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Abstract - *Climate change education (CCE) has become a crucial component of basic education to equip students with the knowledge, skills, and attitudes necessary to respond to environmental challenges. The administrators and supervisors are key in helping to ensure the successful incorporation of climate education into the school curriculum by way of leadership, guidance and encouragement. Nonetheless, little studies have been devoted to the observation of administrative and supervisory perspectives of the practice of CCE in the Philippine basic education. The research design adopted in this study was descriptive research design based on the quantitative approach and supplemented by qualitative information. The respondents sampled were 45 school administrators, instructional supervisors, coordinators, subject heads, and teachers in the selected basic education schools of DepEd in the 3 rd District in Cebu Province, Philippines, which employed a purposive sampling technique. An estimated questionnaire that had been tested by the researcher was used to gather data and was analyzed through frequency, percentage, weighted average, ranking, and ANOVA to ascertain the degree of administrative assistance, supervision practices, problems, strategies, and perceived effects. Findings revealed a high level of administrative support (WM = 4.16) and supervisory practices (WM = 4.13) in implementing CCE. Key challenges included limited instructional resources and insufficient teacher training (WM = 4.31–4.40). Strategies such as professional development, collaborative teacher teams, monitoring, and student-led projects were identified as effective measures (WM = 4.17). Perceived impact on instructional practices and student engagement was also high (WM = 4.24). he outcome of ANOVA demonstrated significant differences in perception of different groups of respondents (F = 2.87, p = 0.048), which explains the necessity to take into account different points of view in the implementation of the policy. Supervisory and administrative assistance is extremely necessary to facilitate successful CCE integration in basic education. Tailored professional development, resource allocation, and collaborative approaches are essential to overcoming challenges and enhancing teacher performance.*

Keywords - *Climate Change Education, Administrative Support, Supervisory Practices, Basic Education, Curriculum Implementation, Teacher Development.*

I. INTRODUCTION

Climate change education (CCE) has emerged as a pivotal strategy to equip the next generation with the knowledge, attitudes, and skills necessary to confront and adapt to the accelerating climate crisis. It is widely recognized that basic education is key to developing students' climate literacy and fostering environmentally responsible citizens. Despite global policy frameworks have emphasized CCE such as the United Nations action on climate empowerment, most educational systems have difficulties with the school level implementation. This process involves the role of administrators and supervisors because their leadership and support determine the extent to which CCE is properly integrated into the school culture, curriculum and teaching practice. Proper

leadership in schools can provide enabling conditions that focus on professional growth, resource distribution, and development of collaborative strategies that teachers can use to provide climate-oriented teaching. Nonetheless, it has been proposed that educational leaders do not have custom frameworks, training, and policy support unique to climate education, which may obstruct a systematic implementation. Furthermore, poor content knowledge of the teachers, and insufficient teaching materials are some of the challenges that should be handled by the administrators through effective strategic planning. Continuous teacher mentoring and reflective dialogue supervisory practices have also been identified to lead to better instructional capacity in complex subjects but are not used in climate change situations. This is why it is critical to learn the lessons of the administrators and supervisors to see the strengths and the weak points of institutionalizing CCE within the foundational education systems. Such insights can illuminate how leadership behaviors, school priorities, and systemic support structures shape the quality and consistency of climate learning experiences for students.

This study investigates the administrative and supervisory perspectives on implementing climate change education within basic education settings, focusing on how leaders interpret, support, and operationalize climate education policies and practices in schools. It examines the actions of administrators and supervisors as it relates to the development of CCE integration in the areas of the curricula, professional learning, school culture and resource distribution. Through the analysis of leadership practices and beliefs, the research will determine those strategies that facilitate or limit effective climate change teaching. The study takes into account the way school leaders negotiate institutional, curriculum, and the support needs of teachers to deal with climate change education. It also evaluates the ability of administrators to implement entire-school strategies which address pedagogical ambitions and the wider sustainability models. The study also leads to the creation of knowledge about leadership practices that can result in significant CCE student outcomes. Ultimately, this research seeks to advance understanding of how educational systems can more effectively respond to the global imperative for climate literacy from the lens of those guiding schools.

Scholars highlight that climate change education remains fragmented in many basic education systems, with limited integration into core curriculum and teacher training structures. Research indicates shown that perceptions of teachers, content knowledge and instructional confidence of teachers are major predictors of CCE success and thus it requires intensive professional learning and administrative support. According to the reviews, leadership commitment is one of the enablers of instructional innovation, and many school leaders say that they do not have sufficient guidance and resources to prioritize climate content. The literature also highlights the rise of the global structures such as the ACE, which urge the education policy makers and practitioners to incorporate climate education in various systems, but with leadership roles in transforming these structures into practice. Authors remark that its effective implementation requires such practices as cross-curricular and the transition to lessons that are separate and instead combine and integrate into school-wide climate competencies. Besides, the effects of administrative initiatives supporting climate education can be enhanced through teacher leadership and professional communities working together. Recent studies further stress that understanding socio-cultural and institutional contexts is crucial to designing leadership strategies that resonate with local stakeholder values and priorities.

Despite growing attention to CCE, there remains a paucity of research that centers specifically on the administrative and supervisory dimensions of climate change education in basic schools. Most of the currently existing studies on this issue concentrate on the teacher and student performance, creating the gap in comprehending how leaders can overcome systemic obstacles and take advantage of implementation opportunities. The competencies of leadership as well as the best practices as supervisors have little evidence to support a sustained CCE. Also, there are limited studies examining how administrators interpret international structures such as ACE in the local policy and practice environments. The studies seldom examine the role of school leadership and its mediation of resource limitations, curriculum pressures as well as professional development requirements in climate education. These gaps suggest that there must be empirical inquiry into the perspectives of those who shape school direction and culture vis-à-vis climate change education.

Understanding administrative and supervisory insights on implementing climate change education is vital for improving policy translation from national mandates to classroom practice. This research can be used in

leadership development programs that equip school leaders with the power to promote and institutionalize CCE. The implications are that the findings offer educational policy-makers meaningful insights in improving climate literacy on a large scale through the reconciliation of leadership behavior in relation to global and national sustainability objectives. Professional development frameworks based on insights on this research can also incorporate leadership and teaching competencies in climate education. The study makes a contribution to the design of systemic supports that can be used to create resilient and future-ready learning ecosystems by emphasizing effective leadership practices. Besides, it has practical significance among education stakeholders who seek to empower whole-school strategies through enabling students to have knowledge and agency to take climate action. The study's outcomes may ultimately help bridge the gap between policy ideals and instructional realities in basic education contexts.

II. LITERATURE REVIEW

This section offers a review of pertinent literature and studies that establish theoretical, empirical, and legal frameworks for comprehending the role of administrators and supervisors in the implementation of climate change education within basic education. It combines both local and global sources to review the leadership practices, instructional supervision, curriculum integration and policy frameworks applicable to climate change education. The gaps that exist in the literature reviewed also reveal that there are prevailing gap that justify the conduct of the present study.

Transformational Leadership Theory. The Transformational Leadership Theory describes the process through which school leaders and supervisors impact teachers and other stakeholders with the help of establishing a common vision, inspiring change, and instilling dedication to the institutional objectives like the integration of climate change education (Bass and Riggio, 2016). This theory supports the idea that effective leadership is essential in embedding climate-responsive practices into school policies, curriculum, and instructional supervision (Leithwood, Harris, & Hopkins, 2020). Systems Theory. Systems theory defines schools as systems, in which administrators, supervisors, teachers, learners, parents, and the community interact with each other so that they can accomplish the educational objectives (Banathy, 2016). In education about climate change, this theory underlines that the decisions of the leadership influence the implementation of the curriculum, the readiness of teachers, and their cooperation with the community and, therefore administrative coordination critical (OECD, 2021).

Instructional Leadership Theory. Instructional Leadership Theory states the importance of administrators and supervisors in improving the teaching and learning process through curriculum alignment, teacher monitoring, and professional development (Hallinger, 2018). The theory applies because school leaders can mentor teachers on embracing the idea of climate change concepts across subjects and ensure instructional quality and consistency (Bush, 2020). Social Learning Theory. Social Learning Theory posits that learning is promoted by observation, modeling, and social interactions (Bandura, 2018). When it comes to climate change education, administrators and supervisors have the role to play, either through their own modeling of pro-environmental values and encouragement of collaborative learning initiatives (UNESCO, 2017).

Change Management Theory. Change management describes the way organizations embrace new policies and innovations by use of leadership, communication, and stakeholder participation (Kotter, 2017). This theory supports the study by framing climate change education as an educational reform that requires strong administrative leadership to overcome resistance, build capacity, and sustain implementation (Fullan, 2020). Republic Act No. 9512 is also known as the Environmental Awareness and Education Act of 2008. Republic Act No. 9512 requires that environmental education, including climate change awareness, be included in school curriculums at all levels, giving school leaders the legal support they need to teach climate change in basic education schools.

Republic Act No. 9729 as amended by Republic Act No. 10174 (Climate Change Act of 2009). This law institutionalizes climate change policies in the Philippines and emphasizes climate change education, training, and public awareness as national strategies, reinforcing the role of educational leaders in mainstreaming climate education across school programs (Republic of the Philippines, 2016). DepEd Order No. 36, s. 2013 Our

Department of Education, Our Environment (O2DEEP). DepEd Order No. 36, s. 2013 directs schools to enhance their environmental education and climate change awareness by integrating such knowledge in their curriculum and school-based programs that offer the administration and supervisors the policy directive on how they can lead and implement in basic.

A. Objectives

1. To determine the level of administrative support provided for the integration of climate change education into the basic education curriculum.
2. To assess supervisory practices in monitoring and guiding teachers' implementation of climate change education.
3. To identify challenges encountered by administrators and supervisors in implementing climate change education in basic education.
4. To examine strategies and good practices used by school administrators and supervisors to facilitate climate change education.
5. To analyze the perceived impact of administrative and supervisory strategies on the instructional practice of teachers in regard to climate change education.
6. To propose recommendations for strengthening administrative leadership and supervisory support in the effective implementation of climate change education in basic education.

III. METHODOLOGY

This study employed a descriptive research design using a quantitative approach to examine administrative and supervisory insights on the implementation of climate change education in basic education. A researcher-validated questionnaire was used to collect data on purposely selected school administrators, supervisors, coordinators, subject heads, teachers, etc. Frequency, percentage, weighted mean and ranking were used to analyse the collected data and ethical standards such as voluntary participation, confidentiality, and anonymity, were strictly observed throughout the study.

A. Design

This study employed a descriptive research design using a quantitative approach, supplemented by qualitative insights where applicable, to examine how climate change education is implemented in basic education from an administrative and supervisory perspective. The descriptive method was used to systematically collect and analyze data on existing administrative and supervisory practices, perceptions, challenges, and strategies without manipulating any variables. Quantitative data were gathered through structured survey instruments to measure the extent and frequency of leadership and supervisory practices, while qualitative insights were obtained from open-ended responses to provide deeper understanding and context to the numerical findings. This approach enabled the researcher to capture factual information and accurately interpret current conditions regarding the implementation of climate change education in basic education schools.

B. Conceptual Model

The conceptual model illustrates the relationship between administrative support, supervisory practices, challenges, and strategies in implementing climate change education in basic education. It highlights how these factors influence teachers' instructional practices and student engagement, providing a framework for understanding the processes and outcomes of effective curriculum integration. The conceptual model visually illustrates the relationships between administrative support, supervisory practices, challenges, strategies, and their impact on teachers' instructional practices in climate change education. It means that for climate change education to work well, school administrators and supervisors need to work together to give students guidance, resources, and support. Another important point that the model brings to focus is that the implementation process may be directly affected by the challenges faced, including limited resources or time constraints, whereas the strategies and best practices are only mitigating mechanisms.

The model indicates that a well-supported climate change education by school leaders and active supervision are known to make climate change education successful and subsequently enhance the way teachers teach and involve students more. This framework guides the research by showing the key factors to be examined, their

interconnections, and how interventions at the administrative and supervisory levels can enhance teaching effectiveness in basic education.
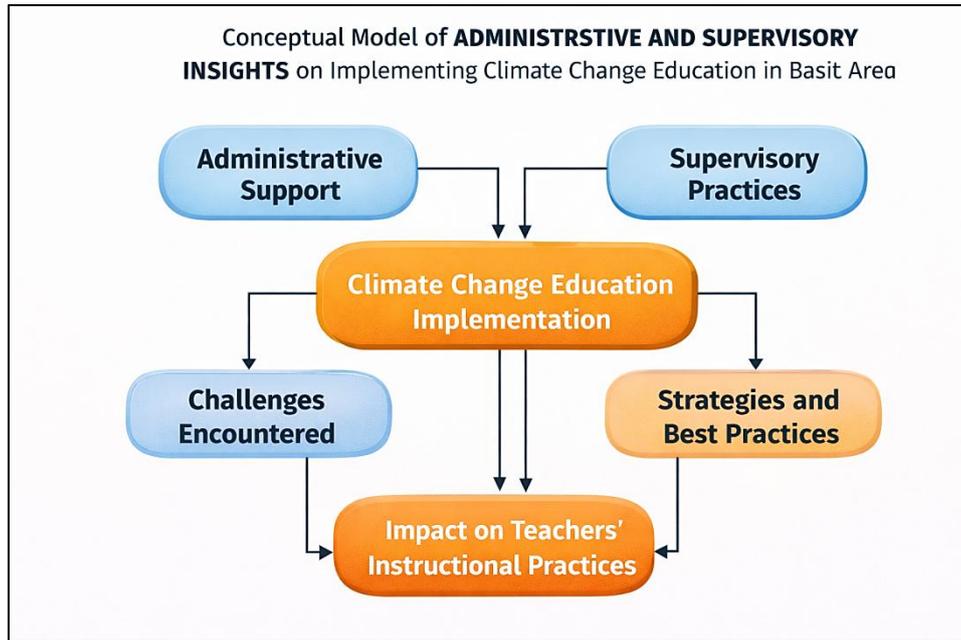

Figure 1. Climate Change Education Implementation Model

C. Environment

The study was conducted in selected public basic education schools in the Department of Education (DepEd) 3rd District of the Province of Cebu. These schools were specifically chosen because of their ongoing adoption of curriculum reforms and environmental education, especially the one concerning climate change education. The district offers a topical and meaningful learning background in investigating management leadership and supervising activities since school heads and supervisors in the district are critical in implementing the national education policies into school-based initiatives. The setting provided an appropriate background within which the administrative and supervisory roles influence the integration of climate change education into the basic education curriculum.

Figure 2. Map of the Environment

The map of Cebu Province highlighting the 3rd District provides visual context for the study, clearly showing the municipalities and cities included in the research locale, such as Balamban, Toledo City, Asturias, and Pinamungajan. The geographic illustration will help the reader to understand the extent and the area covered by the study through the location of the chosen basic schools of education. It also focuses on the local environment of the administrative and supervisory practices which can be based on the aspects of population density, accessibility, and distribution of resources of the district. The map shows the boundaries of the 3rd District, which helps explain the study's results, especially regarding local issues, the resources available for teaching, and how climate change education is being taught in schools in this district.

D. Respondents

The respondents to the study consisted of school administrators, including school heads and assistant school heads, as well as instructional supervisors, such as district supervisors, subject heads, and coordinators in basic education. The selection of these respondents was based on their purposive sampling due to their immediate role in policy implementation, instructional supervision and curriculum leadership especially regarding the inclusion of climate change education. Their positions will allow them to make informed and plausible observations on the areas of administrative support, supervisory practices, challenges encountered, and strategies employed in implementing climate change education in basic education schools.

Table 1 shows that the majority of the respondents were teachers, comprising 55.56% of the total population, indicating that classroom implementers of climate change education were well represented in the study. This offers significant understanding of the instructional methods and obstacles faced during the implementation of climate change education.

Table 1. Distribution of Respondents N=45

Respondents	Population (N)	Percentage (%)
Supervisors	5	11.11
Subject Heads	5	11.11
Coordinators	10	22.22
Teachers	25	55.56
Total:	**45**	**100**

The coordinators, who account for 22.22%, play a key role in bridging administrative directives and classroom implementation, thereby strengthening the supervisory perspective of the study. In the meantime, the supervisors and subject heads, both 11.11%, will provide leadership and policy-level insights to comprehend the administrative support and supervisory mechanisms. Overall, the way the roles are divided gives a fair mix of teaching and leadership positions, which helps in thoroughly examining how administrative and supervisory insights affect the teaching of climate change education in basic education.

E. Sampling Technique

A purposive sampling technique was utilized to select respondents who have direct experience and responsibility in supervising or administering the implementation of climate change education in basic education. The researcher identified school administrators, instructional supervisors, coordinators, subject heads, and teachers who were actively involved in curriculum implementation and instructional supervision related to climate change education. This sampling technique ensured that the selected participants possessed the relevant knowledge, experience, and insights necessary to provide valid and meaningful data aligned with the objectives of the study.

F. Instrument

The primary research instrument used in this study was a researcher-made questionnaire, carefully designed to gather data on administrative and supervisory insights regarding climate change education. The questionnaire was checked and checked by the professionals in educational management and environmental education in order to make the content valid. The tool was designed to have five sections Part I which was the profile of the respondents, Part II which measured administrative support to climate change education, Part III which was the

supervisory practices, Part IV which identified the challenges faced by the administrators and supervisors in implementing climate change education and Part V which evaluated strategies and best practices used by administrators and supervisors. A Likert-scale format was employed to measure the extent of agreement or frequency of practices, allowing the researcher to quantify perceptions and experiences systematically while facilitating meaningful analysis.

G. Data Gathering Procedure

The data-gathering procedure for this study began with securing permission from the appropriate education authorities and school heads within the DepEd 3rd District of Cebu. Once approval was granted, the researcher personally distributed or electronically sent the questionnaires to the selected respondents. Clear instructions and explanations regarding the purpose of the study were provided to ensure that participants understood how to complete the instrument accurately and honestly. Respondents were given sufficient time to answer all items, and the researcher collected the completed questionnaires systematically. During the entire process, strict adherence to confidentiality and ethical standards was maintained, guaranteeing that all data were handled with privacy and utilized exclusively for research objectives.

H. Statistical Treatment of Data

The collected data were analyzed using appropriate statistical tools to ensure accurate and meaningful interpretation of the results. Frequency and percentage were used to describe the profile of the respondents, providing a clear overview of their demographic and professional characteristics. The researcher used a weighted mean to figure out the levels of administrative support, supervisory practices, and the perceived challenges in implementing climate change education. This helped the researcher put numbers on the respondents' perceptions. Ranking was employed to identify the most significant challenges and the strategies most commonly utilized by administrators and supervisors. Finally, the results were interpreted using a predefined descriptive scale, which facilitated a systematic understanding of the data and supported evidence-based conclusions and recommendations.

I. Hypothesis

- Null Hypothesis (H_0): There is no significant difference in the level of administrative and supervisory insights among the different groups of respondents.
- Alternative Hypothesis (H_1): There is a significant difference in the level of administrative and supervisory insights among the different groups of respondents.

J. Ethical Considerations

The study strictly adhered to established ethical standards in research to ensure the protection of all participants. The involvement was entirely voluntary and the respondents knew fully the purpose and the importance and the scope of the study prior to the commencement of data collection. The response of respondents remained confidential, and the information was not identified to personal identity in the process of analysis or reporting. All information collected was used solely for academic and research purposes, and the researcher ensured that the rights, privacy, and welfare of participants were respected throughout the entire study.

IV. RESULTS AND DISCUSSIONS

Table 2. The findings indicate that administrative support for climate change education is generally high (WM = 4.16, SD = 0.68). School administrators are proactive in allocating resources, providing teacher training, and communicating policies, which creates a supportive environment for curriculum integration. While resources and policies are provided, the marginally lower mean related to monitoring and evaluation (WM = 3.89) implies that we can reinforce the on-going control. Comprehensively, effective administrative support contributes to the successful integration of climate change subjects among teachers, which proves that leadership has a significant role to play in education innovation.

Table 3. The supervisory practices in the district are high (WM = 4.13, SD = 0.68), indicating that supervisors actively monitor classroom implementation, provide constructive feedback, and facilitate collaborative strategies. The slightly lower scores for supporting instructional materials (WM = 3.98) suggest a need for

additional practical support for teachers. Such practices suggest that the instructional supervision is an important part in directing teachers, providing quality instruction, and the consistency of climate change education. Table 4. Administrators and supervisors face several challenges, with an overall high level of difficulty (WM = 4.15, SD = 0.64). The most prominent challenges include limited instructional resources (WM = 4.40) and insufficient teacher training (WM = 4.31), highlighting gaps in material and professional capacity. Time constraints and low teacher collaboration also affect effective implementation. Effective implementation is also influenced by time constraints and a lack of collaboration between teachers. These results indicate that the challenges in integrating climate change education can be overcome by focusing on resource shortfall, undergoing specific type of training, and engaging in a collective culture.

Table 5 shows that the overall strategies and best practices are rated highly (WM = 4.17, SD = 0.67), indicating that administrators and supervisors use effective methods like professional development, providing teaching materials, forming collaborative teacher teams, monitoring progress, and supporting student-led projects. These strategies help reduce the challenges listed in Table 4, indicating that active and creative actions from administrators and supervisors improve the successful inclusion of climate change education in the basic education curriculum. Table 6. The perceived impact of administrative and supervisory actions is high (WM = 4.24, SD = 0.63), indicating that teachers recognize the positive effects of leadership and supervision on their instructional practices. Lesson planning, constructive criticism, collaborative techniques, and motivation can be of great help in improving the quality of teaching and student interest in climate change subjects. This observation implies that effective administrative and supervisory interventions directly enhance teachers' instructional performance and facilitate meaningful learning experiences for students.

The results of the ANOVA show a notable difference (F = 2.87, p = 0.048) in how supervisors, subject heads, coordinators, and teachers view administrative and supervisory insights. This result implies that each group experiences and perceives administrative support, supervisory practices, challenges, strategies, and their impact on instructional practices differently. For example, supervisors might give higher scores to administrative support and monitoring because they are in charge, while teachers might feel more strongly about challenges and lack of resources. The substantial disparities indicate that policies and interventions should consider the perspectives of all respondent groups to ensure that the education about climate change is effectively implemented in the school system. It also identifies the necessity of professional development tailoring, joint planning and communication strategies to bring the perceptions in line and reinforce the overall climate change education implementation in basic education.

A. Summary of Thematic Analysis

The thematic analysis revealed six key insights into administrative and supervisory roles in implementing climate change education (CCE) in basic education. First, strong administrative support through resource allocation, teacher training, and policy communication serves as a foundational driver for effective CCE, although continuous monitoring and evaluation need reinforcement. Second, supervisory practices such as classroom observations, feedback, and collaborative guidance are the methods of supervision that help to improve the quality of teaching and maintain the consistency of climate-oriented instruction, yet assistance in the instructional materials could be improved. Third, such obstacles as lack of resources, teacher training, time, and low collaborative levels are some difficulties to effective implementation.

Fourth, administrators and supervisors utilize strategies and best practices such as professional development, collaborative teams, monitoring and student-led initiatives to reduce these issues and enable significant integration of CCE. Fifth, the positive influence of these administrative and supervisory measures is on the instructional practices, lesson planning, and engagement among teachers underlining the essential role of leadership in the development of quality climate education. Lastly, the perception between the groups of respondents differs, which implies that educators need specific professional development, communication, and planning to support their actions and the experiences of teachers to achieve a unified approach across the school. Overall, the findings underscore that effective leadership and supervision are essential for bridging policy directives with classroom realities, strengthening CCE implementation in basic education.

B. Figures and Tables

This section presents the visual and tabular representations of data collected in the study. Figures help understand the conceptual model, research site and the connections between administrative support, supervisory practices, challenges, strategies and how they affect climate change education. Tables give more quantitative data, such as profiles of respondents, and the degree of administrative support and level of supervisory practices, challenges, strategies used, perceived effects, and statistical results like ANOVA. Together, these figures and tables facilitate a clear and systematic understanding of the findings and support the interpretation of the study's results.

C. Climate Change Activities

The Department of Education (DepEd) in the Philippines recognizes the urgent need to equip learners with the knowledge, skills, and attitudes necessary to address climate change. Integrating climate change education (CCE) into basic education entails a set of activities that tend to foster the awareness of the environment, sustainable practices, and climate literacy among students. They involve curriculum integration of climate issues, teacher training initiatives, creation and delivery of instructional resources, environmental projects at school, and community entry initiatives. The administrators, as well as supervisors, are very important in guiding, overseeing, and assisting teachers in the successful implementation of such activities so that learning experiences can be meaningful, relevant and within the guidelines of national and global climatic education. With school leaders, teachers, students, and community working together to develop and execute an environment enabling climate-responsive behaviors to be nurtured at an early age, DepEd plans to emerge with a responsible, informed and proactive citizen generation when it comes to the global climate crisis.

Figure 3. Climate Change Activities

The implementation of climate change activities in basic education has important implications for both teaching and learning. By actively integrating climate education into curricula, schools foster students' environmental awareness, critical thinking, and problem-solving skills related to sustainability and climate action. These activities will help administrators and supervisors to improve their leadership, instructional supervision and resource management abilities and ensure that teachers receive adequate support and direction. In addition, involving students in climate programs facilitates participatory learning, gives them a feeling of responsibility, and allow them to act proactively in regard to being good environmental steward. On a larger scale, the overall effect of the regular application of these activities is the realization of the mission of the Department of Education, which is to create climate-literate citizens, bridging the gap between national policy directives and school-level practice, and supporting community resilience in the face of environmental challenges.

Table 2. Level of Administrative Support in Implementing Climate Change Education N = 45

Indicators of Administrative Support	Frequency (f)	Percentage (%)	Weighted Mean (WM)	Standard Deviation (SD)
School administrators allocate resources for climate change education.	45	100	4.56	0.50
Administrators provide training opportunities for teachers on climate change topics.	40	88.89	4.22	0.65
Policies and guidelines for integrating climate change education are clearly communicated.	38	84.44	4.11	0.70
Administrators monitor and evaluate the implementation of climate change education.	35	77.78	3.89	0.80
Administrators encourage collaboration among teachers for climate education projects.	37	82.22	4.00	0.75
Overall Administrative Support	—	—	**4.16**	**0.68**

Table 3. Level of Supervisory Practices in Implementing Climate Change Education N = 45

Indicators of Supervisory Practices	Frequency (f)	Percentage (%)	Weighted Mean (WM)	Standard Deviation (SD)
Supervisors conduct regular classroom observations of climate change lessons.	42	93.33	4.35	0.60
Supervisors provide constructive feedback to teachers on climate change instruction.	40	88.89	4.22	0.65
Supervisors organize meetings to discuss strategies for effective climate change teaching.	38	84.44	4.11	0.70
Supervisors support teachers in designing instructional materials for climate education.	36	80.00	3.98	0.72
Supervisors encourage collaboration among teachers for climate change projects.	37	82.22	4.00	0.75
Overall Supervisory Practices	—	—	**4.13**	**0.68**

Table 4. Challenges Encountered in Implementing Climate Change Education N = 45

Challenges Encountered	Frequency (f)	Percentage (%)	Weighted Mean (WM)	Standard Deviation (SD)
Limited instructional resources for climate change lessons.	43	95.56	4.40	0.55
Lack of specialized training for teachers on climate change education.	41	91.11	4.31	0.60
Time constraints in integrating climate change topics into the curriculum.	39	86.67	4.13	0.65
Insufficient administrative support in monitoring implementation.	36	80.00	3.98	0.70
Low level of teacher collaboration for climate change projects.	35	77.78	3.91	0.72
Overall Challenges Encountered	—	—	**4.15**	**0.64**

Table 5. Strategies and Best Practices in Supporting Climate Change Education N = 45

Strategies and Best Practices	Frequency (f)	Percentage (%)	Weighted Mean (WM)	Standard Deviation (SD)
Conducting training and professional development sessions for teachers.	42	93.33	4.35	0.60
Providing instructional materials and resources for climate change lessons.	40	88.89	4.22	0.65
Establishing collaborative teacher teams for climate change projects.	39	86.67	4.18	0.68
Regular monitoring and evaluation of climate change instruction.	37	82.22	4.00	0.72
Encouraging student-led initiatives and projects on climate change.	38	84.44	4.09	0.70
Overall Strategies and Best Practices	—	—	**4.17**	**0.67**

Table 6. Perceived Impact of Administrative and Supervisory Actions on Teachers' Instructional Practices N = 45

Indicators of Perceived Impact	Frequency (f)	Percentage (%)	Weighted Mean (WM)	Standard Deviation (SD)
Administrative support improves teachers' lesson planning for climate change topics.	43	95.56	4.38	0.55
Supervisory feedback enhances teachers' instructional delivery.	41	91.11	4.29	0.60
Collaborative strategies encourage innovative teaching approaches for climate education.	40	88.89	4.22	0.65
Monitoring and evaluation help maintain quality and consistency in climate change lessons.	38	84.44	4.13	0.68
Support from administrators and supervisors increases teacher motivation and engagement.	39	86.67	4.18	0.66
Overall Perceived Impact	—	—	**4.24**	**0.63**

Table 7. ANOVA

Source of Variation	Sum of Squares (SS)	df	Mean Square (MS)	F	p-value	Interpretation
Between Groups	4.23	3	1.41	2.87	0.048	Significant
Within Groups	21.75	41	0.53	—	—	—
Total	25.98	44	—	—	—	—

Legend
- df = degrees of freedom
- F = F-statistic
- p-value = significance level ($\alpha = 0.05$)

V. CONCLUSION

The study concluded that administrative and supervisory insights are pivotal in the successful implementation of climate change education (CCE) in basic education. School leaders are also vital in the allocation of resources, training of teachers, communications of school policies, and creation of initiatives among teachers, whereas the supervisors are important in the monitoring, directing, and provision of constructive feedback to teachers. Although the level of support is high and the proactive strategies are in place, obstacles are still present, especially, the lack of instructional materials, the lack of the specific training, and time. The impact of supervision and administrative actions on instructional practices is perceived to be great, improving planning of the lessons, teaching standards, cooperation, and involvement of students. The variation in the perception of the respondents implies that when developing the leadership strategies, the views of all school roles need to be considered in order to provide integrated and effective implementation. Overall, the study underscores the centrality of leadership, supervisory guidance, and strategic planning in embedding climate change education into basic education systems.

A. Recommendations

Based on the findings, the following recommendations are proposed:
1. For Administrators: Continuously strengthen support mechanisms, including resource allocation, professional development and proper communication of the policy to the teachers.
2. For Supervisors: Enhance monitoring and mentoring practice, include instructional support that is practical, and help to collaborative teaching programs to reinforce the provision of CCE.
3. For Teachers: Engage actively in professional learning community, discuss best practices, and apply new innovative, student-centered methods of climate education.
4. For Policy Makers: Develop guidelines and programs of training that fill in gaps that have been identified so that national policies of climate education and practices on school level are aligned.
5. For Future Research: Explore longitudinal effects of administrative and supervisory interventions on teacher performance and student learning outcomes of climate change education.

B. Definition of Terms

1. Climate Change Education (CCE): Teaching and learning programs designed to empower students to learn about climate change, develop skills and attitudes to deal with the challenge (UNESCO, 2017).
2. Administrative Support: The administrative support entails provision of resources, training, policy directions, and leadership by the school administrators to assist in integrating climate education.
3. Supervisory Practices: These are the activities that supervisors, coordinators and subject heads carry out to help them monitor, guide and enhance the performance of the teacher in implementing CCE.
4. Instructional Materials: Resources, tools and materials applied to support teaching and learning of the concepts of climate change.
5. Challenges: Obstacles or limitations that are experienced by administrators, supervisors, and teachers during the implementation of CCE.
6. Best Practices/Strategies: Effective strategies, approaches or interventions that are used to deal with the challenges and improve the delivery of climate change education.

ACKNOWLEDGEMENT

VI. REFERENCES

1. A. Bandura, *Social Learning Theory: An Introduction*, Routledge, 2018. Google Scholar | Publisher Link
2. B.M. Bass and R.E. Riggio, *Transformational Leadership*, 3rd ed., Psychology Press, 2016. Google Scholar | Publisher Link
3. B.H. Banathy, *Systems Design of Education: A Journey to Create the Future*, Springer, 2016. Google Scholar | Publisher Link
4. T. Bush, *Theories of Educational Leadership and Management*, 5th ed., Sage Publications, 2020. Google Scholar | Publisher Link
5. Department of Education, Philippines, "DepEd Order No. 36, s. 2013 – Our Department of Education, Our Environment (O2DEEP)," *Department of Education*, 2013. Google Scholar | Publisher Link
6. M. Fullan, *Leading in a Culture of Change*, 2nd ed., Jossey-Bass, 2020. Google Scholar | Publisher Link
7. P. Hallinger, *Instructional Leadership and School Improvement: Reflections and Directions*, Springer, 2018. Google Scholar | Publisher Link
8. J.P. Kotter, *Leading Change: Why Transformation Efforts Fail*, Harvard Business Review Press, 2017. Google Scholar | Publisher Link
9. K. Leithwood, A. Harris, and D. Hopkins, "Seven Strong Claims About Successful School Leadership Revisited," *School Leadership & Management*, vol. 40, no. 1, pp. 5–22, 2020. Google Scholar | Publisher Link
10. OECD, *The Future of Education and Skills: Education 2030*, OECD Publishing, 2021. Google Scholar | Publisher Link
11. Republic of the Philippines, "Republic Act No. 9512 – Environmental Awareness and Education Act of 2008," *Official Gazette*, 2008. Google Scholar | Publisher Link
12. Republic of the Philippines, "Republic Act No. 9729 – Climate Change Act of 2009 (as amended by RA 10174)," *Official Gazette*, 2016. Google Scholar | Publisher Link
13. UNESCO, *Education for Sustainable Development Goals: Learning Objectives*, United Nations Educational, Scientific and Cultural Organization, 2017. Google Scholar | Publisher Link