

# Assessing Junior High School's Climate Change Literacy: Input for Learning Plan on Climate Change

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## ABSTRACT

Climate change literacy is essential for equipping students with the knowledge, perception, and skills required to comprehend and address the challenges posed by climate change. This study aimed to assess the climate change literacy of students at a National High School in the Philippines. The study also sought to develop a relevant climate change learning plan to improve their climate change literacy. A quantitative approach and a descriptive-developmental research design were employed. The sample size of 264 students was determined using random stratified sampling with a margin of error of 5% and a level of confidence of 95%. The research utilized an adapted survey questionnaire as the primary data-gathering instrument. The questionnaire was divided into four sections to explore various aspects of climate change literacy. The findings revealed that most respondents were female, 13 years old, and in seventh to tenth grade. Students demonstrated a high level of perception, action, attitude, and personal concern regarding climate change. The respondents' understanding of climate change was slightly below average. In addition, the study found differences in climate change literacy by age and grade level, but no significant gender differences. Students' awareness of climate change was significantly influenced by environmental experiences, climate change education, and their peers. Based on the findings, a curriculum-aligned climate change learning plan was devised to enhance, improve, and increase students' knowledge, perception, actions, attitudes, and personal concerns.

**Keywords:** climate change literacy, climate change, climate change assessment, junior high school, learning plan

## INTRODUCTION

Climate change has affected people from pole to pole. Every living thing across the globe experiences climate change, everyone encounters it in different ways and to varying extents. Unfortunately, across the world, those who have made the smallest possible amount of contribution to the causes of climate change; those who are economically marginalized—are particularly likely to experience the severe consequences of this phenomenon. For instance, some of the drastic changes brought by climate change are myriad catastrophes, such as heat waves, droughts, storms, and droughts. All of these are getting worse and happening more frequently. Furthermore, these occurrences may have disastrous and major consequences, including the risk of availability of safe drinking water, fueling wildfires, causing properties to be damaged, polluting the air, water, and land, and worst loss of life.

The humid tropical climate of the Philippines is characterized by high temperatures and heavy rains. There are two seasons in the country: a dry season and a rainy season. Additionally, from December through February, the eastern and northern shorelines experience a second rainy season. Meanwhile, the Philippines has lately seen wetter occurrences throughout the dry season. Sea levels in the country are rising more rapidly than the typical conditions in the world, increasing the risk of storm surges and unavoidable submergence of low-lying regions. According to a study by Climate Central, as published by the Philippine Star, the sea level

has risen approximately eight inches since 1880, and the rate of increase is rising. Benjamin Strauss, co-author of the peer-reviewed Climate Central research, stated, "Most of the sea level rising from now to 2050 is already baked in". Moreover, there are numerous negative effects of Climate Change in the Philippines, specifically annual Gross Domestic Product (GDP) losses, variations in the patterns and distribution of rainfall, droughts, biodiversity threats, food shortage, the rise of sea level, risks to the health of the public, and endangerment of vulnerable society members.

The future of the Philippines is currently undetermined. The country has extreme problems in the form of dangers in the environment - particularly climate change, industry, and lives and livelihoods. Both the Philippine administration and government agencies in the world must work together to address the climate problem by reducing it. According to Sering, Secretary of the Climate Change Commission of the Philippines, "Policymakers have implemented comprehensive policies, programs, and institutions to address climate change". Filipinos can do their share on this by their knowledge and attitudes of strategies regarding facing these challenges. While individuals may do little, if everyone educates themselves about the science underlying climate change and its consequences on people and the environment, the Philippines may begin to adopt progressive change and inspire others to do the same.

As per The United Nations Educational, Scientific and Cultural Organization (UNESCO), education is essential for mitigating climate action. It provides individuals with the knowledge, action, perception, and attitudes required to act as agents of change in comprehending and dealing with the catastrophic climate change phenomenon. The United Nations (UN) Framework Convention on Climate Change, the Paris Agreement, and the associated Action for Climate Empowerment (ACE) agenda require governments to empower knowledge and engage major groups regarding climate change action and policies.

Acknowledging the campaign for developing climate change literacy is equally as vital as finding solutions to the crisis about climate. Without comprehensive education on climate change, climate action initiatives may lack the strength to challenge institutional authorities that endorse such measures. The campaign risks being misdirected if the leaders fail to fully understand the adaptation and mitigation strategies required to ensure a habitable and sustainable future for all. As a result, education must be a significant emphasis for specific plans for the country and adaptation to promote resilience to climate change. It is crucial to utilize education to serve as a tool to develop an unstoppable climate campaign since education provides the information and skills required to transform society into one that balances human advancement with environmental preservation and conservation. Thus, education provides the knowledge and skills necessary to transform our society to engage in climate action.

Thus, the researchers came up with the topic, "Assessing Junior High School's Climate Change Literacy: Input for Climate Change Learning Plan," which aimed to identify, and evaluate the climate change literacy of Junior High School students at the National High School.

## OBJECTIVES

This study aimed to determine the level of climate change literacy of students at a National High School in the Philippines.

Specifically, this study sought to answer the following questions:

1. What is the level of climate change literacy among Junior High School students in terms of:
  - 2.1 Climate Change Knowledge;
  - 2.2 Climate Change Perception;
  - 2.3 Climate Change Action;
  - 2.4 Climate Change Attitude; and
  - 2.5 Climate Change Personal Concern

2. Is there a significant difference in the level of climate change literacy among Junior High School students when they are grouped based on their age, grade level, and sex?
3. What factors influence the Junior High School students' level of awareness regarding climate change in terms of
  - 4.1 environmental experiences;
  - 4.2 climate change education; and
  - 4.3 peers?

## LITERATURE REVIEW

This review covered topics related to climate change and climate change literacy.

Climate Change is a phenomenon that is characterized by a major change over decades or more, average weather conditions, such as conditions being warmer, wetter, or drier, gradually shift. The mechanisms and climate system of Earth are simple. The earth cools as solar energy is reflected into space, as clouds and ice, and also when the earth's atmosphere emits energy. As per the National Geographic Society, the world warms when it absorbs solar energy or when the greenhouse effect stops the heat produced by the planet from escaping into outer space. Numerous human and even natural factors can influence the climate system on Earth. The current rate of climatic warming, especially since the middle of the 20th century, is unprecedentedly rapid and cannot be explained by natural factors alone.

Similarly, Pappas (2020) asserted that climate change occurs in any global or regional change in the average weather pattern over time. The changes in the weather and temperature observed in the world are the result of human activities. These are occurring more rapidly than natural climatic changes in the past. Multiple techniques allow scientists to follow weather conditions across time, and they all demonstrate that the current climate change is caused by humans releasing greenhouse gasses such as methane and carbon dioxide into the atmosphere.

Climate Change Literacy. Literacy in climate change is a component of comprehensive science literacy, which is defined as the capability of an individual to apply their knowledge, abilities, and attitudes in real-life situations regarding issues of climate change. Specifically, climate change literacy focuses on climate science, the quantitative and geographic methods through which it is understood, and the connection between humans and their environment. To acquire a comprehensive understanding of the complexities of climate change literacy, one must have a strong foundation in the systems approach, which is fundamental to studying Earth and geosciences. Climate Change Literacy is an essential component of methods for achieving Sustainable Development Goal (SDG) 13 set by the United Nations: "Take urgent action to combat climate change and its impacts." Developing climate change literacy – individually, institutionally, and societally establishing climate change literacy involves an awareness of why it is necessary, who must be involved, what it entails, where and when it occurs, how to address problems that may arise, and what a literate citizen will look like. This comprehension is crucial for the development of climate change literacy. (Schrot, 2021)

Won et al. (2021) conducted a study entitled "The Impacts of a Climate Change SSI-STEAM Program on Junior High School Students' Climate Literacy" The purpose of this study is to examine climate literacy among junior high school students who participate in an SSI-STEAM climate change education program and to analyze the program's effects on the development of climate literacy. This study included 31 eighth-grade students from Seoul, Korea. Furthermore, pre- and post-program surveys using a climate literacy questionnaire (CLQ), students' background survey questions, interviews with participants, and artifacts created by students during the program were all utilized to gather data. After the program, participants' climate literacy improved significantly after the session, particularly perception and action. Participants' responses revealed four aspects of climate literacy change: more concrete concepts, the scope of thinking, positive responsibility, and relevance recognition.

Lopez and Malay (2019) in their descriptive study entitled "Awareness and Attitude Towards Climate Change of Selected Senior High Students in Cavite, Philippines" the level of understanding and attitude regarding climate change among senior high school students in an educational institution in the Philippines. The descriptive study surveyed 276 Grade 12 students, ages 16 to 19, from various tracks and concentrations. The survey results revealed a moderate to high awareness of climate change-related issues. Also, according to the calculated weighted mean, the level of awareness among senior students is often higher than that of first-year students. Overall, the differences could serve as a foundation for developing academic and extracurricular activities that are sensitive to the gender and grade level of the involved students to improve their cognitive adaptive capacity.

The study of Caisip and Espinosa (2022) determined the present level of climate change awareness among Filipino youth participants in their study entitled, "Filipino Youth's Awareness of Climate Change Impacts: Basis for Program Development in Vulnerable Urban Communities". The participants in the study were 222 Filipino youth participants, ages ranging from fifteen (15) to thirty (30) years old, chosen to represent the twelve (12) urban vulnerable communities in the National Capital Region (NCR). The study revealed that half of the Filipino youth participants from vulnerable urban groups were only moderately aware of the negative implications of climate change on agriculture, health, and water resources. Moreover, it revealed that according to the youth of the Philippines, coastal resources, forestry, and infrastructure do not receive sufficient attention. Spearman's Rho demonstrated a substantial correlation between the amount of climate change awareness among Filipino youth participants and the parents' highest level of education and their family situation. Thus, the context of the findings must be considered as a basis for program development to construct a complete, inclusive, and community-centered environmental literacy program to increase Filipino youth's awareness of climate change mitigation.

According to Dzambo et al. (2020), who conducted the study "An Interactive Online Course in Climate and Climate Change: Advancing Climate Literacy for Non-Atmospheric Science Majors", in 2013, the University of Wisconsin-Madison's Atmospheric and Oceanic Sciences department offered an online course called "Climate and Climate Change." Student climate literacy was measured in this study by voluntary pre- and post-course survey questionnaires encompassing student self-assessment questions, several questions directly related to the course topic. According to post-course survey data, 99% of students in this course felt "fairly well knowledgeable" or "remarkably well informed" about their physical knowledge of the Earth's climate and various mechanisms that drive climate change. The proportion of students who believe that climate change is mostly driven by human activity increased statistically in the 2019 cohort.

The study by Ingcol and Palomar (2020) shows the students' conceptual understanding and images of climate change. The instrument entitled "Explain and Illustrate Task Instrument (EITI)" was administered through a survey to two hundred twenty-four (224) high school students to determine their conceptual understanding and images of climate change. The findings were analyzed based on students' responses and drawings in the EITI with the respective rubrics. The results indicated that students had a limited awareness of the causes of the increase in temperature and no understanding of the concepts of precipitation, cyclones, drought, extreme meteorological conditions, and greenhouse gases. there is a highly significant relationship that exists between students' conceptual understanding of the factors, effects, and images of the concepts of cyclones, extreme meteorological conditions, and greenhouse gases. Nonetheless, there is a very weak relationship between students' conceptual understanding of the causes and concepts in the form of images of temperature, rainfall, and drought. Respondents show they are interested in learning more about climate change by conducting Internet searches, watching television, and reading books.

Kolenaty et.al. (2022) analyses of the study revealed a significant impact of sufficient climate change knowledge on climate change concern which subsequently positively influenced participants' self-efficacy and their willingness to act. The findings of this study suggest that knowledge is a key initial driver for climate action, especially for young people, and confirm the conclusion of previous studies that willingness to adopt pro-climatic behavior presupposes a clear and explicit understanding of climate dynamics and its causal relations. The focus group interviews also revealed that the reported increased willingness to act often translated into actual climate action and that learning about the concept of carbon footprint and the process of

calculating and decreasing it proved to be a very accessible and fast path to participants' engagement in personal climate action.

The study of Maryland and Delaware Climate Change Education Assessment and Research (MADE CLEAR) project, aims to improve climate literacy in the K-16 population through a systemic, sustainable change in teacher preparation. The survey, completed by 119 faculty members from different science disciplines, reported on course climate literacy content and challenges met in incorporating this material into their courses. 55, 46% or close half of the respondents reported a scientific background in biology or Earth/environmental science. 98 or 82% indicated that they have never received formal training in climate change science. 28 of the respondents equal to 47% stated interest in obtaining prepared teaching material. This assessment could be used in other institutions to improve climate change literacy at the K-16 level.

The study by Wu and Otsuka (2021) explores high school students' cognition, knowledge, attitudes, and behavior concerning climate change, based on a questionnaire survey of 657 high school students from Shanghai. The findings reveal that misconceptions and biased understandings of climate change persist; climate-related knowledge and attitudes are weakly associated with behavior. However, the element of 'relevance', including a belief in individual lifestyle, appears to be actively linked to behavior. As an initial investigation of climate literacy in mainland China, the results are expected to increase the existing knowledge of climate literacy and education, from both conceptual and geographical perspectives

Based on Prasad and Mkumbachi (2021) their study aims to analyze and evaluate students' perceptions of climate change at the University of the South Pacific in Fiji. The study aims to understand the main ideas and concepts of climate change by analyzing information habits and individual opinions on the causes of climate change as perceived by the students of two student organizations aimed at environmental protection. The participants of the focus groups believe climate change is a serious problem in the South Pacific region. Results suggest significant differences in climate change perception at the two student organizations chosen for this study. Students at the Econesian Society nicknamed climate change a nuclear weapon for the South Pacific responsible for changes in the habitat, coral bleaching, lifestyle changes, mother of all other environmental problems, and the introduction of invasive species into Fiji. The study also showed that students at the Econesian Society better understand of climate change than the students of Wantok Moana.

Skodienė and Liobikienė (2021) study is concerned that actions related to climate change mitigation have different costs and benefits, in this study, we aimed to reveal whether climate change concerns and personal responsibility equally influenced all actions related to climate change mitigation and whether all types of actions were guided by the same goals. The results showed that the performance of actions related to climate change mitigation varied across European countries. The largest share of respondents declared that they reduce waste and regularly separate it for recycling. Meanwhile, a smaller share of people noted that they perform very high-cost actions such as the purchase of low-energy homes and electric cars. Economic development level significantly affects the assumption of personal responsibility and the number of actions related to climate change mitigation but not climate change concerns. Hofstede's cultural dimensions influence climate change concerns, responsibility, and the number of actions differently. Considering separate actions related to climate change mitigation, the assumption of personal responsibility significantly and positively influenced almost all actions. Climate change concerns positively and significantly affected only low-cost actions. Because of the different costs and guiding goals, the respondents who performed one action did not necessarily perform other actions related to climate change mitigation.

## **MATERIALS AND METHODS**

### **Research Design**

The study used quantitative research with descriptive- developmental type. Quantitative research collects and analyzes to shed light on the situation being conducted to find out patterns, and averages; test causal relationships, and give a general overview of the matter. Descriptive type on the other hand may describe a situation or phenomenon and investigate one or more variables while developmental comes in as an

output based on results and findings..

## Sampling Design and the Respondents

A sample size for Junior High School students at a National High School in the Philippines was calculated using a Raosoft sample size calculator, providing a confidence level of 95% and a margin of error of 5%. The total sample size calculated for all grade levels was 264.

## Data Gathering Instrument

The researcher adapted the questionnaire utilized from studies conducted by Skyock (2020), Kaushik (2020), and Basic and Loeb (2022). The questionnaires include close-ended questions. It has a checklist wherein the respondents choose their answers on it. Checklists are used to encourage or verify that several specific statements of inquiry, steps, or actions are being taken or have been taken, by researchers. It has items or statements related to the topic being surveyed with a crafted response option

The survey questionnaire consists of four parts. The first section analyzes the respondents' demographic profile, including their age, grade level, and sex. The second section evaluates the students' level of climate change literacy, concentrating on climate perception, climate change action, climate change attitude, and personal concern regarding climate change. The third section assesses the factors such as environmental experiences, climate change education, and peers that influence students' awareness of climate change. The final section of the questionnaire consists of a 10-item assessment designed to assess students' climate change knowledge. The responses to this questionnaire were used to develop a learning plan to enhance the student's understanding of climate change.

The questionnaire was subjected to a comprehensive review procedure, which included evaluation by the adviser and three (3) validators, to ensure its validity and improvement. The recommendations made by the adviser and the validators were thoroughly reviewed and integrated into the questionnaire. A final copy was subsequently produced for distribution.

## Statistical Treatment of Data

The responses collected from the survey questionnaire were assessed using various statistical tools. The data was classified, tallied, and tabulated for better presentation and interpretation of the results. The statistical treatment for the data includes percentage, frequency, weighted mean, Kruskal-Wallis H Test, and Mann-Whitney U Test. The mentioned statistical treatments were implemented in order to establish meaningful information from the data gathered where results are ready to be tabulated, analyzed, and interpreted.

**Percentage:** This was utilized to compare and contrast the data collected on the respondents' demographic profile. Also, in order to assess and evaluate the climate change literacy of the students in terms of climate change knowledge. It is one of the most frequently utilized ways of representing statistics.

**Frequency:** This was done in order to emphasize relatively typical responses given the size of the sample that was utilized. This statistical method was also applied to determine the level of knowledge which the respondents currently possess regarding climate change.

**Weighted Mean:** This was used to evaluate the generalizability of the findings obtained from the responses provided by respondents to surveys that utilized the five-scale options. In addition, this statistical instrument is used to measure the students' climate change literacy based on their current climate change knowledge as well as their attitude related to the climate change intervention they attended in terms of knowledge, perception, action, attitude, and personal concern.

**Kruskal-Wallis H Test:** This was used to compare three or more independent groups concerning a continuous or ordinal outcome variable. It examines the null hypothesis that the population median of the outcome variable is the same for all groups. It also tests the alternative hypothesis that shows not equal population

median or the median of the population differs from the other groups.

**Mann-Whitney U Test:** This was utilized to compare two non-normally distributed independent data sets. It is used to determine the fact that two samples begin from populations with different medians.

## RESULTS AND DISCUSSION

To give a whole perspective of the study, Won et al. (2021). included 31 eighth-grade students from Seoul, Korea. A pre- and post-program surveys using a climate literacy questionnaire (CLQ), students' background survey questions, interviews with participants, and artifacts created by students during the program were all utilized to gather data. After the program, participants' climate literacy improved significantly after the session, particularly perception and action. Participants' responses revealed four aspects of climate literacy change: more concrete concepts, the scope of thinking, positive responsibility, and relevance recognition.

### Demographic Profile of The Junior High School Students

The demographic profile of the JHS students is tabulated above. In terms of age, 76 of them or 28.8% are 13 years old and 68 or 25.8% are 15 years old and 20 or 7.6% are 12 years old. The respondents are composed of 64 or 24.2% from Grades 7 and 8, and 68, or 25.8% from Grades 9 and 10. They are equally distributed to five sections in Grades 7 and 8, and 4 sections in Grades 9 and 10. Most of the respondents are female with 189 or 71.6% while 75 of them or 28.4% are male.

This is in line study of Caisip and Espinosa (2022). The participants in the study were 222 Filipino youth participants, ages ranging from fifteen (15) to thirty (30) years old. Lopez and Malay (2019) surveyed 276 Grade 12 students, ages 16 to 19, from various tracks and concentrations. The survey results revealed a moderate to high awareness of climate change-related issues. Also, according to the calculated weighted mean, the level of awareness among senior students is often higher than that of first-year students. Overall, the differences could serve as a foundation for developing academic and extracurricular activities that are sensitive to the gender and grade level of the involved students to improve their cognitive adaptive capacity.

It is in line with the study of Kutuywayo, A. et al., (2022) which showed that a significant portion of junior high students have limited knowledge about climate change. The data presented also underlines the need for greater climate change education in schools to boost student knowledge and foster positive attitudes regarding climate change.

### Level of Climate Change Literacy Among JHS Students

#### Respondent's Level of Climate Change Knowledge

Out of 264, none of the respondents obtained a perfect score of 10, indicating that none of the students demonstrated a high level of climate change literacy. Results revealed only 7.9% of respondents gained a passing score of 8. This indicates that only a small percentage of students demonstrated a literate level of knowledge.

The majority of students (20.1%) attained a score of 5, indicating a slightly literate level of knowledge, this implies that a sizable proportion of students have a fundamental comprehension of climate change but still require further learning. The remaining respondents scored below the minimum required score, which means an illiterate level of climate change knowledge and underscoring the need for educational interventions to improve their comprehension and awareness.

The study by Wu and Otsuka (2021) explores high school students' cognition, knowledge, attitudes, and behavior concerning climate change, based on a questionnaire survey of 657 high school climate-related knowledge and attitudes that are weakly associated with behavior.

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## **Respondents' Level of Climate Change Perception**

The study reveals the climate change perception, displaying a mean score of 3.48, indicating that respondents are literate in their understanding of climate change perception, demonstrating their agreement that climate change is a complex and urgent issue that affects everyone. In addition, with a mean score of 2.47, their disagreement with the belief that living for today is more essential than worrying about the future effects of climate change falls within the slightly literate range, indicating a lack of awareness regarding the future effects of climate change. The respondents' overall mean score of 3.22 positions them in the literate category, which means they have a generally solid grasp of climate change indicators. Based on Prasad and Mkumbachi (2021) there are significant differences in climate change perception at the two student organizations -the Econesian Society and the students of Wantok Moana. The study also showed that students at the Econesian Society better understand climate change than the students of Wantok Moana.

## **Respondents' Level of Climate Change Action**

The respondents' mean score of 3.70 indicates that they firmly agreed that planting trees helps absorb one ton of carbon dioxide. This places them in the category of highly literate individuals, demonstrating that they are willing to initiate climate change action. The respondents' mean score of 3.23 on the statement about reducing energy consumption to slow climate change falls within the literate range. This indicates that they concur with the concept in general, but may not strongly endorse it. The respondents' mean score of 3.37 places them in the literate category, indicating they have a thorough understanding of climate change action. The focus group interviews conducted by Kolenatý et.al. (2022) revealed that the reported increased willingness to act often translated into actual climate action and that learning about the concept of carbon footprint and the process of calculating and decreasing it proved to be a very accessible and fast path to participants' engagement in personal climate action.

## **Respondents' Level of Climate Change Attitude**

The respondents agreed that they are concerned about the future of the planet and the effects of climate change on its ecosystem and communities with a mean score of 3.52. This places them in the category of highly literate individuals, indicating a profound awareness and concern for the effects of climate change. With a mean score of 3.22, they agreed that they would contribute to reducing climate change if everyone else did the same. This falls within the literate range, indicating a generally solid understanding of climate change attitudes, but also some reluctance to act individually. Taking into consideration the overall mean score of 3.38, the respondents' attitude toward climate change is classified as literate. This suggests that they have a well-rounded understanding of climate change and its implications. The findings are consistent with the findings of Tatli H.'s (2022) study, which concluded that people are generally willing to take action to reduce their energy consumption if adequately motivated and given the appropriate type of information. The study by Wu and Otsuka (2021) explores high school students' cognition, knowledge, attitudes, and behavior concerning climate change, based on a questionnaire survey of 657 high school climate-related knowledge and attitudes that are weakly associated with behavior.

## **Respondents' Level of Climate Change Personal Concern**

The respondents can be classified as literate in terms of their personal concern for climate change. The mean score of 3.51 falls within the range of 3.51-4.00, indicating a high level of agreement and indicating that their irresponsible attitudes, such as throwing garbage anywhere, have been significantly changed. This indicates that they are highly conscious of how their actions contribute to climate change.

The respondents' overall mean score of 3.43 positions them in the literate category, indicating that they have a solid level of awareness in regards to their personal concern for climate change. This indicates that they have knowledge and comprehension of the issues surrounding climate change, which means that the respondents are well-informed and literate in terms of climate change as a personal concern, and that they comprehend the urgency and complexity of climate change.



These results are consistent with those of Poushter and Huang's (2019) study, which surveyed citizens from 26 countries and found that the vast majority concur that climate change poses a serious threat to their countries. In thirteen of these countries, climate change is viewed as the greatest global threat.

### **Test of Differences of the Respondents' Level of Climate Change Literacy based on age, grade level and sex**

In connection to the age profile, with p-values of greater than 0.05 level of significance, there are no significant differences in the level of literacy in terms of knowledge, perception, and attitude. This implies that the level of climate change literacy in terms of knowledge, perception, and attitude of the respondents is the same at all age ranges (12 years old - 16 years old). On the contrary, there are significant differences in the level of climate change literacy in terms of action and personal concern with p-values of .007 and .010, respectively. There is a significant difference since the climate change action of ages 13 years old and 14 years old were the lowest. Whereas, in climate change personal concern, ages 13-16 years old and above got the lowest also.

Regarding grade level profile, the p-values are all less than 0.05 significance level indicating that there are significant differences in the level of literacy in terms of all indicators. There is a significant difference in climate change knowledge when grouped in grade level since grades 7-8 got the lowest result. While in climate change perception, it is significantly different since grades 9-10 got the lowest result. Whereas grades 7-9 got the lowest result action. On the other hand, grades 7-8 got the lowest result in climate change attitudes. Lastly, climate change personal concern has also a significant difference since grades 7-8 got the lowest result. Thus, the climate change literacy of Junior High School students of climate change knowledge, perception, action, attitude, and personal concern varies across grade levels.

Lastly, in the sex profile, the p-values are all greater than 0.05 indicating that the differences on the level of climate change literacy in terms of these five indicators are not significant. This implies that the climate change literacy in terms of climate change knowledge, perception, action, attitude, and personal concern of respondents are all the same whether they are male or female.

### **Factors That Influence the Level of Awareness of JHS Students Regarding Climate Change**

#### **Environmental Experiences as Factors that Influence the Respondents' Level of Climate Change Literacy**

With respect to environmental experiences, they are often familiar with the concept of "climate change" because of everyday exposure with the highest mean of 3.38. The lowest mean of 2.86 shows that they often notice that the river they used to visit is now all dried up as one of the effects of climate change. The overall mean of 3.13 implies that they often experience these factors. This relates to the study of Sambrook et al. (2021), which demonstrates that there is some evidence that local warming can produce concern about climate change, but the potential for personal experience to influence action may depend on the experience being associated with climate change first.

#### **Climate Change Education as a Factor that Influences the Respondents' Level of Climate Change Literacy**

Then, concerning climate change education, its highest mean of 3.59 means that the respondents often know about climate change because of what their teacher discussed. Its lowest mean of 2.86 showed they often know about climate change because of attended programs and seminars. The overall mean of 3.26 indicates that the respondents often know about climate change. It is similar to the study of Henneman et al. (2020), he stated that the impact of climate change education programs on the knowledge and attitudes of participants regarding climate change. Attending these discussions significantly increased participants' knowledge of climate change and its effects, as well as their enthusiasm to take action to combat it, the study. The authors concluded that climate change education programs can play a significant role in developing climate awareness

and encouraging both individual and community participation to address climate change. It is also in line with the study of Myers et al. (2019), which analyzed the state of climate change education in K–12 classrooms in the United States. The study indicated that despite climate change being taught in many classes, the quality and quantity of instruction varies considerably. The authors highlighted the importance of teacher education and professional development in enhancing the efficacy of climate change education.

### **Peers as a Factor that Influences the Respondents' Level of Climate Change Literacy**

In peers, often know about climate change because their parents warned them to save electricity as it contributes to climate change, a mean of 3.30. Then, they often know this because one of their friends advocates climate change and its drastic effects, a mean of 2.87. The general mean of 3.09 indicates that they often perceive these factors that influence their awareness of climate change. Similar to the study of Wang et al. (2022), the results showed that the family parenting style significantly predicts children's willingness to save energy. Additionally, this supports their child's learning of environmental concerns. The study confirmed the effectiveness of family relationships in promoting energy saving.

### **Development of the Proposed Learning Plan**

The researchers' output is a proposed learning plan. This allowed the researchers to extract the data from the questionnaire. Researchers identified the portion of the study that acquired the lowest number of respondents and used the results to develop the proposed learning plan. The researchers subsequently determine the lessons within the curriculum where the lacking topics can be integrated. The researchers then request permission from the administration of a National High School in the Philippines to provide a copy of the curriculum so that the proposed learning plan will be integrated into the lessons and students' understanding of climate change will be enhanced through their teaching.

The proposed learning plan consisted of learning objectives that are clearly defined and align with the desired learning outcomes. It is well-structured and scaffolded to support students' learning progression and provides opportunities for students to build on their prior knowledge and develop new skills and attitudes related to climate change. It also provide learning tasks prior to, during, and after the delivery of the instruction. An assessment is also included to measure the progress of the students

## **CONCLUSIONS**

Based on the findings of the study, the researchers concluded that:

1. The study is limited to one (1) national high school in the Philippines representing all grade levels. Other national high schools are not included since the number of respondents may provide a clear assessment.
2. The demographic profile of the Junior High School students from a National High School in the Philippines revealed that there are grades 7 to 10 with the majority of female and 13-year-old respondents.
3. The Junior High School students exhibit a high level of climate change perception, action, attitude, and personal concern. However, their climate change knowledge is marginally below average, and they are illiterate since only 7.9% of students gained a passing score of 8.
4. The climate change literacy in terms of climate change knowledge, perception, action, attitude, and personal concern of the Junior High School students are not the same across age, and grade level. However, the climate change literacy of the students in terms of the five indicators is the same regardless of their sex.
5. The respondents affirm that climate change education has a greater influence on students' climate change awareness than environmental experiences, followed by students' peers. Climate change education appears to be the most influential factor in raising learners' awareness of climate change.
4. The development of a proposed learning plan that may be considered for use by preservice teachers to enhance the climate change literacy of the Junior High School students as it is aligned with the

curriculum utilized by the institution, as well as based on the gathered result from the study.

## RECOMMENDATIONS

Based on the findings and conclusions made from the study, the accompanying suggestions are thusly proposed by the researchers:

1. That the developed learning guide for climate change education must be continuously integrated into the present curriculum of Junior High Schools. This can be achieved by integrating the proposed learning plan into relevant subjects.
2. The proposed learning plan may be used to promote learning on climate change and they be given opportunities to participate in climate change mitigation and adaptation activities. These opportunities may include participating in local climate change initiatives, undertaking environmental research projects, and engaging in hands-on activities such as gardening or composting.
3. Future researchers are encouraged to make further investigation into the effectiveness of climate change action in promoting climate change literacy among Junior High School students.

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