

Climate Change Consciousness among Tertiary Students: Implications to Curriculum Development

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Abstract - *Climate change per se is not evident among people but the seasonal events one experiences may lead to understand climate change. This descriptive-quantitative research considered the degree of awareness on climate change among the tertiary students of the Catanduanes State University – Panganiban Campus in terms of climate change causes; climate change effects; and; climate change possible mitigation. Also, the research identified the demographic profile of the student-respondents concerning age, sex, year level, and academic program. The results revealed that the average student-respondents out of 271 have a modest degree of awareness and attitude on climate change that could still be improved by intensifying institutional programs and activities regarding climate change. About the profiles: age, sex, and academic-program, they do little to determine either the degree of awareness or attitude related to climate change among the student-respondents because of the findings ‘no significant difference’. While the year-level of education expresses that when one gets a higher level of education, the degree of awareness and attitude on climate change also gets higher. With the gathered data, the study recommends additional academic and non-academic activities may be required for tertiary students to be more aware of the issues on climate change and do activities that would help mitigate the impact on their respective communities. Other activities include, proper waste disposal campaign, planting trees and mangroves, and networking with other agencies for human and financial*

support and policymaking. Lastly, public information drive and extension services programs can be initiated to promote positive response towards climate change.

Keywords: *climate change, higher education, curriculum development*

INTRODUCTION

A declaration is persuasive and credible whichever since it is directly obvious or because it appears to be proved from other testimonies that are so [1]. Climate change itself is not precisely evident among people because it is a slow change over a long period and can only be noticeable mostly by people who can observe this phenomenon through mathematical models and scientific measurements. However, knowing that the seasonal events and the weather conditions are the fundamental indicators by which individuals can understand and observe the climate, it is reasonable that this is a method by which people may understand climate change [2]. But it is further argued that lacking first-hand experiences or information on the possible consequences brought about by climate change could be a driving factor why some people are passive to take action to mitigate climate change. From an advantageous perspective, those who have had direct experience or experiences associated with this phenomenon called climate change would likely be more concerned with the issue and thus more inclined towards a useful strategy to mitigate climate change [2]. And thus a question may be asked on what shapes the awareness on Climate Change, both of its scope or why it happens? Where lies the differences in its views about this changing climate with varying degrees of concern that motivate people to take their mitigative actions [3]. With the query raised, whatever answer one may formulate, we can follow the argument of Aristotle 2,370 years ago

that whether the assumptions of the scientists or an ordinary people may contradict among themselves but one thing we can be sure for now, that climate change is a self-evident phenomenon around the world although it may vary according to the environmental or geographical location of a certain place. With this, academic Communities suggest that we should treat climate change as an issue which could be a large threat to our society and human civilization, and therefore information and communication concerning climate change carry varied seriousness, urgency, and attention [4]. With the age of digital technology where people can easily project their ideas that sometimes may distort scientific facts to let others believe their claims that may create societal enigma that could have an extensive effect for both environmental and human systems and create transformation within a certain society [5]. And thus, there is increasing recognition of the role of learning institutions in figuring out how the society may understand climate change [6]. The government particularly the Higher Education Institutions which is responsible for implementing curricular programs and activities which help educate its clientele about climate change. Empower society, the youth in particular, for their effective participation in preparing and implementing decisions about climate change [7]. It also shows that there are no strict guidelines mandating learning intuitions on the integration of climate change into the curriculum [8]. It is further argued that the constant monitoring and investigation of the factors affecting the climate may be performed by the government so that the general public may be aware of climate change including possible mitigation strategies [9]. It is also said that climate change mitigation requires perceiving the changing climate. And it is through education that one can manage to respond through the changing conditions amidst climate change and help in minimizing its adverse effects [10]. Climate change as a topic is an ideal theme to be integrated into the teaching-learning process from simple to complex investigation dealing with the many aspects of climate change so that learners may comprehend and apply this essential information which is beneficial to them and the community [11].

But it has been reported that even though students studied environmental matters, their environmental awareness and being environmentally responsible citizens do not manifest their behaviors and actions. And thus, curricular designs may consider this finding for effective curriculum development implementation.

[12]. Because there is a demand in integrating the concepts of climate change into the curriculum of tertiary education to increase the students' degree of awareness on climate change and become agents in mitigating its negative effects [9].

It is claimed that there is a piece of evidence confirming that pedagogical interventions are most effective when focusing on an individual, actual, local, and doable aspects of climate change [13]. In so doing, education enhances capabilities, perception of risk, and knowledge which, if applied, may directly or indirectly improve health, reduce poverty, and promote accessing resources and information. Hence, educated individuals are expected to be more empowered and more adaptive when facing risks in climate or natural hazards [14]. Thus, there is a need to ascertain the climate change consciousness among tertiary students that may implicate curriculum development.

OBJECTIVES OF THE STUDY

This study determined the degree of Awareness on Climate Change among the Tertiary Students of the Catanduanes State University – Panganiban Campus in terms of Climate Change Causes; Climate Change Effects; and; Climate Change Possible Mitigation (School Year 2019-2020). Also, the research aimed to identify the demographic profile of the student-respondents concerning age, sex, year level, and academic program. Lastly, their attitude towards climate change is also considered. This also tests the significant difference between the profile of the student-respondents and the Degree of Awareness on Climate Change, Effects, Possible Mitigation and Education, and the Attitude Towards Climate Change. The student-respondents' awareness and attitude towards climate change are significant for government agencies specifically the academe to develop a curriculum that will enhance climate change literacy. Further, an idea of public awareness and campaign among the general public be carried out to improve resiliency on the possible unfavorable effect of climate change.

METHODS

Nature of Research

The study employed a descriptive-quantitative research method to explain and consider the degree of Awareness on Climate Change among the Tertiary Students in terms of Climate Change Causes; Climate Change Effects; and; Climate Change Possible

Mitigation. Only the first-year and second-year students were taken as student-respondents among the three programs: Bachelor of Elementary Education (BEED), the Bachelor of Technical and Vocational Teacher Education (BTVTEd) and Bachelor of Science in Agriculture (BSA) of the University Satellite Campus are offering since third-year and fourth-year students are not available in the two programs (BEED and BTVTEd) because of the K-12 Curriculum Program implementation that gives a gap in the admission of tertiary students in CSU-PC.

Research Locale

The Catanduanes State University – Panganiban Campus (CSU-PC), Panganiban, Catanduanes Island, Philippines is the universe of the study. The CSU-PC is the only satellite Campus of the Catanduanes State University (Main Campus) located at Virac, Catanduanes that is approximately 63 kilometers away from the Satellite Campus that lies geographically at 13 54' 31" latitude and 124 17' 58" longitude.

Sampling Design

The study used quota sampling and complete enumeration in the identification of the student-respondents. This non-probability technique which is Quota sampling aims to make the model representative of the population-student-respondents by identifying which BSA Blocks will be considered in the present study. Since in BSA program, there are 4 blocks in first-year, and 2 blocks in second-year, the researcher considered only 2 blocks both for first-year and second-year as samples of the study. While in the other two programs, the BEED and the BTVTEd which have only one block for each program, total enumerations were applied. And the blocks identified for each program, total enumeration were also applied except those students who were absent during the data gathering were not included as research samples. And it garnered a total of 271 student-respondents.

Survey Instrument

A research tool item-statements from previously conducted researches on climate awareness surveys [17, 18] were modified, simplified, and adapted to harmonize the level of understanding of the student-respondents. The final version of the research instrument begins with the cover letter to the students-respondents duly noted by their respective Department Chairs and approved by the Campus Administrator. Inside the questionnaire proper are the 27 statements

with 2 parts: Part I- Student-Respondent Profile, Part II-A. Degree of Awareness on Climate Change (20 statements), and B. Attitude Towards Climate Change (7 statements). The last portion of the instrument is the informed consent form where the students affixed their signatures showing that they are completely knowledgeable about the nature and purpose of the study and they freely agree to participate in the conduct of the study. The data collection process implies that this study is compliant with the ethical considerations of research. The survey was conducted during November 2019. And only this faculty-researcher has access to the research data gathered to observe data privacy. To make sure the reliability of the questionnaire, this writer used the method of assessing the internal consistency known as Cronbach's Alpha Coefficient. The actual data gathered from the 271 student-respondents through the questionnaire was estimated using Cronbach's Alpha Coefficient. The normally approved lower limit is 0.77 [17]. The results were presented in Table 1. The Cronbach's Alpha Coefficient results of all questionnaire items of .85 shown in Table 1 were greater than the threshold of 0.77, and therefore the questionnaire was considered 'reliable'.

Table 1. Reliability Analysis

Variables	No. of items	Cronbach's Alpha Coefficient (α)
Degree of Awareness on Climate Change	20	.84
Attitude Towards Climate Change	7	.71
All questionnaire items	27	.85

Statistical Treatment

A five-point Likert scale was used to compute replies. Every response scale was given value [20, 17] The tallied data on the Degree of Awareness on Climate Change were given value: Fully Aware = 5 (76% to 100 Aware), Moderately Aware = 4 (51% to 75% Aware), Aware = 3 (26% to 50% Aware), Less Aware = 2 (1% to 25% Aware) and Not Aware = 1 (0% Aware). While on the Attitude Towards Climate Change, the given value for the five-point Likert Scale were: Strongly Agree = 5 (51% to 100 Agree), Agree = 4 (1% to 50% Agree), Undecided = 3 (0% Agree or Disagree), Disagree = 2 (1% to 50% Disagree), and Strongly Disagree 1 (51% to 100 Disagree). Frequency count and weighted mean were applied to ascertain the degree of Awareness on Climate Change

among the Tertiary Students in terms of Climate Change Causes; Climate Change Effects; and; Climate Change Possible Mitigation; and the Attitude towards Climate among the student-respondents of the CSUPC. The ANOVA F-Test and Z-test were used as statistical tools to determine the significant difference between the profile of the student-respondents and the degree of awareness and attitudes towards Climate Change.

RESULTS AND DISCUSSION

Table 2. Profile Distribution of the Student-Respondents

Profile	Categories	n	%
Age	17-21	215	79.3
	22-26	39	14.4
	27-31	14	5.2
	32-36	3	1.1
Sex	Male	107	39.5
	Female	164	60.5
Year Level	First-Year	134	49.4
	Second-Year	137	50.6
Academic Program	BEED	85	31.4
	BSA	123	45.4
	BTVTEd	63	23.2

Table 2 shows that most of the respondents were aged ranged from 17-21 years old. In terms of their

sex, the female is higher in number than male. In terms of their year level, first-year and second-year students' ratio are almost equal with the difference of only 3. Lastly, in the Academic Program, most of the student respondents are taking the BSA program.

Table 3 presents the student-respondents degree of Awareness on Climate Change causes, effects, possible mitigation, and education. Means from the answers to 20 statements showed that the respondents are moderate to fully aware of the given statements. Similarly, student-respondents showed fully aware of the statements 16 to 20 under education. These show most of them are fully aware on climate change: (item-16) issues will be appreciated more when it is taught/integrated into various classroom instruction; (item-17) issues need to be explained to everyone; (item-18) is helpful when climate change education is introduced to the various institutions; (item-19) positive attitudes towards climate change will be ensured when students are fully aware of it; (item-20) education is interconnected with other social issues such as economic development and poverty reduction. The finding implies the importance of Climate change literacy that can be promoted by educational institutions to uphold public engagement support for climate change literacy and action. [16]and become agents to lessen the unfavorable effects of climate change [4].

Table 3. Degree of Awareness on Climate Change: Causes, Effects, Possible Mitigation and Education

STATEMENTS	MEAN	INTERPRETATION
Causes		
1. Deforestation leads to Climate Change	4.50	Fully Aware
2. Cutting trees causes climate change.	4.73	Fully Aware
3. Climate change is influenced by poor agricultural procedures (e.g. Fertilizers)	3.77	Moderately Aware
4. Climate change is inclined by carbon emissions from vehicles.	4.53	Fully Aware
5. Irresponsible or poor waste disposal causes climate change.	4.53	Fully Aware
Sub-Grand Mean	4.41	Moderately Aware
Effects		
1. Climate change causes food scarcities.	4.42	Moderately Aware
2. Climate change triggers more floods and drought.	4.69	Fully Aware
3. Climate change tend to escalate sea levels	4.28	Moderately Aware
4. Depleting the ozone layer causes climate change.	4.62	Fully Aware
5. Climate change causes the environment to become hotter than it was.	4.50	Fully Aware
Sub-Grand Mean	4.50	Fully Aware

Table 3 (cont). Degree of Awareness on Climate Change: Causes, Effects, Possible Mitigation and Education

STATEMENTS	MEAN	INTERPRETATION
Possible Mitigation		
1. Climate change can be lessened with organic farming.	4.09	Moderately Aware
2. The practice of land-fills as an alternative to open damp sites can mitigate climate change	4.18	Moderately Aware
3. Climate change can be minimized by mitigated air pollution from industries	4.33	Moderately Aware
4. Planting more trees may help hinder climate change.	4.84	Fully Aware
5. Climate change can be mitigated through information dissemination about climate change.	4.42	Moderately Aware
Sub-Grand Mean	4.37	Moderately Aware
Education		
1. Climate Change issues will be appreciated more when it is taught/integrated into various classroom instruction.	4.57	Fully Aware
2. Climate Change issues need to be explained to everyone.	4.76	Fully Aware
3. It is helpful when climate change education is introduced to the various institutions.	4.65	Fully Aware
4. Positive attitudes towards climate change will be ensured when students are fully aware of it.	4.75	Fully Aware
5. Climate change education is interconnected with other social issues such as economic development and poverty reduction.	4.61	Fully Aware
Sub-Grand Mean	4.67	Fully Aware
GRAND MEAN	4.49	Moderately Aware

The moderate to full awareness suggests that the student-respondents have previous knowledge about climate change although the data further reveals that they still need to discover more about the possible mitigation relative to climate change to address climate change issues. It is argued that the information-based science advocacy seems to have only a minor effect on public concern on climate change [19] and also reported that even though students studied environmental matters, their environmental awareness and being environmentally mature individuals do not show with their actions [12].

Likewise, among the four-indicator-statements about climate change, ‘possible mitigation’-statement-

indicator garnered the lowest sub-grand mean among the indicators implying that the student-respondents are less aware of how to lessen the negative effects of climate change relative to other indicators. Having no first-hand information about climate change tend to make people passive in mitigating climate change [2]. The garnered grand mean of 4.49 fall under the threshold of ‘Moderately Aware’ or 51% to 75% awareness as shown in the quantification of the five-point Likert scale used in this study that denotes a modest degree of awareness on climate change which could still use some improvement, and this would be achieved by intensifying institutional programs and activities.

Table 4. Attitude Towards Climate Change

STATEMENTS	MEAN	INTERPRETATION
1. I consider climate change to be a fact.	4.86	Strongly Agree
2. Time is still enough to prepare for the problems brought about by climate change.	4.42	Agree
3. I believe that action about mitigating climate change be done immediately.	4.62	Strongly Agree
4. I keep myself prepared for possible problems caused by climate change.	4.30	Agree
5. I update myself with news and issues concerning climate change.	4.17	Agree
6. Climate change is a topic that I am seriously concerned with.	4.53	Strongly Agree
7. I would join in the effort of combatting climate change.	4.45	Agree
GRAND MEAN	4.48	Agree

The mean response of students' attitudes towards climate change ranged from 4.17 to 4.87 is shown in Table 4. Students expressed strong agreement to statements (item-1) I consider climate change to be a fact; (item-3) I believe that action about mitigating climate change be done immediately; and (item-6) Climate change is a topic that I am seriously concerned with. While the remaining 4-item statements got an interpretation of 'Agreement' The garnered grand mean of 4.48 falls under the threshold of Agree or 1% to 50% degree of agreement on the statements related to attitude towards climate change considering the five-point Likert-scale adopted in this study. This denotes an acceptable degree of attitude towards climate which could still be considered for a more appropriate attitude by strengthening University programs and activities that are anchored on Climate change awareness and campaign.

Age and Sex

Statistical inquiry shown in table 5 proved that age has no significant difference on the degree of awareness on climate change, effects, possible mitigation and education given the $F(3, 76) = 0.56, p = 0.64$ and also demonstrates that there is no

significant difference on the attitude towards climate change getting $F(3, 24) = 0.66, p = 0.58$. This finding suggests that age has little to no effect on the awareness and attitude on climate change. The finding is parallel with Lopez and Malay study [16] implying that the age level does not necessarily determine the degree of awareness and attitude towards climate change among the student-respondent.

In terms of sex, the computed data displays no significant difference on the degree of awareness on climate change, effects, possible mitigation and education, with the Male students' group mean (4.42, $n=107$) that is lower than Female students' which is (4.53, $n=164$), $z=-1.27, p=0.20$. Sex also has no significant difference in attitude towards climate change, with the Male students which have a group mean (4.36, $n=107$) that is also lower than Female students' which is (4.45, $n=164$), $z=-1.00, p=0.32$. This finding implies that sex does little to determine either the level of awareness or attitude related to climate change among the student-respondents. The finding is again similar to Lopez and Malay study [16] reporting that awareness and attitude on climate change among the respondents considering sex did not significantly differ.

Table 5. Summary of tests of differences among variables

Differentiated Variables	Profile	Group Mean	Test Statistic	Computed Value	P-Value	Degrees of Freedom	Interpretation
Age vs. awareness	17-21	4.47 (n=215)	F Test	0.56	.64	3/76	no significant difference
	22-26	4.57 (n=39)					
	27-31	4.58 (n=14)					
	32-36	4.62 (n=3)					
Age vs. attitude	17-21	4.45 (n=215)	F Test	0.66	.58	3/24	no significant difference
	22-26	4.56 (n=39)					
	27-31	4.64 (n=14)					
	32-36	4.57 (n=3)					
Sex vs. awareness	Male	4.42 (n=107)	Z-test	-1.27	0.20	n/a	no significant difference
	Female	4.53 (n=164)					
Sex vs. attitude	Male	4.36 (n=107)	Z-test	-1.00	0.32	n/a	no significant difference
	Female	4.45 (n=164)					
Year-level vs. Awareness	First-Year	4.37 (n=134)	Z-test	-2.68	0.01	n/a	significant difference
	Second-Year	4.60 (n=137)					
Year-level vs. attitude	First-Year	4.30 (n=134)	Z-test	-2.29	0.02	n/a	significant difference
	Second-Year	4.53 (n=137)					
Academic program vs. Awareness	BEED	4.45 (n=85)	F Test	0.85	.43	2/57	no significant difference
	BSA	4.48 (n=123)					
	BTVTEd	4.56 (n=63)					
Academic program vs. attitude	BEED	4.41 (n=85)	F Test	0.42	.66	2/18	no significant difference
	BSA	4.50 (n=123)					
	BTVTEd	4.52 (n=63)					

Year-Level and Academic Program

Considering the statistical results in Table 5, the profile: year-level indicates a significant difference on the degree of awareness on climate change, effects, possible mitigation and education, with the First-year students which have the group mean (4.37, n=134) that is lesser than the Second-year students' which is (4.60, n=137), $z=-2.68$, $p=0.01$. Year-level also has no significant difference in attitude towards climate change, with the First-year students which have the group mean (4.30, n=134) that is also lesser than the Second-year students (4.53, n=137), $z=-2.29$, $p=0.02$. The findings denote that when one gets a higher level of education, the level of awareness and attitude on climate change gets higher also. Because it is argued that educated persons are likely to be more positive and knowledgeable in facing risks in the natural environment or natural hazards [14].

Lastly, academic-program denotes a significant difference on the degree of awareness on climate change, effects, possible mitigation and education having $F(2, 57) = 0.85$, $p = 0.43$ while no significant difference on the Attitude Towards Climate Change given the $F(2, 18) = 0.42$, $p = 0.66$. This signifies that academic-programs make students aware of climate change at various levels yet their attitude demonstrates similarity.

CONCLUSION AND RECOMMENDATION

The results of this baseline information study revealed that the average student-respondents out of 271 have a modest degree of awareness and attitude on Climate Change and it could still be improved by intensifying institutional programs and activities regarding climate change.

About the profiles: age, sex, and academic-program, they do little to determine either the degree of awareness or attitude related to climate change among the student-respondents because of the findings 'no significant difference'. While the year-level of education expresses that when one gets a higher level of education, the degree of awareness and attitude on climate change also gets higher.

Similarly, Increasing Climate Change Awareness is beneficial, albeit in theory. Since according to the findings of Oğuz, Ccedil, and Kavas, even though students studied environmental matters and have increased awareness of environmental issues, they tend not to do anything progressive as environmentally responsible citizens [12]. This implies that awareness, alone, is not enough as a driving force in helping mitigate Climate Change.

Thus, in designing curricular programs for higher education institutions, the awareness of climate change concepts and issues may be considered while also translating them into concrete applications and actions that may ensure that they make full use of what they have learned. Making definite rules about while also promoting the integration of climate change into the curriculum may address the findings of Chang and Pascua saying that the integration of climate change into the curriculum is not yet a common practice in educational institutions [8].

Given the scenario, the study further recommends that additional academic and non-academic activities may be required for tertiary students to be more aware of the issues on climate change and do activities that would help mitigate the impact on their respective communities. Other activities include, proper waste disposal campaign, planting trees and mangroves, and networking with other agencies for human and financial support and policymaking. Lastly, public information drive and extension services programs can be initiated to promote positive response towards climate change.

This query has limitations that could be addressed in future investigation. The study focuses only on the awareness and attitude towards climate change, which does not include their actions towards the changing climate, only among tertiary students which obviously cannot cater to the whole picture of climate change curriculum integration in the academe. And therefore the results of the study should not be generalized in all academic institutions comprising all levels of education that include basic education and technical and vocational education for out-of-school youth in the Philippines. Further, actions related to climate change mitigation may be considered to enhance the relation between and among their degree of awareness and attitude towards climate change.

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