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Attitude and behavior of students enrolled in applied science courses towards environmental protection

Juvelyn D. Capili, Gilbert C. Magulod Jr*.

Cagayan State University, Philippines

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Abstract

University students of the present will be the leaders of the future generation. This paper focuses on the attitude and behavior of students enrolled in applied science courses toward environmental protection. The descriptive survey research design was used in the study. Standardized research tools were used in the study. The study employed descriptive and inferential statistics. The respondents were the 152 randomly selected students. Results of the study showed that the students indicated positive environmental attitudes and environmental behavior. They have positive background knowledge about the environment, which is translated to their attitudes and behaviors towards the environment. Test of difference showed that female students enrolled in applied science courses perceived themselves to have the higher level of attitude towards the environment compared to their male counterparts while no significant difference on the students' responsible behavior towards environment and attitude towards environmental science courses when grouped according to sex. Finally, differences showed on the students' attitude and behavior when grouped according to their degree programs where electronics students expressed the highest positive attitude towards environment; information technology students assessed themselves to have the highest environmental behavior; and mechanical students have the highest positive attitude towards learning environmental science courses. Implications of the study will help the academe intensify its degree programs to improve the awareness and consciousness of students towards the environment.

* **Corresponding Author:** G. C. Magulod ✉ gilbertmagulod_rdecsulasam28@yahoo.com

Introduction

Environmental deterioration has emerged as a serious issue in the current world. The human factor is the largest contributor to the creation and exacerbation of many environmental problems that might advance into serious threats to humans and all living organisms. These environmental problems may increase greatly, mainly due to global negative activities or lack of environmental legislation in countries rather than individual activity. However, individuals with negative attitudes towards the environment will continue to pose problems regarding the environment (Uzun and Saglam, 2006) while individuals who have environmental literacy, awareness and sensibility might contribute to the solution of these environmental problems.

Major environmental problems such as deforestation, loss of biodiversity, ozone layer depletion, global climate change, pollution and over-consumption of natural resources cause a destructive impact on the economics of a country, on the health of the people and another living organism. The World Commission on Environment and Development (WCED) defined sustainability as "the living being able to make their own development without compromising the ability of the future generations to meet their needs." Sustainability can only be achieved if the availability of natural resources, the inability to use them, and the irreversibility thereof are considered (Yaylalı, 2009).

Young people are one of the most promising sectors of the society. They can be promoters of change, young as they are because of their natural dynamism and will power, they can bring a fresh perspective, energy, drive and a sense of what is possible (Jokinen, 2016). Youth in the academe, being educated and informed have greater opportunity to be involved and take part in addressing environmental concerns. There's much we can do to learn and support their efforts.

Schultz and Zelezny (2000) pointed out that the attitude of environmental concern originates from the individual's concept of himself and from the degree of self-perception as a fundamental part of the natural environment. It is believed that behavior is what people do, whether it is appropriate for the environment or not. In general, the behavior is supported by knowledge and attitude, but the direct connections between knowledge to attitude and behavior do not always exist.

Undoubtedly, the youth can significantly perform vital roles in society. It is imperative that youth from all parts of the world participate actively in all relevant levels of decision-making processes because it affects their lives today and has implications for their futures. Students are change agents (Spira, 2015). They are part of sustainable development efforts (Levin, 2000) producers of school outcomes and their involvement are fundamental to all improvement (Walner, 2005). Their inputs, leadership and decision making were at the forefront of environmental education activities. No doubt, the youth of today through student organizations can be an important tool in the promotion of environmental education and protection. It is therefore worthy to look at the environmental initiatives of student organizations in academic institutions.

Universities have integrated environmental science as a required subjects for applied science courses in the Philippines. Many studies have already conducted on environmental attitude among universities but most not much focusing on students enrolled in applied science courses (Raman, 2016). Further affirmed by Heyl *et al.* (2013) that there is a limited number of studies on environmental attitudes and pro-environmental behaviors of students of Agronomy, Commercial Engineering, Public Accounting, and Auditing, Forestry Engineering, Law and Architecture. One particular study for this case is the research conducted by Cerda *et al.* (2007), which highlights the existence of an important gap between attitude and action; students have positive environmental attitudes yet very few of them have adopted positive environmental actions.

In particular, no literature was found which only refers to applied science courses students in the Philippines. This study is important because it investigated factors that affect students to adopt

positive attitudes and responsible behaviors towards their environment. Additionally, this study may help in developing course material and activities, as well as provide suggestions to protect the environment and explore solutions to environmental problems.

This study generally assessed the environmental attitude of students enrolled in applied science courses of one campus of a state university in the Philippines. It specifically aimed to: (1) identify the attitude and behavior of the students; (2) ascertain the differences in environmental attitude when grouped according to the profile of the respondents.

Materials and methods

Research Design

The study employed a descriptive survey research design. The descriptive research design is a scientific method which involves observing and describing the behavior of a subject without influencing it in any way. In the study, the environmental attitude of students was surveyed.

Participants

The participants of the study were the 152 randomly sampled students from a population of 250 students enrolled in the applied science courses. The study used an online sampling calculator with a 95 percent confidence level and 5% margin of error. The respondents were the students taking up Bachelor of Science in Information technology, Bachelor of Science in Industrial Technology-Electronics, Bachelor of Science in Industrial technology- Food technology, and Bachelor of Science- Mechanical Technology.

Instrumentation

The study used the following:

The Attitudes and Behaviour Scale towards the Environment. ABSTE was designed to determine students' attitudes and behavior towards the environment. The scale consists of (30) items put in two groups on a 5-point Likert scale that ranged from 1 (strongly agree) to 5 (strongly disagree). The two main factors of the scale were (a) Students' Attitudes towards the Environment (SATE). (15 items) (b) Students' Responsible Behaviour towards the Environment (SRBTE). (15 items).

The other instrument was the Environmental sciences course evaluation questionnaire. This questionnaire was designed to evaluate students' opinions towards the environmental sciences course, it consisted of 10 items with a 5 point Likert scale, that ranged from 1 (strongly agree) to 5 (strongly disagree).

Data Analysis

To analyze the data gathered, descriptive statistics such as mean, standard deviation and rank were used. Inferential statistics such as independent sample t-test and one-way ANOVA were utilized to find out the significant differences among the environmental attitude of the respondents when grouped according to their profile variables. The scale of interpretation followed this range: 4.20-5.00 (Very High); 3.40-4.19 (High); 2.60- 3.39 (Uncertain); 1.8-2.59 (Low); 1.0-1.79 (Very Low).

Results and discussion

Table 1 shows the students' attitude towards the environment. Generally, the respondents have a grand mean of 3.48 implying that the students enrolled in applied science courses have a high level of environmental attitude and behavior. The students enrolled in the environmental sciences course indicated positive environmental attitudes and environmental behavior. This shows that the students expressed high positive behavior towards the environment, responsible behavior towards the environment, and attitude towards environmental courses.

Table 1. Assessment of the Environmental Attitude and Behaviour of the Respondents.

	Mean	S.D.	D.I.	Rank
Students' Attitude Towards the environment (SATE)	3.45	0.83	High	2
Student's Responsible Behaviour towards the environment (SRBE)	3.41	0.94	High	3
Attitude Towards Environmental Science Courses (ATESC)	3.58	0.90	High	1
Grand Mean	3.48		High	

Legend: 4.20-5.00 (Very High); 3.40-4.19 (High); 2.60-3.39 (Uncertain); 1.8-2.59 (Low); 1.0-1.79 (Very Low)

As seen in Table 1, the attitude of the students towards environmental science course obtained the highest mean of 3.58 (sd=0.90). This suggests that the students can recognize the importance of taking up environmental science courses as part of the subjects for their degree programs. They showed positive understanding that the environmental subjects will make them feel and fulfill the responsibility as green technology innovators and professionals. The statements highly favored by the respondents are "Environmental sciences course provides very important information about environmental issues," Environmental sciences course made me think to find solutions for an environmental problem", Feeling satisfied with studying Environmental sciences course. These findings support previous studies which observed that students who had environmental education subjects were more aware of environmental attitudes than other students (Manzanal *et al*, 2007; Ozsoy, 2012; Aslan & Cansaran, 2008, Magulod, 2018). Likewise, the results also agree with other studies that found significant effects of environmental education on students' environmental behaviors (Chawla, 2006).

Consequently, students' attitude towards the environment was rated high with a mean of 3.45 (sd=0.83). The finding implies that the students exhibit a positive attitude towards the environment. The three highest statements were: "Awareness of environmental problems contributes to countries' development," "Environmental problems have to be discussed in all the countries," and "Media must have a role in spreading environmental awareness." These three items reflect the students' consciousness and understanding, the importance of environmental awareness and its effect on countries' development, and how the ecological crisis is threatening humankind through environmental problems. The results show how the students understand the role of media in spreading environmental awareness. They are keen to know and care about the environment which indicates students' positive attitudes towards the environment.

Finally, Student's Responsible Behaviour towards the environment obtained the mean of 3.41 (sd=0.94) shows that the students display high positive environmental behavior. There were three relatively highest statements: "For saving energy, I turn off the light in my house when it is not used," "I willingly join activities to help in saving the environment," "I don't consume a long time while I'm showering." In these items, students translate their environmental awareness and environmental attitudes in many practical reactions like saving environmental recourses (water and energy). This asserts the positive effect of environmental awareness and attitudes on responsible behavior towards the environment.

In totality, it is clearly conveyed that students enrolled in applied science choruses have positive background knowledge about the environment, which is translated to their attitudes and behaviors towards the environment. Although there are many factors that could affect their attitudes and behaviors, environmental education could be one of the most important factors that affect their attitudes and behaviors towards the environment. Therefore, it is a good indication that the university has integrated an environmental sciences course as a required course.

Table 2. The difference on Respondents Environmental Attitude and Behaviour when grouped to sex.

	Sex	Mean	t-value	p-value
Students' Attitude Towards the environment (SATE)	Male	3.20	3.02	0.002*
	Female	3.61		
Student's Responsible Behaviour towards the environment (SRBE)	Male	3.50	0.89	0.372ns
	Female	3.35		
Attitude Towards Environmental Science Courses (ATESC)	Male	3.53	0.64	0.518ns
	Female	3.62		

*Significant at 0.05

In this study, it is revealed in Table 2, that there exists a significant difference on the environmental attitude and behavior of the students when grouped according to sex particularly on Students' Attitude Towards the environment in favor of the female respondents with the computed p-value of 0.002 lower than the alpha level of 0.05. This means that female students enrolled in applied science courses have a higher level of attitude towards the environment. Meanwhile, the students' responsible behavior towards environment

showed no significant difference when grouped according to sex with the computed p-value of 0.372 implying that both groups of respondents established a high positive level of environmental responsibility. Likewise, along Attitude towards environmental science courses, both grouped of respondents showed a high positive level of attitude as evidenced with the p-value of 0.518.

Various researchers found significant differences between male and female attitudes towards environmental problems and behavior towards the environment. Females had higher pro-environmental attitudes than males (Kuitunen & Tynys, 2000; Talay, Gunduz, & Akpinar, 2003; Sherkat and Ellison, 2007; Fernández-Manzanal *et al.*, 2007; Torgler, García-Valiñas, & Macintyre, 2008; Ek, *et al.*, 2009; Ozsoy, 2012). As Jenkins and Pell (2006) found, females show a high degree of social responsibility and make a significant contribution to environmental protection.

Table 3. The difference on Respondents Environmental Attitude and Behaviour when grouped to degree programs.

	Degree Programs	Mean	f-value	p-value
Students' Attitude Towards the environment (SATE)	Information Technology	3.12	4.175	0.007*
	Applied Electronics	3.81		
	Food Technology	3.37		
	Mechanical Technology	3.51		
Student's Responsible Behaviour towards the environment (SRBE)	Information Technology	3.68	3.715	0.012*
	Applied Electronics	3.63		
	Food Technology	3.09		
	Mechanical Technology	3.45		
Attitude Towards Environmental Science Courses (ATESC)	Information Technology	3.28	3.559	0.015*
	Applied Electronics	3.39		
	Food Technology	3.69		
	Mechanical Technology	3.90		

*Significant at 0.05

In Table 3, it can be seen that there is a significant difference in the students' environmental attitude and behavior when grouped according to the program along the three aspects, which are Students' Attitude Towards the environment, Student's Responsible Behaviour towards the environment and Attitude towards Environmental Science Courses.

The data show that electronics students expressed the highest positive attitude towards environment compared to the students enrolled in other applied science courses with the mean of 3.81. The computed p-value of 0.007 implies that there is a significant difference in the environmental attitude of students when grouped according to the degree programs. The finding suggests that electronic students perceived themselves to have the highest level of environmental attitude. As future electronic technicians, they are aware that environmental problems are currently affecting the environment and they think that proper recycling, innovation, and creation of environmentally friendly technologies is one of the good starts to help protect the environment. They have a strong conviction that they have a role in the design and development of eco-friendly technologies having no adverse effect in the environment. Hence, they can recognize their future role as green tech innovators. Tundele (2015) confirms that eco-friendly technology is also known as clean tech, green tech, and environmental tech, eco-friendly technology can help preserve the environment through energy efficiency and reduction of harmful waste.

As to the Student's Responsible Behaviour towards the environment, the comparison of the means showed that information technology students assessed themselves to have the highest rating of 3.68. The computed p-value of 0.012 reveals that there is a significant difference in the students' perception of responsible behavior towards the environment when grouped according to degree programs. The finding means that the It students displayed a high level of environmental responsibility particularly on environment and environmental awareness on social networks, avoiding harmless products, and proper conservation of electricity. They are aware that Information Technology mostly gives direct effects to the surrounding. Among the impacts that are rated as the first order is the manufacture of IT equipment such as computers, mobile phones, peripheral devices, and satellites. Another direct impact they can consider is the consumption of energy by the ICT equipment. These ideas gave them the strong conviction that as future environment sensitive IT professionals.

Chowdhury & Shanmugan (2015) affirmed that in this modern world, Information Technology gives impacts on society, countries, economy, and environment.

Findings regarding the evaluation of the environmental course showed that students enrolled in mechanical technology have the highest mean score of 3.90. When taken as a whole, the computed p-value of 0.015 reveals a significant difference in the students' attitude towards environmental science courses. This shows that the mechanical students perceived expressed the highest positive attitude towards learning environmental science courses. This means that becoming future mechanical technicians, they are can see the importance of learning the subjects in their degree program. They are capable of designing, troubleshooting and maintaining machines, such as air-conditioning systems, heating and ventilation units, and power plants. Hence, they adhere that environmental sciences courses provided them very important information about environmental issues. They also manifest an understanding that Environmental sciences course made them think to find solutions for environmental problems.

As Ek *et al.* (2009) showed, an environmental course should be included in university education as well as primary and secondary education. For future implications, the content and delivery of the environmental course might be restructured to obtain more interests of university students from wide range colleges and different backgrounds in handling environmental issues and improving their environmental attitudes and behaviors.

Conclusion and recommendation

This study endeavors to assess the attitude and behavior towards the environment among students enrolled in applied science courses of one campus of a state university in the Philippines. Results of the study showed that the students indicated positive environmental attitudes and environmental behavior. They have positive background knowledge about the environment, which is translated to their attitudes and behaviors towards the environment. Test of difference showed that female students enrolled in applied science courses perceived themselves to have a higher level of attitude towards the environment compared to their male counterparts while no significant difference on the students' responsible behavior towards environment and attitude towards environmental science courses when grouped according to sex. Finally, there is a significant difference on the students' attitude and behavior when grouped according to their degree programs where electronics students expressed the highest positive attitude towards environment; information technology students assessed themselves to have the highest environmental behavior; and mechanical students have the highest positive attitude towards learning environmental science courses.

Based on the conclusion of this study, it is recommended that: (1) the university should continue to intensify its environmental education program covering environmental sciences for all programs and colleges in order to sustain the awareness and consciousness of students towards environment; (2) Environmental education instructors should incorporate practical activities in their classroom to make students more involved in environmental issues such as trips, visitation, seminar workshop, and orientation; (3) student organizations may initiate environmental programs, projects and activities for the students; (4) as implication for further studies, this study is only limited to one campus of a state university in the Philippines with a few numbers of samples, another study may be conducted using other variables and factors to validate the findings of the study. Likewise, with the use of mixed method research in the future may also help capture the authentic environmental attitude and behavior of the students.

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