

Environmental Education of Students Pursuing Higher Education: Probing on Climate Change Awareness

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Abstract: Several studies argued that the inclination of individuals to participate in activities aiming at environmental conservation emanates from their degree of awareness of the existing problem. Hence, this study examined the level of awareness of students of Batanes State College, Philippines, towards climate change and compare their knowledge to the individual backgrounds. The researchers used a survey questionnaire as the primary tool for gathering data. Mean and percentage were used to describe the profile of the respondents and their awareness of climate change while Chi-Square Test was used to determine the significant difference in the awareness of the respondents in terms of their profile. The results showed that the students demonstrated a moderate level of awareness of the occurrences, causes and consequences of climate change. When compared against their personal backgrounds, the result revealed that there is no significant difference in their level of climate change awareness. This moderate level of awareness towards climate change, despite the harsh weather conditions frequently experienced in Batanes, calls for intensifying the school's efforts in raising awareness of the occurrence, consequences, and causes of climate change. Consequently, these actions will eventually improve the attitude and behaviour of the students to take active participation in the protection of the environment.

Keywords: Climate change; Awareness; Curriculum; Integration; Climate literacy.

Introduction

Unarguably, many countries consider climate change an urgent global concern. Kreft et al. (2017) reported that Philippines is one of the most vulnerable nations in terms of the risks of climate change. Over the years, the country and its people have suffered the devastating effects of natural disasters, which are continuously intensifying. The industries greatly disturbed by climate change are agriculture and food security, which are at risk of low productivity because of abrupt increases in temperature and frequency and intensity of rainfall that brings about floods and landslides. As the strength of these effects continues to a great extent, the Philippine

government has taken disaster risk seriously. In fact, the law-making branch of the country is lobbying for the Department of Disaster Resilience, a new department primarily responsible for overseeing and coordinating the preparation, implementation, monitoring, and evaluation of disaster and climate change resilience plans and programmes.

In 2009, Republic Act. No. 9729 or the Climate Change Act was passed into law, creating the Climate Change Commission (CCC), which was led by the President as chair (Santos et al., 2011). This government agency has been the main climate policymaking body. Not until the passing of this mandate, that the Philippines established a definite acceptance and

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understanding that climate change is a real problem that needs serious attention. It is noteworthy that the National Climate Change Action Plan (NCCAP) sets one of its directions towards increasing the awareness of the Filipinos on climate change (Climate Change and the Philippines Executive Brief, 2018). From a broader perspective, climate change education has been a part of UNESCO's Education for Sustainable Development (ESD) programme. In 2014, the Global Action Program (GAP) on ESD was launched by UNESCO and is considered a crucial focus in climate change. UNESCO purports to put climate change education a more visible part of the international response to climate change (UNESCO, 2018). With these premises that the researchers were interested in studying the level of awareness of the students on climate change to formatively evaluate the extent to which the said government initiatives have been useful.

Speaking of disaster resilience, an island province in the northern part of Luzon has shown the whole nation its strength amidst natural disasters. But this does not make them complacent as they continually improve their capacity to adapt to climate change. The province of Batanes is located within the boundaries of the Pacific Ocean and the West Philippine Sea – a spot extremely vulnerable to strong typhoons. Over the centuries, the indigenous Ivatan people have adapted to this harsh environment by, among other practices, building one-story vernacular houses made of stone, lime, and cogon that are meant to withstand strong winds and heavy rains (Ignacio, 2008). However, despite this presumed adaptation to severe weather conditions, it can't serve in proving the awareness of the locals of climate change.

In the pursuit of spreading the awareness on climate change, higher educational institutions have a critical role to play. Among these roles is preparing the society to adapt to the impacts of climate change by providing research and education around adaptation strategies and science (Nozaleda & Calubaquib, 2020). The law notes the role of educational institutions like Batanes State College (BSC) in mainstreaming Disaster Risk Reduction and Climate Change Adaptation in the curriculum and their research, development, and extension functions. Sec 4 of RA 9512 also mandates the institutions to include environmental education and awareness programs and activities in the National Service Training Program under Republic Act No. 9163, as part of the Civic Welfare Training Service component required for all baccalaureate degree courses and vocational courses with a curriculum of at least two (2) years.

However, several studies argued that attitude towards environmental concerns affects the level of participation of students in school activities. The inclination of individuals to participate in a specific cause emanates from their degree of awareness of the object. In providing and implementing climate change adaptation and mitigation initiatives, it is necessary to investigate the knowledge of students towards climate change so that the school can maximise opportunities in promoting climate literacy.

In relation to similar studies, Ochieng & Koske (2013) revealed that there exist considerable knowledge gaps among primary school teachers, however, noting that their awareness is not at all very low. Similar to this finding, Skalik (2015) found a strong correlation between students' assessments of the urgency of resolving climate change and the amount of information they are able to access. It goes to show that the students' reliance on scientific data and efforts to use several sources of information are correlated with their level of awareness. Additionally, studies have revealed that many pupils' perceptions of climate change are inaccurate. Students typically do not comprehend how global warming translates into climate change (David, 2015). When evaluating the most effective methods for climate education, the research also took into account the variations in increased conceptual understanding or improved decision-making in the educational programs. Aspects of climate change are interwoven and cross-disciplinary, and pupils are heavily influenced by their families and the society outside of school, according to Dickinson (2009). Meanwhile, Tabago (2016) discovered high levels of perception and attitude regarding climate change among students at a state university in the Philippines, confirming that perception of climate change results in an attitude toward assisting in reducing factors contributing to climate change.

This study generally aims to examine the level of awareness of BSC students towards climate change and compare the climate change awareness of the respondents against their backgrounds. It is hoped that the results will serve as a piece of baseline information in the assessment of the level of climate change awareness to compare the effectiveness of the current curriculum and future revisions to it. Also, the result of the study could assist the college in the development and conduct of disaster risk reduction and climate change enhancing-awareness seminars among its constituents, especially the students. The result could provide useful information for Batanes State College to evaluate its curricular programmes and academic activities to

enhance the level of climate change awareness of their students as well as to strengthen the integration of climate change into their general education subjects. After all, schools are not made to hone the intellect solely but also to promote and help in building a healthy environment.

Material and Methods

Research Design

This study employed a quantitative research design. Specifically, this study employed a descriptive method to shed light on the level of awareness towards climate change of the students in Batanes State College. Descriptive research is a type of analysis that focuses on outlining the features of the population or issue under study. This descriptive methodology emphasizes the “what” of the research issue more so than the “why.” Meanwhile, a survey was conducted by the researcher to gather pertinent data and was treated using descriptive statistics. A survey, according to Salaria (2012), employs applications of the scientific method by critically analysing and examining the source materials, analysing and interpreting data, and by arriving at generalisation and prediction.

Sources of Data

The study was conducted in Batanes State College, San Antonio, Basco, Batanes. Total enumeration was employed since the student and teacher population in BSC is not large. The population of the study included 83 third-year college students from the five departments: Teacher Education, Agriculture, Hotel and Restaurant Management, Industrial Technology and Information Technology.

Data Gathering Instruments

The researchers used a survey questionnaire as the main tool for gathering data. The questionnaire was used to collect data on the background of the respondents and their level of climate change awareness.

The research instrument has two sections. Section A contained the personal profile of the respondents namely age, sex, course, parents’ highest educational attainment, parents’ occupation, and family monthly income. Section B (Climate Change Awareness questionnaire) includes statements reflecting the level of awareness towards climate change on the three dimensions, namely (1) awareness of the occurrence of climate change, (2) awareness of the causes of climate change, and (3) awareness on the consequences of

climate change. The 4-point Likert scale for section B ranges from strongly disagree to strongly agree while Section C was measured using the following scales: never, occasionally, frequently and very frequently.

The Climate Change Awareness questionnaire was adapted from the study of Carr (2015), Ouano (2013) and Ezeudu (2016) and was later modified to make the questions relevant to the present study. The content validity of the research instruments and interview guide was ensured through the expert judgment of professors from Isabela State University and Cagayan State University.

The research instrument for students and faculty was pre-tested among 80 students and 20 faculty members of Isabela State University, respectively. The reliability of the research instruments was measured at 0.80 using Cronbach Alpha.

Data Gathering Procedure

Prior to administering the instruments, the researchers explained the purpose of the study as well as the instructions for answering the questionnaires. This measure ensured that the respondents completely answered all items in the questionnaires. After the data gathering, the researcher collated and tallied the data and employed statistical treatment for the interpretation of the results.

Data Analysis

Frequency, percentages and arithmetic mean were utilised to analyse the quantitative data such as the profile of the student respondents and teacher respondents. To determine the significant difference in the level of climate change awareness of the student respondents when grouped according to their profile, Chi Square Test was used.

Results and Discussion

Profile of the Respondents

With regards to the profile of the student respondents, the majority of the respondents are between the ages of 21-25 years old. It must be noted that the students-respondents of this study are third year students. Consequently, these students were graduates of the old Revised Basic Education Curriculum (RBEC) who stopped schooling or are acceptably known as life-long learners. Meanwhile, in terms of sex, there is almost an equal proportion of male and female third year students enrolled in BSC. Nearly half (36 or 43.3%) of the third-year students are taking Bachelor of Science in

Hotel and Restaurant Management and the least chosen programs are education and industrial technology. Furthermore, the male parents of the respondents are mostly engaged in agriculture while the mothers are housewives. Despite these findings, most of the parents have reached college and even graduated from college. Consequently, the respondents characterised the family monthly income as below 10,000 PhP.

Level of Awareness on the Occurrence of Climate Change

Table 1 presents the students' level of awareness of climate change. In general, the third-year students of Batanes State College are moderately aware of climate change. The students obtained a grand mean of 3.21 which suggests a moderate level of awareness. This seems an unexpected result for such locals who live in a place frequently stricken by strong typhoons. However, this same frequency of typhoon occurrences may also explain the moderate awareness of the respondents. The locals may have been used to the typhoon experience, and thus the perceived normality of such natural phenomena. In fact, in 2014, the Provincial Environment and Natural Resources Officer George Reyes said while climate change negatively affects most parts of the country, Batanes residents have noted some good things brought by the weather change like increased crop production (Villanueva, 2014).

Furthermore, the abovementioned finding on the level of awareness of BSC students is relatively lower compared to what local literature have found. Barreda (2018) in his study on climate literacy at Partido State University mentioned that students of PSU have much awareness of climate change issues. Meanwhile, Magulod (2018) concluded that the students of Cagayan State University at Lasam have a "high" level of awareness of climate change. This generally suggests that the students survey demonstrated a high level of climate change awareness. In the findings of Agboola and Emmanuel (2016), undergraduates in two universities in Nigeria possessed a "high level" of awareness on the concept of climate change.

On the other hand, the findings of Carr et al. (2015) in which he state that despite attempts by the Tanzanian government to introduce initiatives that attempt to increase public awareness of climate change, levels of awareness and understanding among Tanzanians are still "very low" at all levels. Moreover, further deductions of the same table will show that the highest rated statement is that climate change is a real problem (3.60) but if asked if the evidence of climate change are reliable

(2.99), the students didn't rate it as high as the former. This suggests that although the students are aware of climate change as a problem, there seems to be a lower level of awareness of the evidence of climate change.

Again, this irony can be explained by the fact that the people of Batanes' perception of normality of extreme weather conditions overshadows observable weather changes in some parts of the country and in the world brought about by climate change. It is common knowledge that for centuries, the Ivatans have learned climate adaptation strategies even before "climate change" has earned an established global environmental phenomenon. Altogether, these findings on the awareness of BSC students highlight the opportunity of the college to implement climate change-related awareness programs like seminars or even integrations in the curriculum.

In fact, the basic education sector has responded to this call by including Disaster Risk Management as a separate subject in Senior High School. Colleges

Table 1: Students' level of awareness on the occurrence of climate change

<i>Indicators</i>	<i>Mean</i>	<i>Descriptive interpretation</i>
1. Climate change is a real problem	3.60	High
2. Our climate is changing	3.46	Moderate
3. It seems to me that weather patterns had changed compared to when I was a child	3.40	Moderate
4. Global warming is already occurring in our country	3.37	Moderate
5. I have already noticed some signs of global warming	3.28	Moderate
6. The weather seems to be hotter nowadays	3.27	Moderate
7. Climate change is inevitable because of the way modern society works	3.23	Moderate
8. Climate change is something that frightens me	3.13	Moderate
9. The evidence for climate change is reliable	2.99	Moderate
10. Climate change is just a natural fluctuation in earth's temperature	2.34	Slight
Mean Rating	3.21	Moderate

such as BSC and universities may consider including courses or subjects relevant to climate change. This recommendation is supported by Calvo and Apilado (2014) who recommended integrating climate change concepts in general education subjects in the curriculum courses to increase the level of awareness, knowledge, and attitude of students. This is essential so that students would be able to spread their awareness to others (Amanchukwn et al., 2015).

Level of Awareness on Causes of Climate Change

The key to climate mitigation is the awareness of men to the causes of climate change. Table 2 shows an interesting finding. Despite continuous efforts of the government on educating the young Filipinos starting from basic education, the table shows that in general, the respondents only possess a “moderate” level of awareness (3.06) of the causes of climate change. This is pretty consistent with the moderate awareness

of the same respondents on the occurrence of climate change. Looking further at Table 2, the causes where the respondents are most aware are human activities (3.41), damage to the ozone layer (3.41), and the burning of fossil fuels. All of the said causes are due to human activities. Meanwhile, the causes that the respondents are least aware of are natural causes (2.02), increasing livestock production (2.69), and the use of chemical fertilisers and pesticides (2.82). These causes are not frequently discussed in books and during class lectures.

The result of the present study is similar to the result obtained by The Asia Foundation (2012) where it was mentioned that the population, in general, is familiar with the term ‘climate change’ but they appear to be largely unaware of its causes. Similarly, Carr et al. (2015) have seen that more direct human interferences with our atmosphere such as the effects of cutting down trees and industry climate change are better understood among the population he sampled in Tanzania. Meanwhile, looking at local studies, Lopez and Malay (2019) surveyed 276 Senior High School Students at Cavite and revealed an extreme awareness from the respondents of the causes of climate change specifically ozone layer depletion of greenhouse gas emission.

Table 2: Students’ level of awareness on causes of climate change

<i>Indicators</i>	<i>Mean</i>	<i>Descriptive Interpretation</i>
1. The main causes of global warming are human activities	3.41	Moderate
2. Damage to the ozone layer causes climate change	3.41	Moderate
3. Burning fossil fuels causes climate change	3.40	Moderate
4. Climate change is caused by persistent deforestation	3.36	Moderate
5. Pollution from industry is the main cause of climate change	3.27	Moderate
6. Climate change is the result of poor waste management	3.25	Moderate
7. Erupting volcanoes can cause climate change	2.99	Moderate
8. Climate change is the result of using chemical fertilizers and pesticides in the farms	2.82	Moderate
9. Climate change is due to increasing livestock production	2.69	Moderate
10. Global warming is mainly due to natural causes, not human activity	2.02	Slight
Mean Rating	3.06	Moderate

Level of Awareness of the Consequences of Climate Change

With an overall mean of 2.87 as seen in Table 3, it can be deduced that there is a “moderate” level of awareness in the surveyed population on the consequences of climate change. Again, this is consistent with the previous findings on the two other dimensions of climate literacy (occurrence of climate change and causes of climate change). In a closer inspection of statements presented on the table ranked from highest to lowest, the respondents agree as reflected by a relatively high awareness that climate change can bring about several negative effects (3.40). Second, the respondents were also knowledgeable that climate change can increase the possibility of flooding and drought (3.31). Ultimately, climate change causing increased frequency of natural calamities is ranked third (3.27). However, with respect to the other pre-determined effects of climate change, the surveyed population has a relatively low awareness level that climate change can cause some serious health problems and spread communicable diseases.

This moderate awareness of BSC students on the consequences of climate change is not in accord with the findings of Magulod (2018) when he surveyed students at CSU-Lasam in Cagayan, a nearby province from

Table 3: Students' level of awareness on the consequences of climate change

<i>Indicators</i>	<i>Mean</i>	<i>Descriptive Interpretation</i>
1. Global warming will bring about some serious negative consequences	3.40	Moderate
2. Climate change can cause more flooding and droughts	3.31	Moderate
3. Climate change phenomena have increased natural calamities	3.27	Moderate
4. Climate change leads to water shortages for household use and crop plantations	3.22	Moderate
5. There is observed increase in sea level in the coastal areas	3.20	Moderate
6. Climate change situation has created shortage of food	3.13	Moderate
7. Increased prevalence of vector-borne diseases like dengue fever is due to climate change	2.90	Moderate
8. Climate change can lead to more plant and animal species	2.24	Slight
9. Climate change will improve the weather	2.16	Slight
10. Climate change is good for us	1.90	Slight
Mean Rating	2.87	Moderate
Overall Mean Rating	3.05	Moderate

Batanes. Magulod (2018) recorded a “high” level of awareness of the consequences of climate change among his respondents. Lopez and Malay (2019) also recorded an “extreme” awareness of the surveyed population at a senior high school in Cavite on the consequences of climate change. But like the finding of this study, Lopez and Malay (2019) mentioned that the respondents are most aware of flooding as a consequence of climate change. They attributed that to the frequent flooding in their place due to strong typhoons and monsoon rains. Unlike the findings of the present study, Carr (2014) found that the spread of disease as a consequence of climate change received high awareness among the respondents of his study. A study by Oloke et al. (2013), which was conducted in an urban environment among adults in Nigeria presents an interesting developing world contrast. Similarly, extreme weather, droughts

and flooding were the most popularly chosen effects of climate change.

In summary, after analysing all dimensions of climate change awareness, it was found that the respondents were moderately aware. This seems to imply that the administration of Batanes State College and other relevant agencies need to initiate programmes and activities that would raise awareness of the students and the community on climate change.

This overall finding agrees with what experts at the Asian Development Bank (ADB) headquarters in which they were emphatic that the Philippines needs a strong national response to climate change, something that is lacking despite the fact that it is acutely vulnerable to its effects (Weiss, 2009). ADB observed that most Filipinos have actually felt the consequences of climate change but did not respond to mitigate it. What makes it even worse is the low level of awareness of the locals on climate change. This low knowledge of climate change and the confusion that comes along with it is also true in other sectors of society like local public offices, business industries, and even journalists who report on the issue. They attributed these fallouts to a lack of dialogue, research and a deep divide between the national and local levels of government. The researcher believes that indeed, communication is very important to raise awareness among students and the community at large.

Comparison of Students' Level of Climate Change Awareness When Grouped According to their Profile

The level of awareness among students on the occurrence, causes and consequences of climate change was compared according to the profile variables. In terms of age groups, the analysis shows that there is no significant difference in the level of awareness of the students on the occurrence of climate change ($X^2 = .000, p = 1.000$), likewise, on the causes ($X^2 = .000, p = 1.000$) and on the consequences of climate change ($X^2 = .000, p = 1.000$).

Overall, the difference in the level of climate change awareness of the students when grouped according to age is not significant ($X^2 = .000, p = 1.000$). This implies that regardless of age, the respondents have the same level of climate change awareness. This finding confirms the findings of Tabago (2016) that the perception of the respondents is similar even at different ages. On the other hand, the finding negates the findings of Lyon (1994) that older students were more active and aware of biological and environmental facts. However,

in a study published by Benestad et al. (2016), it was found that there is a rising climate change generation gap in America. Americans who deny the existence of climate change were mostly adults, while those who accept it were the youth, this result negates the findings of Lyon et al. (1994).

On the other hand, statistical test results showed that there were no significant differences in the aspect of the level of climate change awareness among male and female students. This suggests that the null hypothesis is accepted. These findings are also consistent with the study of Lopez and Malay (2019), who through statistical analysis showed no significant differences among respondents' awareness and attitude towards climate change with respect to age and gender. Thus, the result differed from the conclusion drawn by Rahman et al. (2014), who suggested that female students were more knowledgeable about climate change as they are more conscious of their studies and current issues.

Meanwhile, there was no significant difference on the level of climate change awareness of students taking different courses in terms of occurrence ($X^2 = .000, p = 1.000$), causes ($X^2 = .000, p = 1.000$), and consequences ($X^2 = .001, p = .976$). Generally, the level of climate change awareness of respondents when grouped according to the course is not significant ($X^2 = .000, p = 1.000$). This implies that the respondents have the same level of climate change awareness regardless of the courses they are taking. This finding confirms the result of the study by Tabago (2016) which states that the respondents have the same perception of climate change.

Furthermore, the analysis revealed no significant differences in the level of climate change awareness in terms of causes, occurrence and consequences of the respondents when grouped according to the highest educational attainment of both parents. This result negates the study of Magulod (2018) in which he concluded that parents' educational attainment showed significant differences in the level of climate change awareness of the respondents. The respondents whose parents are college undergraduates and graduates are more aware of climate change compared to those respondents whose parents were elementary and high school graduates and undergraduates. He attributed his findings to the fact that when parents are more educated the higher level of environmental concern, they exhibit in what their children may have seen and observed. A remark he added is supported by Kahriman-Ozturk et al. (2012). However, in the study of Rahman et al. (2014), mothers' education level appears to be

an important demographic feature that significantly impacts the awareness level. It was also concluded in the study that in almost every case where any of the parents are below or equal to high school, the children know comparatively less than the children of parents with undergraduate or postgraduate degrees.

Additionally, the student's level of climate change awareness as to fathers' occupation is not significantly different ($p = .385$). This implies that regardless of the father's occupation, the respondents have the same level of awareness of climate change. Thus, the findings of Rahman et al. (2014) showed a different result, he stated in his findings that children of service holder mothers and businessmen or service holder fathers exhibited higher climate awareness index. Also, the same conclusion can be derived from the mother's occupation. This contradicts the conclusion of Rahman et al. (2014) that children of working mothers know significantly more compared to the children of housewife mothers. However, a local study by Magulod (2018) had a similar finding. He identified parents' occupation and other profile variables such as year level, college departments, and type of high school graduate to be non-significant in spelling differences in climate change awareness of the respondents.

Lastly, in terms of family income, there is no significant difference in the respondents' level of awareness of the occurrence, causes and consequences of climate change. This is supported by the findings of Magulod (2018) as mentioned. However, Ozden (2008) stated that rich students have a more positive attitude towards environmental issues than poor and average ones, which was similar to the outcomes shown by the study of Yanger (2016) who stated that the higher the family income, the higher the understanding of global warming.

Conclusion and Recommendations

Based on the findings of the study, from a survey of 83 students of Batanes State College, the students demonstrated a moderate level of awareness of the occurrences, causes and consequences of climate change. With regard to the comparison of the level of climate change awareness of the student respondents according to their personal backgrounds, the result of the study revealed that there is no significant difference in their level of climate change awareness.

Though there is a moderate level of awareness among the student-respondents on climate change, it is still recommended that the institution should intensify

its efforts in raising awareness of the consequences and causes of climate change. Seminars, forums, and the production of IEC materials are encouraged. The utilisation of social media and other communication forms is suggested as dissemination platforms. It is strongly believed that with a high level of awareness of the causes of climate change people begin to examine their activities and begin helping nature cope with climate change. Consequently, these recommended actions will eventually improve the attitude and behaviour of the students to take active participation in the protection of the environment.

At the end of the administration of BSC, a measurable and specific institutional climate change awareness and environmental strategic work plan should be conceived by the administration. The findings of this study may be used as baseline data for the development of the plan or a set of policies. Moreover, the moderate awareness of students may be brought by teachers' knowledge of climate change but this is still subject to further studies. Therefore, it is recommended that students and teachers should participate in activities on climate change, awareness, adaptation, and mitigation for them to reach a certain standard before they are used as actors in the implementation of a climate change policy or program.

Lastly, further study should be conducted to explore other independent variables and a larger sampling size of respondents. Utilizing qualitative or in combination with quantitative research design may also help in explaining the gaps in this research.

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