Environmental literacy of 8th grade students

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Abstract. Philippine laws require environmental education to be integrated into basic education curriculum as early as 1977. After four decades of implementation, a study was made to assess the current ecological literacy among 8th-grade students in city and province of Iloilo, Philippines and will provide a baseline data which is useful to design the appropriate environmental education programs. The detailed results showed that there was a high level of ecological literacy among respondents in their ecological knowledge, verbal commitment, real commitment, and environmental sensitivity. While in the general environmental feelings it was found out to have very high-level environmental literacy. Furthermore, a significant relationship was found between school curriculum and residence location to ecological knowledge, school curriculum and verbal commitment, sex and residence location to real engagement, sex and school curriculum with environmental sensitivity, and school type to environmental feelings. Likewise, indicators such as ecological knowledge, verbal commitment, and general environmental perceptions were examined to have a moderate degree, meager and inverses low degree of correlation respectively with academic performance in science.

1. Introduction

The world is facing significant environmental problems such as severe weather condition, flooding, loss of biodiversity, garbage disposal, and pollution of natural resources which directly affects our ability to develop economically while sustaining peoples' health as well as plants and animals. In 1972, the United Nations saw the importance of addressing this issues to make the environment more sustainable. Thus a Conference was held in Stockholm which made a declaration that embodied 26 principles. From that declaration, Principle 19 provides a framework on environmental education for young generation as well as adults in responsible conduct in protecting and improving the environment to enable man to develop in every respect. While Principle 20 encourages scientific research and development in the context of environmental problems both national and multinational level that would allow the free flow of up-to-date scientific information and transfer of experiences to facilitate the solution of ecological problems [18]. Five years later, in 1977 the Stockholm conference, the intergovernmental conference on environmental education was organized by the United Nations Education, Scientific, and Cultural Organization (UNESCO) in cooperation with the U.N. Environment Programme (UNEP) and was convened in Tbilisi, Georgia (USSR) in October 1977. The delegates adopted the guiding principles for environmental education: 1. to foster clear awareness of, and concern about, economic, social, political, and ecological interdependence in urban and rural areas; 2. to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment,

and skills needed to protect and improve the environment; and 3. to create new patterns of behavior of individuals, groups, and society as a whole towards the environment [16-17].

Thus, in 1977 the Department of Education Culture & Sports (DECS) started integrating environmental education subjects in the school curriculum at all levels [5-6]. In December 2008, Republic Act No. 9512 was enacted and known as the National Environmental Awareness and Education Act of 2008. The law declares that consistent with the policy of the State to protect and advance the right of the people to a balanced and healthful ecology in accord with the rhythm and harmony of nature, and in recognition of the vital role of the youth in nation building and the role of education to promote national awareness on the role of natural resources in economic growth and the importance of environmental conservation and ecological balance towards sustained national development [15]. The law envisions the development of scientifically, technologically, and environmentally literate and productive members of society who are critical problem solvers, responsible stewards of nature, innovative and creative citizens, informed decision makers, and effective communicators [1-4].

To make an informed decision a scientific study on environmental education, particularly on environmental literacy, should be done to evaluate the extent of knowledge acquisition and understanding of the students. Thus, this study tries to assess the level of environmental literacy of 8th Grade students and about respondents profile and grade in science.The outcome of the research would serve as baseline information in the Philippines about other countries which use the same instrument and in support of enriching the science curriculum in the context of K+12 program by the Department of Education.

2. Literature Review

Environmental Education (EE) is an indispensable tool in giving solutions to environmental problems that beseech our modern world. It includes relevant biophysical, economic, and other social, cultural, and political aspects of environmental issues worthy to be recognized and investigated. The history of assessing ecological education can be traced back more than two centuries ago. However, the formal and systematic assessment was formalized by various authors. One of the pioneering work to investigate environmentally [14]. He stressed that developing EL is the primary goal of environmental education, with the objective of fostering productive and responsible citizens of this planet and our society. Schools have a major objective in the preparation of students to be productive and responsible citizens in our community, and the development and fostering of environmental literacy need to be a key objective of any general education program.

The study in Taiwan assessing the environmental literacy and analysis of predictors of responsible environmental behavior found that a moderate level of ecological knowledge [9]. This study is contrary to the findings of who observe that Grade 8 students acquired higher ecological knowledge [10-11]. The same was affirmed by the investigation who said that respondents on their study got the highest level of environmental literacy regarding their ecological knowledge [7-8].

In the study conducted by [12-13] found out a higher ecological knowledge that the environmental literacy. Additionally, in Taiwan assessment of EL, found out that that the teachers as respondents had positive environmental attitudes, high levels of environmental sensitivity and environmental responsibility. In Korea on the other hand, initiated a study to understand what students know, how they feel, and how they act in the perspectives of environmental literacy. Based on the correct diagnosis of Korean students' environmental literacy, environmental education in Korea, including national curriculum, teaching materials, and strategy is in the right way.

A similar study in Turkey was conducted by [5]. The purpose is to assess the 5th-grade Turkish students' environmental literacy level by considering six EL components. The results of the study revealed that EL score of the students was found a moderate level of Environmental Literacy. Surveyed designers and architects for building industry found that a higher than average degree of

emotionality regarding the natural environment and average degree of verbal commitment toward behaviors [19]. In the Philippines, environmental literacy among science teachers. The study showed that the teachers obtained the highest level of ecological literacy regarding ecological knowledge while lowest in the pro-environmental behavior which is influenced by the integration of environmental issues for the science teachers.

3. Methodology

The study was based on the National Environmental Literacy Assessment Project in the United States [11]. The questionnaire used was the Middle School Environmental Literacy Survey (MSELS) Instrument, which was revised to take considerations the localize context of the Philippines. The poll is divided into six categories; (1) profile of the respondents, (2) ecological foundations, (3) verbal commitment, (4) real commitment, (5) environmental sensitivity, and (6) general environmental feelings. The questionnaire contains multiple choice questions and to be answered using a Likert scales. It is designed to be explained in a time frame up to 60 minutes.

The necessary authority from the school's principals was secured to ensure smoothness of the administration of the questionnaire. As protocol, the principal assigned the section advisers and set the date and time to administer the questionnaire. The questionnaire was returned by the section adviser and was pick up by the researcher and input data using Microsoft Excel and process it using SPSS. The study utilized a descriptive-correlational design employing quantitative approaches to determine the level of environmental literacy among the 8th Grade Students. The study was conducted in four high schools from Iloilo City and province of Iloilo, Philippines over the school year 2017-2018.

Table 1. Environmental Literacy categories, MSELS parts

Types of Environmental Literacy	Parts of MLS	N Items
1 Profile of the Respondents	I. About Yourself	5
2 Ecological Knowledge	II. Green Foundation	16
3 Verbal Commitment	III. How You Think about the Environment	12
4 Actual Commitment	IV. What You Have Done Concerning the Environment	11
5 Environmental Sensitivity	V. You and Environmental Sensitivity	11
6 General Environmental Feeling	VI. How You Feel About the Environment	2

The Part I considers the profile of the respondents while Part II measures the ecological knowledge which contextualizes questions that are familiar to Filipino learners and Part measures the perception of the learners towards the environment. Moreover, Part IV weighs the action done by learners, and Part V reflects the warmth attitude of learners towards the situation. Whereas, Part VI manifest the positive feelings of the respondents.

4. Results and Discussions

The demographic profile of the respondents was presented in Table 2 which provide information about the respondent's sex, school curriculum, school type, and residence location. As shown in the data there were 204 respondents and majority were female and most belongs to regular classes. Regarding school curriculum provides the most prominent group were the regular class than the particular science class. The small number of students belonging to particular science class only revealed that only a few schools were allowed by the Department of Education to open specialized programs and were capable of providing the required equipment and laboratory instruments. For

school type, the majority come from the public high schools since it is free and offer specialized programs which are comparable with their counterpart. The majority were from urban or resides in the city than in rural areas only reflects the extensive demographic coverage of the respondents and ideally represents each component of the study.

Table 2. Profile of the respondents

	Profiles	Frequency, n =204	Percentage
Sex	Female	117	57.35 %
	Male	87	42.65 %
School curriculum	Regular class	174	85.29 %
	Special science class	30	14.71 %
School type	Public High school	132	64.71 %
	State University Lab School	41	20.10 %
	Private High school	31	15.20 %
Residence location	Urban	116	56.86 %
	Rural	88	43.14 %

Table 3 shows the science grade for the third grading period for the school year 2017-2018 of 8th Grade students. The study uses the science grade since environmental topics were integrated into the science subjects. From the 204 respondents there are 39 or 19.12% with degrees 90 and above and are classified as very good, while 135 or 66.17% got a grade of 80- 89 and were classified as fair and reasonable, and 24 or 11.76% got a degree 70 -79 were classified as very poor and sick. The data reflects that most of the students belong to fair, right, and very good in their science subject. While less than twelve percent of learners belong poor and inferior group, consequently, that data showed a good representation of a group of student in a class which in reality ruminates that many belong to middle achiever and very few would be either very good or very poor academic performer.

Table 3. Science Grade of 8thGrade Students

Science Grade	f	Percentage	Description
70 – 74	5	2.45	Very Poor
75 – 79	19	9.31	Poor
80 – 84	71	34.80	Fair

85 – 89	64	31.37	Good
90 – 94	39	19.12	Very Good
95 – 99	6	2.94	Excellent

Table 4 shows the categories of the Environmental Literacy of 8th Grade students as classified into five. The results obtained a score of (M=2.39; Sd=0.46) which imply a high level of environmental literacy among respondents. This meant that regardless a respondent is a male or female, who belongs to a regular class or special science classes who enrolled in public, private or laboratory schools and living in rural or in cities acquired a high level of environmental literacy. Specifically, the mean score ranges from (M=2.31-2.48) of the four categories were almost similar to each other. The results imply that our environmental education which was the started in 1977 by the Department of Education Culture and Sport (DECS) are now bearing fruits regarding the knowledge gain by this students. Other studies suggest a moderate level of environmental expertis. Moreover, observe that there wsere higher general environmental feelings from the respondents. Furthermore, today's generation of students is knowledgeable about their environment. The characteristics of being well-informed may be attributed to the advent of social media, internet, and other information channels. If this knowledge will be harness and put into strong action will likely help to mitigate climate change and reduce global warming.

Table 4. Shows the Environmental Literacy of the 8th Grade Students

Categories	Mean	Std. Dev	Interpretation
1.1 Ecological Knowledge	2.44	0.49	High
1.2 Verbal Commitment	2.31	0.43	High
1.3 Actual Commitment	2.32	0.56	High
1.4 Environmental Sensitivity	2.48	0.52	High
1.5 General Environmental Feeling	1.37	0.64	Very High
Grand Mean	2.39	0.46	High

Table 5 shows the relationship between sex and environmental literacy categories. The data shows that sex is correlated with actual commitment and environmental sensitivity which obtained a value of (X^2=46.193 and p=0.017) and (X^2= 44.362 and p=0.014) respectively connotes that null hypotheses were rejected and denoted that there was a significant relationship. The data revealed that sex correlates with actual commitment and environmental sensitivity of the respondents and implies a meaningful indicator in the ecological literacy survey. The male and female were found to be committed and environmentally sensitive towards nature. Whereas, the study disclosed that women are more committed than males, while the results obtained reported that there was a significant difference between males and females students about their ecological knowledge [13]. Conversely, the above findings of the present and previous studies only show the dynamic of the respondents which requires further investigation to specifically identify significant indicators in the environmental literacy of the students.

Table 5. The level of environmental literacy when correlated with sex

Categories	Chi-squared(X^2)	p-value
Ecological Knowledge	0.297	0.862
Verbal commitment	31.036	0.188
Actual commitment	46.193	0.017*
Environmental sensitivity	44.362	0.014*
General environmental feelings	3.210	0.782

*p-value is significant at the .05 level.

Table 6 shows the relationship between the school curriculum and the level of environmental literacy. The table divulges that school curriculum when compared to ecological knowledge, verbal commitment and environmental sensitivity obtained a value of (X^2=15.056; p=0.001), (X2=43.860; p=0.011), and (X^2=54.583; p=0.001) respectively showed a significant relationship. The acquired results affirm that school curriculum which refers to a regular class and particular science class is an indicator to the extent of the environmental literacy of the respondents.

Table 6. Environmental Literacy when correlated with school curriculum.

Categories	Chi-squared(X^2)	p-value
Ecological Knowledge	15.056	0.001**
Verbal commitment	43.860	0.011*
Actual commitment	24.880	0.634
Environmental sensitivity	54.583	0.001**
General environmental feelings	8.521	0.202

*p-value is significant at the .05 level.

Table 7 shows the relationship between the level of environmental literacy and school type. The results showed that from among the five indicators only the general environmental feelings has a significant correlation based on the value of (X^2=23.845; p= 0.021). The table showed that four out of five indicators does not affect the environmental literacy of the learners. This implied that whether the students who belong to the public high school, private high school, or laboratory school does not have a bearing regarding the environmental literacy of the learners.

Table 7. Environmental Literacy when correlated with school type.

Indicators	Chi-squared (X^2)	p-value
Ecological Knowledge	6.204	0.184
Verbal commitment	58.399	0.194

Actual responsibility	67.196	0.145
Environmental sensitivity	66.850	0.081
General environmental feelings	23.845	0.021*

*p-value is significant at the .05 level.

Table 8 shows the relationship between residence location and the level of environmental literacy. The results achieved indicated that residence location revealed a significant correlation in the ecological knowledge and actual commitment of respondents with a value of (X^2=13.634; p=0.001) and (X^2=46.588; p=0.015) respectively. This implied that respondents situated homes directly affect the performance of students in related academic engagement and they are more committed as compared with their counterpart. Moreover, Williams (2017) found out that there was a significant difference in the overall environmental literacy scores between rural and urban schools. Wherein urban schools exhibited higher scores than rural students but did not specify on what particular indicator the significant took placed. Furthermore, emphasized that ecological literacy is much observed between this residence location when compared.

Table 8. Environmental Literacy when correlated with residence location

Categories	Chi-squared(X^2)	p-value
Ecological Knowledge	13.634	0.001**
Verbal commitment	31.535	0.172
Actual commitment	46.588	0.015*
Environmental sensitivity	37.109	0.073
General environmental feelings	8.869	0.181

*p-value is significant at the .05 level.

Table 9 shows the relationship between the level of environmental literacy and grade in science. The data revealed that ecological knowledge with a value of (r= 0.405; p= 0.000) has a significant correlation with the respondent's grade in science. The association obtained was moderate which implies a small degree of relationship. Moreover, verbal commitment and general environmental feelings acquired a value of (r=-0.178; p=0.017) and (r=0.282; p=0.000) respectively denotes a very low correlation and low inverse correlation. The results inferred that very low correlation could be interpreted as very minimal relationship while low inverse correlation means that relationship was in the opposite direction. The outcome suggests that science grade does not affect the environmental literacy of learners except for ecological knowledge.

Table 9. Level of Environmental Literacy and Grade in Scienc**e**

Variables	Pearson's r	Degree of correlation	p-value
Ecological knowledge	0.405	Moderate correlation	0.000**

Verbal commitment	-0.178	Very low	0.017*
Actual responsibility	-0.020	Inverse negligible	0.777
Environmental sensitivity	-0.004	Inverse negligible	0.955
General environmental feelings	-0.282	Inverse low correlation	0.000**

*p-value is significant at the .05 level.

5. Conclusion

The results from this study revealed that after 40 years of environmental education in the Philippines it was found out that 8th-grade respondents gained a high level of ecological literacy particularly in areas of environmental knowledge, verbal commitment, actual commitment, environmental sensitivity, and general ecological feelings. Whereas, a profile such as sex were significantly related to individual responsibility and environmental sensitivity, while school curriculum found to have a significant relationship with ecological knowledge, verbal commitment, and environmental sensitivity. Furthermore, a significant correlation was also found between school type and general environmental feelings and between residence location and ecological knowledge and actual commitment. Additionally, academic performance was moderately correlated with environmental education.

Future research should consider studying whether students environmental literacy can be converted into environmentally responsible behavior such that the knowledge plus action would equal a sustainable environment. Since this research was conducted in Iloilo, the Philippines with a sample of 204 students. Future studies should consider a broader sample taken from different city and municipality of the country to come up a national data about environmental literacy.

The results of this study can provide baseline data about environmental education in the Philippines. Also, data obtained from this research could part of a more significant study in the southeast Asian region with regards to ecological literacy using the MSELS Survey instrument.

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