



Students' Environmental Awareness and Environmental Behaviors in Higher Secondary School student

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ABSTRACT

Present environmental concerns necessitate the changing focus of education to develop students with environmental awareness as well as positive behaviors towards the environment. There is evidence that education positively impacts students' environmental awareness. This study aims to determine the level of environmental awareness and the level of environmental behavior of third year high school students after taking up science related courses. Moreover, it attempts to establish the correlation between environmental awareness and environmental behavior. The environmental issues determined in the focus group discussion were vulnerability to disasters, pollution, climate change, loss of natural resources, and waste management. The focus group was composed of three (3) science teachers, two (2) social studies teachers and one (1) agriculture teacher. Based on the results of the FGD, a survey material was developed, validated, and administered to third year high school students to assess their awareness of environmental issues in the community and environmental behavior. The reliability of the survey was indicated by Cronbach coefficient alpha, with scores of 0.823 and 0.890 for the environmental awareness and environmental behavior surveys, respectively. A moderate correlation was observed between environmental awareness and environmental behavior (Spearman rho correlation = 0.433, $p=0.00002$). Awareness of consequence and inclusion-of-self in nature are correlated with environmental behavior, but not environmental awareness (Spearman rho correlation = 0.318, $p=0.002$). Based on the correlations, the researchers recommended possible areas where science courses can enhance environmental education including understanding the nature of pollutants and effective solutions to contamination, the chemical nature of greenhouse gases, reactions of ozone and other radicals, causes of acid deposition and its effects on the environment, and chemistry in water safety.

Keywords: *environmental awareness, environmental behavior, value-action gap*

1. INTRODUCTION

Several studies have shown that education is a key factor for increasing environmental awareness (Frey Meyer and Johnson, 2010; Duroy, 2005; Kolmuss and Agyeman, 2002). Environmental awareness involves both the cognitive and affective domains of learning. Students should have sufficient knowledge of environmental issues and good perception of one's impact on the environment. Environmental degradation experienced globally partly results from poor environmental campaigns and ignorance (Peter, 2013). This study investigates the integration of environmental themes in different science related courses offered in high school. Specifically, this study aims to assess and determine the level of environmental awareness and environmental behavior of students. With the increasing effort of the science community to increase environmental awareness of students, it is still observed that there is a value-action gap (or attitude-behavior gap). Environmental awareness of students was not adequately translated to pro-environmental behavior. It was reported that consumers who acknowledge awareness of environmental issues still do not take steps to purchase environmental friendly products. The study later bridged the gap between environmental awareness and environmental behavior through eco-labels, text, or both, over cleaning products. Several factors that might cause the value-action gap are demographic factors (gender, years of education), institutional factors, economic factors, social and cultural factors and internal factors. Institutional factors may involve the presence of infrastructure for people to practice pro-environmental behavior, such as recycling centers and public transportation. Internal factors include motivation, altruistic and social values, and willingness to act .

Several studies have reported socio-economic factors to be a key determinant of proenvironmental behavior. Nevertheless, there is a growing number of support for environmental education as a significant contributor to increasing pro-environmental behavior. The researchers hypothesize that awareness of environmental issues that are of direct and immediate concern to students corresponds to more pro-environmental behavior. Issues that are of direct concern to students in Los Baños are flooding, climate-change disaster risk and solid waste recycling schemes. Also, coral reef destruction, extinction of plants and animals and effects of forest lost are given emphasis in the awareness survey.

There is also the problem of reliably measuring environmental awareness, which is multifaceted and not a straightforward variable to measure. According to Hansla et al (2008), several studies that measure environmental awareness of consequence have low reliability and validity. This could be attributed in part to the subtle differences between awareness of consequences for the environment and environmental concern. These are often treated as interchangeable, but awareness is not necessarily translated into concern (Hansla et al, 2008). Shultz (2001) differentiated different types of concern, namely concern for the biosphere, concern for others, and concern for self. To address the lack of internal consistency and poor correlation between awareness and behavior, Dunlap and colleagues developed the revised New Ecological Paradigm Scale (NEP) in 2000. The NEP scale is a

widely used measure in the United States for assessments of environmental awareness, attitudes on public policy, and pro-environmental behaviors (Anderson, 2012).

2. OBJECTIVES

The objectives of the study are the following:

- identify key environmental issues in the locality,
- Measure high school students' awareness of local environmental issues and environmental behaviors,
- Examine awareness of which issues are correlated to environmental behaviors
- Recommend areas where environmental education could be enhanced

3. METHODOLOGY

A focus group discussion (FGD) was designed to identify environmental issues relevant to the students. The FGD was participated in by the science, agriculture and social studies teachers. The group started the discussion with pressing environmental issues in the locality. The discussion extended to the behavior of students when it comes to caring for the environment. From the result of the FGD, an environmental awareness questionnaire was developed and validated. Content experts validated the questionnaire. Scales for environmental awareness based on the work of Dunlap (2000) and inclusion of self in nature based on the work of Schultz (2002) were also added. The reliability of the researcher developed survey was assessed through Cronbach's alpha, a measure of internal consistency of whether the individual items in the survey measures the intended variables reliably.

The survey was administered to third year high school students. Eighty-nine (89) out of 120 High secondary school students were selected to answer the survey. Data from the responses were analyzed using SPSS software, using Cronbach coefficient alpha to determine the reliability of the survey and Spearman Rho correlation for interpretation of the relationships between variables.

Students who scored high in both tests for environmental awareness (EA) and proenvironmental behavior (EB) were interviewed to provide additional information and triangulation in the study. Interview questions were open-ended and were intended to determine sources of environmental information and the factors that reinforce pro-environmental practices.

Development of Environmental Awareness and Environmental Behavior Survey

The following environmental issues came up during the FDG: flooding, climate change, pollution, deforestation and damage to coral reefs. These issues were incorporated into the developed and validated survey (Likert-type) instrument.

The questionnaire is composed of two parts. The first part consists of ten (10) environmental issues in Laguna and other relevant environmental concerns in the country. Table 1 shows the issue

statements used in the questionnaire. The issue statements were used to gauge the level of environmental awareness of students. The responses in the Likert-type survey varied from "not aware at all" to "highly aware". The second part of the questionnaire was used to determine how often the students do proenvironmental behavior in their everyday life. Table 2 summarizes the fifteen (15) pro-environmental scale from "never", "seldom", "sometimes", "most of the time", to "always". A scale for awareness of consequence, based on the revised NEP by Dunlap et al (2000), is also included. Table 3 shows the seven statements that aim to measure awareness of environmental consequences. The revised NEP measures pro-environmental orientation. Agreement with the statements were indicated on the Likert scale from "not at all", "slightly agree", "neutral", "moderately agree", and "strongly agree".

<i>Issues included in the Environmental Awareness Subtest</i>	
EA1	In 2012 and 2013, several municipalities experienced flooding from knee-deep up to a depth of six feet
EA2	high climate-related disaster risk
EA3	It has lost more than half of its forest cover since the 1950s
EA4	poor to fair condition
EA5	overall vulnerability to disasters (i.e. typhoons, earthquakes, landslides, volcanic eruptions).
EA6	causing damage
EA7	In 2000, a landfill in <i>Payatas</i> collapsed and killed about 300 people, mostly waste scavengers
EA8	the world's center of biodiversity
EA9	Only 1% of plastic bags produced globally are recycled
EA10	Over the next decade, thousands of species of plants and animals will become extinct

Table 2. Pro-environment actions incorporated in the researcher-developed instrument to measure environmental behavior (derived from the FGD of this study).

<i>Actions included in the Environmental Behavior (EB) Subtest</i>	
EB1	I switch off lights before I go to sleep.
EB2	I unplug electrical appliances when not in use
EB3	When travelling short distances, I walk instead of riding a vehicle
EB4	I pour water into cups/glasses instead of letting it run when brushing my teeth
EB5	I purchase products with less or eco-friendly packaging
EB6	I use scrap paper instead of new paper when possible

Table 2 (Continued). Pro-environment actions incorporated in the researcher-developed instrument to measure environmental behavior (derived from the FGD of this study).

<i>Actions included in the Environmental Behavior (EB) Subtest</i>	
EB7	use eco-bags when buying from stores.
EB8	I donate unused clothes or things
EB9	I repair damaged materials instead of throwing them out immediately
EB10	I reuse envelopes, folders, and paper clips
EB11	I reuse utensils instead of using disposables
EB12	I purchase recycled products (e.g. recycled tissue pulp, paper).
EB13	I collect and sell recyclables (e.g. plastic bottles, glass, newspaper, used paper, metal scraps) to junk shops
EB14	I follow the school's waste segregation scheme.
EB15	I pick up litter at school and home, even if it's not my own

Table 3. Statements in the Awareness of Consequence scale (adopted from Dunlap, et al, 2000).

<i>Issues included in the Environmental Awareness Subtest</i>	
AC1	Environmental protection is beneficial to my health
AC2	Environmental protection will help people have a better quality of life.
AC3	Environmental damage generated here harms people all over the world.
AC4	Environmental protection provides me with better opportunities for recreation
AC5	Claims that we are changing the climate are greatly exaggerated
AC6	Environmental threats to public health have been exaggerated
AC7	While some local plants and animals may have been harmed by environmental degradation, over the whole Earth there has been little effect

4. RESULTS AND DISCUSSION

Reliability analysis for the survey resulted in a Cronbach's alpha value of 0.823 for environmental awareness and 0.890 for environmental behavior. For the scale based on the revised NEP, Cronbach's alpha is 0.648. This indicates that both researcher-developed scales and the NEP scale from Dunlap were highly reliable for the measured variables.

Table 4. Reliability analysis and mean scores for subtests included in the questionnaire (n=89).

Subtests	Reliability analysis (Cronbach's Alpha)	Mean (Max. Score)	Standard deviation
Environmental awareness (EA)	0.823	30.0 (50)	8.36
Environmental Behavior (EB)	0.890	50.8 (75)	8.25
Awareness of Consequences (AC)	0.648	26.7 (35)	4.28
Inclusion-of-self in nature	n/a	4.30 (7)	1.19

It is 30.0 (SD=8.36), corresponding to a "fairly aware" self-reported level of awareness. For the pro-environmental behavior, the highest possible score is 75 and the mean score is 50.8 (SD=8.25). This

corresponds to a self-reported frequency of pro-environmental behavior as "sometimes". In the plot of the total EA score and total EB scores of each student, a positive correlation was observed (Figure 2). In general, higher EA scores correspond to higher EB score. A moderate linear correlation is measured by the Pearson product coefficient ($r = 0.4935$) and Spearman rho (0.433). Since the data is based on an ordinal scale, Spearman rho for non-parametric correlations is better suited to measure monotonicity. The teaching and learning process of the environmental education has a strong correlation to the environmental knowledge or awareness of the students and develops intrinsic motivation. Environmental awareness through education leads to environmental behavior and actions.

However, this correlation relates only the total EA score to the total EB score. Item-by-item analysis of the issues in the EA survey was also undertaken to determine which specific issues, and awareness of these, are correlated with pro-environmental behavior. As seen in Table 5, the behaviors that are significantly correlated with EA scores are EB3, EB8, EB10, and EB13, or mostly pertaining to recycling and reusing. Interestingly, environmental behaviors related to wise purchasing of products, energy conservation, repairs, and waste segregation in school and at home are not significantly correlated with the awareness of the environmental issues included in the study. The results suggest that EB3, EB8, EB10, and EB 13, were most likely the activities that they perform in their homes, community, and school. On the contrary, EB1, EB2, EB4, EB5, EB6, EB7, EB9, EB11, EB12, EB14 and EB15 were believed to be the activities students less likely do (Chen and Tsai, 2016). Bergman (2016) emphasized the need to improve these environmental behaviors and develop environment appreciation among students through active involvement of outside or field environmental preservation activities of the schools and communities which will cater the social or affective domains of environmental education.

Developing the environmental emotional intelligence of the students will positively affect environmental attitudes, intentions, and behavior (AguilarLuzon et al, 2014). It is also believed that relation to nature was strongly related to environmental attitudes and behavior and weakly related to knowledge .

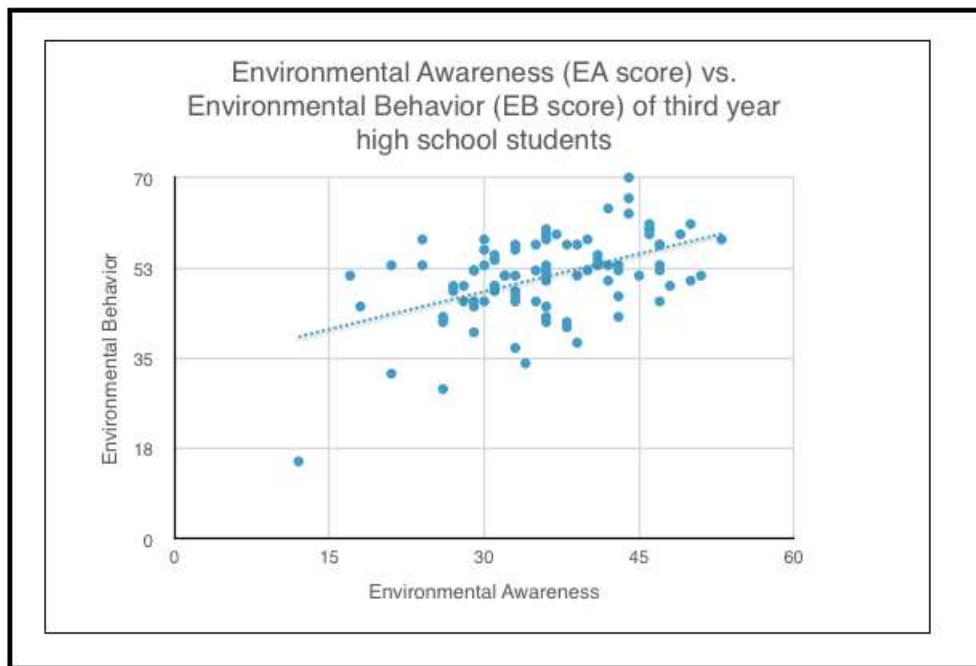


Figure 2. Scatter plot of environmental behavior (EB scores) as a function of environmental awareness

(EA) from student responses in the survey (n=89). A moderate positive correlation is observed

(Pearson $r=0.4935$, Spearman $\rho = 0.433$).

On the other hand, the issues that are significantly correlated with EB scores are EA2, EA3, EA6, EA7, and EA8, which covers local climate disaster issues, deforestation, landfills and natural resources. It was revealed that general topics related to the environment appeared to be more familiar to students as compared with technical and conceptual environmental issues. The result of this study reflects that students appeared to be more familiar to general concepts (EA2, EA3, and EA8) or current events (EA6 and EA7) which they might have encountered from family, mass media (TV, newspaper, internet, documentaries and pamphlets), and school teachers and personnel. On the other hand, local issues (EA1) appear to have low correlation because they are seldom presented through mass media. The use of social stories by schools and communities is recommended to significantly increase the environmental awareness of the students in local issues (Mahasneh et al, 2017). In addition, the researchers believed that technical and trivial concepts (EA4, EA5, EA9, and EA10) obtained poor correlation with environmental behavior because this information require in-depth studying of environmental researches. As for the AC subtest and graphical inclusion-of-self scale, both were positively correlated with EB ($r_s = 0.318$ for both, $p=0.002$) but not with EA. High-scoring students in both EA and EB scales were interviewed. According to the respondents, most of them get their information on environmental issues from family, mass media (TV, newspaper, internet, documentaries and pamphlets), and school.

Table 5. Items from the environmental awareness (EA) and environmental behavior (EB) inventory that have significant correlations at the 0.01 level (2-tailed)

<i>Significantly correlated with EA (p < 0.01)</i>		
Spearman’s coefficient, rs		
EB3	0.288	0.006

EB8	0.322	0.002
EB10	0.333	0.002
EB13	0.357	0.0006
<i>Significantly correlated with EB (p < 0.01)</i>		
EA2	0.312	0.003
EA3	0.309	0.003
EA6	0.314	0.003
EA7	0.283	0.007
EA8	0.313	0.003

Teachers and parents continuously encourage students to observe environmental behaviors. Several classroom practices contribute to their environmental awareness. Trivia and bonus questions were given in class about the environment, encouraging increased environmental awareness. Science classes also emphasize the effect of human activities on the environment. According to the respondents the school activities that help make them more environmentally aware include: segregation scheme, no littering campaign, and general cleaning every week. Pro-environmental behavior was also practiced at

home by high EB-scorers. Indeed, Matthies et al (2012) showed that parental behavior has a direct influence on pro-environmental behavior of their children, through communication and modelling of pro environmental norms. In addition, the educational system can also help increase the pro-environmental behavior of the students. Jovanic et al (2016) suggested a more effective formal education which can be expected to have a greater influence in terms of developing cognitive and emotional connection with the environment, developing ecocentric attitudes and attitudes about personal responsibility, and an increase and improvement in students' pro-environmental behavior

5. CONCLUSION

A reliable instrument for measuring environmental awareness and environmental behavior was developed based on students' knowledge of local environmental issues. The self-rated level of environmental awareness of the respondents were "fairly aware" and the average frequency of environmental behavior was rated "sometimes". A moderate positive correlation is observed between

reported environmental awareness and environmental behavior. Awareness of consequences based on

Dunlap's New Ecological Paradigm is also correlated to pro-environmental behavior. Awareness of environmental issues that are directly experienced are correlated to more proenvironmental behaviors. Local issues are more influential in shaping environmental behavior than regional or national issues. Incorporation of environmental issues in the locality may enhance education and translate to positive environmental behaviors (e.g. causes of flooding and its mitigation, nature of pollutants and solutions to pollution, chemistry in water safety, etc.).

6. References

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