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CLIMATE CHANGE AND ACADEMIC PERFORMANCE AMONG GRADE 9 STUDENTS: EVIDENCE FROM A RURAL PHILIPPINE PUBLIC SCHOOL

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ABSTRACT

Climate change increasingly poses challenges to educational continuity, student well-being, and academic performance, particularly in climate-vulnerable communities. This study examined the relationship between climate change hazards and the academic performance of Grade 9 students in MAPEH at Sagbayan National High School, San Miguel District 2, Surigao del Sur, Philippines during the School Year 2025-2026. A mixed-methods research design integrating quantitative descriptive and qualitative phenomenological approaches was employed. The study involved 121 respondents, comprising 113 Grade 9 learners and 8 Grade 9 teachers. Quantitative data were gathered through a structured questionnaire and academic performance records, while qualitative data were obtained from participants' lived experiences of climate-related disruptions. Findings showed that students strongly perceived climate change hazards across eight dimensions, with an overall weighted mean of 4.69. Environmental protection received the highest rating (M = 4.80), followed by students' attitude (M = 4.76), well-being (M = 4.74), psychological concerns (M = 4.73), and socio-economic developmental concerns (M = 4.72). School infrastructure received the lowest, although still strong, perception rating (M = 4.46). Despite high climate-change perceptions, students' MAPEH performance remained at a low proficiency level, with a mean score of 31.77 out of 50 and a mean percentage score of 53.62. Pearson correlation analysis indicated a statistically significant relationship between climate-change hazard perceptions and academic performance ($r = 0.43$, $p < .05$). Climate-change response strategies were also strongly endorsed (M = 4.59) and demonstrated a significant positive relationship with academic performance ($r = 0.44$, $p < .05$). Qualitative findings further revealed disruptions in attendance, instructional time, concentration, emotional well-being, and learning continuity. The findings indicate that climate change constitutes a multidimensional

educational challenge requiring integrated responses involving climate-resilient infrastructure, psychosocial support, climate-change education, environmental initiatives, and academic continuity mechanisms.

Keywords: *climate change; academic performance; climate resilience; climate change education; learning continuity; student well-being; MAPEH; rural education*

INTRODUCTION

Climate change has increasingly become an educational concern because its effects extend beyond environmental systems to the conditions under which students learn. Extreme heat, flooding, storms, wildfires, and other climate-related hazards can interrupt school operations, reduce instructional time, damage educational infrastructure, and affect students' ability to participate consistently in learning. Miller and Hui (2022) found that even short-term school closures associated with wildfires, natural hazards, infrastructure problems, and student safety were associated with changes in academic performance, demonstrating how disruptions to schooling can have measurable educational consequences.

The educational consequences of climate change are not limited to physical disruptions. Students' perceptions, emotions, attitudes, and capacity to respond to environmental risks are also important dimensions of climate-related educational resilience. Trott (2022) emphasized that climate change education needs to consider the affective and attitudinal dimensions of young people's learning because students' emotional experiences can influence constructive engagement with climate issues. In this regard, climate change education should extend beyond the transmission of scientific information and support students in developing understanding, agency, adaptive capacity, and meaningful engagement with climate-related challenges.

Schools therefore represent an important setting for strengthening climate literacy and preparedness. Evidence from school-based climate education demonstrates that appropriately designed learning experiences can improve students' understanding of climate change while encouraging motivation and engagement. Kumar et al. (2023), for example, reported improvements in climate-change knowledge among primary and secondary students following an empirical, activity-based science education intervention. Their findings suggest that experiential and contextually relevant approaches can make climate change concepts more accessible to learners and can strengthen students' capacity to understand environmental challenges.

At the same time, climate education must account for students' psychological well-being. Climate-related experiences may generate worry, distress, uncertainty, and other emotional responses, particularly among young people who perceive climate change as an immediate threat to their future. Newberry Le Vay et al. (2024) argued that climate change education should incorporate mental health and well-being considerations so that students can develop knowledge and resilience without overlooking the emotional dimensions of climate-related learning. A whole-school approach that integrates

curriculum, school leadership, student support, and psychosocial resources may therefore provide a more comprehensive response to the educational consequences of climate change.

Recent evidence also indicates that school-based climate programs can influence students' climate-related knowledge, attitudes, and psychological outcomes. Keller et al. (2024) examined a multi-component school-based climate program and highlighted the potential of structured school interventions to promote climate awareness and action while addressing students' psychological and behavioral responses. Such findings reinforce the importance of examining climate change not only as an environmental phenomenon but also as an educational issue requiring coordinated institutional responses.

Within the Philippine educational context, the issue is particularly relevant because schools and communities are exposed to recurring climate-related hazards that may affect school attendance, learning continuity, physical learning environments, and student well-being. A recent Philippine study by Ligsa et al. (2024) found that junior high school students demonstrated generally high levels of climate-change perception, action, attitude, and personal concern, while their understanding of climate change remained comparatively limited. The authors further identified environmental experiences, climate-change education, and peer influence as factors associated with students' awareness, underscoring the importance of context-sensitive climate education in Philippine schools.

Despite the growing literature on climate change education and student resilience, an important research gap remains concerning how climate-related hazards are associated with actual academic performance within specific public-school contexts, particularly in rural and geographically vulnerable communities in the Philippines. Much of the existing literature focuses on climate literacy, environmental attitudes, psychological responses, or broad educational disruptions. Less attention has been given to the simultaneous examination of students' perceptions of climate hazards, their response strategies, lived experiences, and measured academic performance within a single school setting.

The present study addressed this gap by examining the relationship between climate change hazards and the academic performance of Grade 9 students in MAPEH at Sagbayan National High School, San Miguel District 2, Surigao del Sur. The study employed a mixed-methods approach to examine students' perceptions of climate-related hazards, their perceived response strategies, academic performance, and lived experiences of climate-related disruptions. The thesis reports that 121 Grade 9 learners and teachers participated in the study, with the quantitative component examining students' perceptions and academic performance and the qualitative component documenting lived experiences.

The study further responded to an important empirical observation: although students demonstrated strong perceptions of climate-change hazards, their MAPEH 9 academic performance remained at a low proficiency level, with an overall mean percentage score of 53.62. The quantitative findings also indicated significant

relationships between climate-change hazard perceptions and academic performance ($r = 0.43$, $p < .05$) and between climate-change response strategies and academic performance ($r = 0.44$, $p < .05$).

Accordingly, this study sought to contribute empirical evidence on the educational dimensions of climate change in a rural Philippine public-school setting. By integrating quantitative relationships with students' and teachers' lived experiences, the study provided a more contextualized understanding of how climate-related hazards may interact with attendance, instructional continuity, concentration, psychological well-being, and academic performance. The findings are intended to inform school-based climate resilience initiatives, climate-change education, psychosocial support, and learning-continuity mechanisms responsive to the needs of students in climate-vulnerable communities.

Research Questions

This study sought to examine the relationship between climate change hazards and the academic performance of Grade 9 students in MAPEH at Sagbayan National High School, San Miguel District 2. Specifically, it sought to answer the following questions:

1. What are the students' perceptions of climate change hazards in terms of:
   1.1. School infrastructure;
   1.2. Students' attitude;
   1.3. Students' well-being;
   1.4. Climate change awareness;
   1.5. Psychological concerns;
   1.6. Environmental protection;
   1.7. Public policies; and
   1.8. Socio-economic developmental concerns?
2. What response strategies can be employed to combat the hazards of climate change in terms of:
   2.1. Renewable energy adoption rate;
   2.2. Carbon pricing mechanisms;
   2.3. Sustainable land use practices;
   2.4. Climate-resilient infrastructure development; and
   2.5. Climate change education and awareness programs?
3. What is the academic performance of high school students in Sagbayan National High School (SNHS) in MAPEH 9?
4. Is there a significant relationship between the level of the respondents' perceptions of climate change hazards and their academic performance in MAPEH 9?
5. Is there a significant relationship between the response strategies employed to combat climate change hazards and the academic performance of students in MAPEH 9 during the 2nd Quarter of School Year 2024–2025?
6. What are the lived experiences of the respondents who are experiencing climate change during the 2nd quarter?

7. What intervention program can be proposed based on the findings of the study?

METHODOLOGY

The study employed a mixed-methods research design, integrating a quantitative descriptive approach with a qualitative phenomenological approach to examine climate change hazards and their relationship with students' academic performance in MAPEH 9 at Sagbayan National High School, San Miguel District 2, Surigao del Sur. The study involved 119 respondents, consisting of 111 Grade 9 students and 8 teachers, selected through universal sampling. Data were collected using a researcher-made questionnaire covering perceptions of climate change hazards, response strategies, and their effects on academic performance, supplemented by qualitative interviews/focus group discussions to document participants' lived experiences. The instrument underwent expert validation by three Master Teacher I validators, after which necessary revisions were incorporated. Quantitative data were analyzed using frequency, percentage, weighted mean, and Pearson product-moment correlation, while qualitative responses were examined thematically to identify recurring experiences related to attendance, learning continuity, concentration, well-being, and climate-related disruptions. Ethical procedures, including institutional permission, informed consent, voluntary participation, confidentiality, and anonymity, were observed throughout the study.

RESULTS

Table 1. Students' Perceptions of Climate Change Hazards

Perception Dimension	Average Weighted Mean	Descriptive Category	Rank
Environmental Protection	4.80	Strongly Perceived	1
Students' Attitude	4.76	Strongly Perceived	2
Students' Well-being	4.74	Strongly Perceived	3
Psychological Concerns	4.73	Strongly Perceived	4
Socio-Economic Developmental Concerns	4.72	Strongly Perceived	5
Public Policies	4.68	Strongly Perceived	6
Climate Change Literacy	4.60	Strongly Perceived	7
School Infrastructure	4.46	Strongly Perceived	8
General Average	**4.69**	**Strongly Perceived**	—

Table 2. Response Strategies to Combat Climate Change Hazards

Response Strategy	Average Weighted Mean	Descriptive Category	Rank
Sustainable Land Use Practices	4.79	Most Responsive	1
Climate Change Education and Awareness Programs	4.61	Most Responsive	2.5
Climate-Resilient Infrastructure Development	4.61	Most Responsive	2.5
Renewable Energy Adoption Rate	4.59	Most Responsive	4
Carbon Pricing Mechanisms	4.34	Most Responsive	5
Grand Average	**4.59**	**Most Responsive**	—

Table 3. Academic Performance of Grade 9 Students in MAPEH 9

Sex	Actual Test Takers	Mean Score	Highest Possible Score	MPS	Proficiency Level
Female	77	33.35	50	66.70	Near Proficiency
Male	44	29.00	50	58.00	Low Proficiency
Total	**121**	**31.77**	**50**	**53.62**	**Low Proficiency**

Table 4. Proficiency Distribution of Grade 9 Students in MAPEH 9

Proficiency Level	Frequency	Percentage
Highly Proficient (90–100)	4	3.31%
Proficient (75–89)	16	13.22%
Near Proficiency (50–74)	45	37.19%
Low Proficiency (25–49)	48	39.67%
Not Proficient (0–24)	8	6.61%
Total	**121**	**100.00%**

Table 5. Relationship Between Perceptions of Climate Change Hazards and Academic Performance

Perception Dimension	Average Weighted Mean	Pearson r	p-value	Decision at α = .05	Result
School Infrastructure	4.46	0.43	<0.000	Reject H_{01}	Significant
Students' Attitude	4.76	0.43	<0.000	Reject H_{01}	Significant
Students' Well-being	4.74	0.43	<0.000	Reject H_{01}	Significant
Climate Change Literacy	4.60	0.43	<0.000	Reject H_{01}	Significant

Perception Dimension	Average Weighted Mean	Pearson r	p-value	Decision at α = .05	Result
Psychological Concerns	4.73	0.43	<0.000	Reject H_{01}	Significant
Environmental Protection	4.80	0.43	<0.000	Reject H_{01}	Significant
Public Policies	4.68	0.43	<0.000	Reject H_{01}	Significant
Socio-Economic Developmental Concerns	4.72	0.43	<0.000	Reject H_{01}	Significant
Overall Perceptions	**4.72**	**0.43**	**<0.000**	**Reject H_{01}**	**Significant**

Table 6. Relationship Between Climate Change Response Strategies and Academic Performance

Response Strategy	Average Weighted Mean	Pearson r	p-value	Decision at α = .05	Result
Renewable Energy Adoption	4.59	0.41	0.000	Reject H_{02}	Significant
Carbon Pricing Mechanisms	4.34	0.38	0.000	Reject H_{02}	Significant
Sustainable Land Use Practices	4.79	0.45	0.000	Reject H_{02}	Significant
Climate-Resilient Infrastructure Development	4.61	0.47	0.000	Reject H_{02}	Significant
Climate Change Education and Awareness Programs	4.61	0.44	0.000	Reject H_{02}	Significant
Overall Response Strategies	**4.59**	**0.44**	**0.000**	**Reject H_{02}**	**Significant**

Table 7. Lived Experiences of Respondents During Climate-Related Events

Major Theme	Reported Lived Experience	Educational Implication
1. Climate Change-Induced Attendance and Punctuality Challenges	Heavy rainfall, flooding, and typhoons caused absences and tardiness; flooded roads and school grounds created mobility barriers.	Disrupted attendance and learning continuity
2. Disruption of Academic Calendar and Learning Activities	Class suspensions, shortened periods, postponed assessments, unfinished lessons, and academic backlogs were reported.	Reduced instructional time and curriculum delivery

Major Theme	Reported Lived Experience	Educational Implication
3. Reduced Concentration, Academic Focus, and Classroom Performance	Extreme heat caused discomfort, fatigue, difficulty focusing, reduced participation, and reduced comprehension.	Lower classroom engagement and academic focus
4. Psychological Stress and Emotional Impact	Students experienced anxiety, fear, worry, and emotional distress during typhoons and extreme weather events.	Reduced attentiveness, motivation, and academic engagement
5. Socio-Economic Strain Affecting Academic Engagement	Loss of family income, damaged livelihoods, and household responsibilities affected students' ability to focus on schoolwork.	Competing family responsibilities and weakened academic engagement
6. Infrastructure and Resource Limitations	Poor drainage, poorly ventilated classrooms, flooded classrooms, overheated learning spaces, and limited learning resources were reported.	Unconducive learning environment and disrupted teaching
7. School Support Systems and Teacher Preparedness	Existing support included flexible deadlines, guidance counseling, disaster drills, and teacher adjustments, but respondents identified a need for stronger preparedness and continuity plans.	Need for stronger institutional climate-resilience mechanisms

Table 8. Proposed Intervention Program: SNHS-CRASP

Program Component	Major Activities	Expected Outcome
Climate-Resilient Infrastructure Improvement	Facility assessment, drainage improvement, minor repairs and infrastructure planning	Safer and more functional learning spaces
Climate Change Education and Awareness	Climate awareness seminars and integration of climate concepts in instruction	Increased climate literacy
Student Wellness and Psychosocial Support	Stress-management workshops, counseling, and referral mechanisms	Improved psychological well-being
Sustainable School Practices	Tree planting, clean-up drives, waste segregation, and energy conservation	More sustainable school environment

Program Component	Major Activities	Expected Outcome
Disaster Preparedness and Learning Continuity	Disaster preparedness activities, academic catch-up programs, flexible learning mechanisms	Reduced learning disruption and stronger continuity
Policy and Community Engagement	Policy forums and community engagement activities	Increased awareness of climate policies and community resilience

Table 9. SNHS-CRASP Implementation Schedule

Activity	Participants	Time Frame	Persons Involved	Expected Output
Climate Awareness Seminars	Students and teachers	Quarterly	Science Teachers, DRRM Coordinators	Increased climate literacy
Stress Management Workshops	Students	Quarterly	Guidance Counselor	Improved psychological well-being
School Facility Assessment	School administrators and teachers	Start of School Year	School Head	Infrastructure improvement plan
Tree Planting and Clean-up Drives	Students	Semi-annual	YES-O Advisers	Sustainable school environment
Academic Catch-Up Programs	Students	During/after disruptions	Teachers	Reduced learning gaps
Policy Forums and Community Engagement	School/community stakeholders	As scheduled	School Administration/Partners	Increased climate-policy awareness

Table 10. Summary of Major Findings

Phase	Month	Major Activity	Main Purpose
Preparation	1	Stakeholder Orientation	Present findings and secure stakeholder support
	2	Baseline Mapping	Group learners according to PHIL-IRI profiles
Launch	3	Buddy Reading and Word Quest	Build engagement and activate peer support
Implementation	4	Distribution of Parental Toolkits	Strengthen home reading support

Phase	Month	Major Activity	Main Purpose
	5–6	Community Reading Corners	Extend reading opportunities into the community
	7	Mid-Year Remediation Review	Monitor progress and adjust instruction
	8	Reading Camp/Storytelling Festival	Promote reading as a community activity
Evaluation	9	Post-Test Using PHIL-IRI	Measure changes in below-grade-level reading
	10	Recognition and Awarding	Reinforce positive reading-support behaviors

DISCUSSION

The findings indicate that climate change is closely intertwined with the educational experiences of Grade 9 students at Sagbayan National High School. Students strongly perceived climate change hazards across environmental, psychological, socioeconomic, institutional, and policy-related dimensions, with environmental protection receiving the highest rating. This high level of perception is consistent with evidence that climate-related risks increasingly affect not only physical environments but also the conditions under which students learn. In the Philippine context, Ligsa et al. (2024) similarly emphasized the importance of climate change literacy among junior high school students and the need for learning interventions that strengthen students' understanding and preparedness.

Despite the high level of climate change perception and responsiveness to proposed strategies, students' MAPEH 9 performance remained at a low-proficiency level (MPS = 53.62). This finding is consistent with research showing that exposure to high temperatures and other climate-related stressors can interfere with learning. Roach and Whitney (2022) found that increasing temperatures, particularly exposure to very hot days, were associated with reductions in student achievement. Likewise, Venegas Marin et al. (2024), in a review of evidence, reported that extreme heat can reduce learning and that floods, tropical cyclones, and other extreme weather events can interrupt schooling through school closures and related disruptions.

The significant relationships reported between climate change perceptions, response strategies, and academic performance further suggest that climate-related educational challenges are multidimensional. The qualitative findings reinforce this interpretation: students and teachers described attendance problems, class suspensions, shortened instructional periods, difficulty concentrating during extreme heat, psychological distress, socioeconomic pressures, and limitations in school infrastructure. These experiences are particularly relevant to the Philippine setting. Preña and Labayo (2025) documented how extreme heat in the Philippines prompted class suspensions, alternative instructional arrangements, and schedule adjustments as educational institutions attempted to protect students and teachers while maintaining learning continuity. Similarly, Abrigo et al. (2026) found evidence from Philippine TIMSS data that

school closures associated with calamities can have measurable negative effects on student achievement.

The positive relationships between the identified response strategies and academic performance should, however, be interpreted as associations rather than evidence that the strategies directly cause higher achievement. The findings indicate that students who reported stronger recognition or presence of climate-response measures also showed variation in academic performance, but the correlational design does not establish causality. Nevertheless, the convergence of the quantitative and qualitative findings provides a reasonable basis for strengthening school-level climate adaptation measures. In particular, the proposed SNHS-CRASP appropriately integrates infrastructure resilience, climate education, psychosocial support, sustainable practices, disaster preparedness, and learning-continuity mechanisms. Taken together, the findings support the view that climate resilience in schools should extend beyond environmental awareness to include the protection of instructional time, student well-being, learning spaces, and continuity of education.

Conclusions

The study concludes that students at Sagbayan National High School strongly perceived climate change hazards across environmental, psychological, socioeconomic, institutional, and policy dimensions and reported a high level of responsiveness to identified climate change response strategies. Despite this strong awareness and perceived responsiveness, the students' overall academic performance in MAPEH 9 remained at the Low Proficiency level, with an overall mean percentage score of 53.62. Significant relationships were found between students' perceptions of climate change hazards and academic performance, as well as between climate change response strategies and academic performance, indicating that climate-related conditions and responses are associated with students' academic outcomes. The qualitative findings further revealed that climate-related disruptions affected attendance, learning continuity, concentration, psychological well-being, socioeconomic conditions, and access to school resources. Based on these findings, the proposed Sagbayan National High School Climate Resilience and Academic Support Program (SNHS-CRASP) provides an integrated framework addressing climate-resilient infrastructure, climate education, student wellness, sustainable practices, disaster preparedness, and learning continuity to support students' academic engagement and resilience.

Recommendations

It is recommended that Sagbayan National High School implement the proposed Sagbayan National High School Climate Resilience and Academic Support Program (SNHS-CRASP) by strengthening climate-resilient infrastructure, integrating climate change education and awareness into learning activities, providing psychosocial and wellness support, promoting sustainable school practices, and improving disaster preparedness and learning continuity mechanisms. School administrators and teachers should establish flexible academic arrangements during climate-related disruptions, provide appropriate interventions for learners whose attendance, concentration, and

academic engagement are affected, and strengthen teacher preparedness through relevant training and capacity-building activities. The school should also strengthen coordination with parents, the local government, and other stakeholders to mobilize resources and support climate-resilience initiatives. Finally, the implementation of SNHS-CRASP should be regularly monitored and evaluated using attendance records, monitoring checklists, observation reports, and student feedback to determine its effectiveness and guide future improvements.

Compliance with Ethical Standards

The study adhered to established ethical standards throughout the research process. Permission to conduct the study was obtained from the research adviser and the school administration of Sagbayan National High School before data collection. Participation was voluntary, and respondents were informed of the purpose and procedures of the study. Written informed consent was obtained from participants prior to the interviews and focus group discussions. The confidentiality and anonymity of respondents were protected, and no identifying information was collected. All gathered data were handled, analyzed, and reported responsibly and were used solely for research purposes, consistent with the study's commitment to research integrity and credibility.

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