

INFORMATION EDUCATION CAMPAIGN FOR ECOLOGICAL SOLID WASTE MANAGEMENT

JLEIAN MARD M. LOSEÑARA

<https://orcid.org/0000-0002-0672-9826>

mard.losenara@gmail.com

College of Arts and Sciences, Cebu Technological University
Tuburan, Cebu, Philippines 6043

ABSTRACT

Waste is an unavoidable by product of human activities. Economic development, urbanization and improving living standards in cities have led to an increase in the quantity and complexity of generated wastes. There is a growing need to evaluate whether lessons learned in the classroom are practiced at home. In connection, ecological waste management should be integrated in educational instruction. With that, the researcher determined the level of ecological waste management practices among Second Year Bachelor of Elementary Education (BSED) students of the Cebu Technological University – Tuburan Campus during Summer class of Academic Year 2016–2017, and its relationship with their performance in Ecology subject. To achieve the purpose of this investigation, the researcher utilized a quantitative, non-experimental approach specifically the descriptive – correlational survey method with adapted questionnaire; the weighted mean was utilized to assess the ecological solid waste management while Chi Square Test was used to test the association between the performance of the respondents and their practices on solid waste management. Findings revealed that the respondents “sometimes” performed what they have learned. Results showed that there is a highly significant association between the performance of students and their ecological solid waste management practices. Ten (10) least performed practices were identified and became the basis for creating IEC materials. The study concluded that the higher the students’ grades in the Ecology subject, the more likely they will practice what they have learned. Information Education Campaign materials are, therefore recommended to further improve their level of practices.

Keywords: environment, ecological solid waste management, practices, Information Education Campaign

INTRODUCTION

When the environment cannot accommodate wastes as when these are not destroyed as fast as these are produced, pollution occurs. Pollution is the introduction of contaminants into the natural environment that cause adverse change. It occurs in the land, water and the atmosphere and may be in the form of noise. Parallel to this, waste is an unavoidable by product of human activities. Economic development, urbanization and improving living standards in cities, have led

to an increase in the quantity and complexity of generated waste. Solid waste disposal has been an enormous concern in developing countries due to poverty, population growth, urbanization, and ineffectual fund.

As stated in the Journal Science, the Philippines placed third in the highest producers of plastic wastes thrown into the ocean after China and Indonesia. This could be attributed to the poor solid waste management secondary to the lack of education and inconsistent compliance (Villanueva, 2015).

Climate change continues to happen. The Philippine Atmospheric and Geophysical and Astronomical Services Administration

(PAGASA, 2016) asserts that the evidences that support the change cannot simply be explained by natural variation. The most recent scientific evaluations have confirmed that this is most likely to be due to human activities, owed to an increase in greenhouse gas concentrations, burning fossil fuels and land use change.

Environmental behavior is regarded as a mixture of pro-social activities ensuing a concern for other people, future generations, other species, ecosystems, and self-interest activities (Morren, 2016). Ecological waste management should be integrated in basic educational instruction. In the classroom, teachers play an important role in molding and stimulating a change in the behaviour of the students.

The prominent goals of Science teaching for the lower years revolve around values and attitudes that are easily developed at young age. Young people could employ scientific ways of satisfying their own curiosities and inquiries which should be a paramount goal to carry up to adulthood. Imbued with Science values they will be knowledge-driven and science-minded throughout their lives. Children today are born into a world where climate change, pollution, CO₂ emissions and declining biodiversity are main global issues. (Hedefalk, 2014).

Environmental Ethics is a topic of Applied Ethics which examines the moral basis of environmental responsibility. The goal of Environmental Ethics is not to convince that people should be careful about the environment – most already are. Instead, environmental ethics focuses on the moral foundation of environmental responsibility. There are three primary theories of moral responsibility to the environment. Environmental anthropocentrism, the view that all environmental responsibility is derived from human interests alone, assumes that only human beings are morally significant persons and have a direct moral standing. Since the environment is crucial to human well-being and human survival, then people have an indirect duty towards the environment, that is, a duty which is derived from human interests. According to the broadest form of the life-centered theory, the Biocentric Theory, all forms of life have an inherent right to exist. Some

biocentric thinkers give species a hierarchy of values. The third approach to environmental responsibility, Ecocentrism, maintains that the environment deserves a direct moral consideration, and not one which is merely derived from human interests. In ecocentrism, it is suggested that the environment has direct rights that it qualifies for moral personhood that it is deserving of a direct duty, and that it has inherent worth. The environment, by itself, is on a moral par with humans. Through Environmental Ethics, values and moral responsibilities are expressed and can influence the perception of nonhuman nature, environmental justice, and their relationship to public health (Jennings et al., 2016).

Education plays a very important role in addressing global community challenges especially in raising awareness in the continuing degradation of the environment and the alarming increase of wastes. Additionally, teachers are great influence in providing the proper education and information needed in facing these challenges and making sure students will have not only the knowledge but the lifetime commitment to support in protecting the environment and its flora and fauna. In response to these global challenges and in pursuit to find appropriate solutions, the government has provided necessary interventions.

For instance, Section 55 of Republic Act No. 9003 also known as the “Ecological Solid Waste Management Act of 2000” states that information on waste collection services, solid waste management and related health and environmental concerns are widely disseminated among the public should be ensured. The DECS (now DepEd) and the Commission on Higher Education shall ensure that waste management shall be incorporated in the curriculum of primary, secondary and college students by giving educational institutions responsibility to conduct education and information campaign on solid waste management which aims to develop public awareness of the ill-effects of and the community-based solutions to the solid waste problem. Section 3 of RA No. 9512, an Act to promote environmental awareness through environmental education states that

environmental education shall encompass environmental concepts and principles, environmental laws, the state of international and local environment, local environmental practices, the threats of environmental degradation and its impact on human well-being, the responsibility of the citizenry to the environment and the value of conservation, protection and rehabilitation of natural resources and the environment in the context of sustainable development.

RA No. 9512 further enhances the role of education in promoting environmental awareness. Along with DepEd, TESDA, DENR and DOST, CHED shall lead implementation of public awareness programs on environmental protection and conservation.

Environmental education should be given emphasis and be among the top priorities. Environmental education is a learning process that increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action (UNESCO, Tbilisi Declaration, 1978).

It is the goal of every teacher to see students who are "practicing what is being preached" – that is lifelong learning which is not only limited within the four corners of the classroom but ultimately extends in the home and community. The second year BSED students at Cebu Technological University – Tuburan Campus has, as part of their curriculum, the course Ecology. One of the subtopics of the topic 'pollution' is Solid Waste Management. As per CHED Bulletin of Information, the course discusses a familiarization and orientation on the basic environmental management system, principles of environment assessments and monitoring systems and the impact of Human on Environment.

This research undertaking sought to assess the ecological solid waste management of the respondents. Considering the fact that Teacher Education students are future teachers who will train and mold young minds, the researcher aimed to assess the students'

practices on ecological solid waste management so that appropriate interventions and reinforcement are provided for them which will consequently be cascaded to Elementary pupils.

OBJECTIVES OF THE STUDY

This study assessed the ecological solid waste management among Ecology students in Cebu Technological University – Tuburan Campus during Academic Year 2016 – 2017 as the basis for information education campaign materials. Specifically, this investigation has the following objectives: 1) to assess the practices on solid waste management according to the moral responsibility to the environment, 2) to determine students' performance on the Ecology subject, 3) to determine the relationship between the performance of the respondents and their practices on solid waste management, 4) to identify the issues and concerns on solid waste management.

METHODOLOGY

To achieve the purpose of this investigation, the researcher utilized a quantitative, non-experimental approach specifically the descriptive – correlational survey method to assess the ecological solid waste management among Ecology students as basis for information education campaign materials. In this study, data were gathered through questionnaire and interview.

The study took place at CTU – Tuburan and included second year BEED students who were taking Ecology. To obtain the overall practices on solid waste management according to the moral responsibility to the environment, the weighted mean was utilized. For the performance of the respondents in their ecology subject, final grades were used based on the grading computation with the following criteria: 40% major exams, 30% quizzes, 20% oral participation, 10% attendance and project. The final grade is an average from two grading terms in the semester. However, the Chi Square Test was used to test the association between the



performance of the respondents and their practices on solid waste management. To determine the issues and concerns on solid waste management, the weighted mean was applied based on the lowest mean scores.

Questionnaire was adapted from an unpublished Masteral thesis (Diaz, 2008) and from the Review of Related Literature based on the course description of Ecology subject. The researcher as an adviser of the Ecology subject gave the lectures and activities related to the topic on Waste Management.

A period of one month could lapse, specifically after one month since the class started, before data collection had commenced. Informed consent was secured, and respondents were informed of the risks, benefits and confidentiality of data was gathered too throughout the study.

RESULTS AND DISCUSSION

1. Practices on solid waste management according to the moral responsibility to the environment

1.1 Solid Waste Management Practices according to the Anthropocentric Theory of Moral Responsibility

The questions in the Anthropocentric Theory category are human centered. It is focused on how human beings are morally responsible to the environment. Table 1 shows the practices of the students in Ecology on their solid waste management according to their anthropocentric moral responsibility to the environment. This showed an overall weighted mean of 1.76 which is interpreted as sometimes being practiced. Items 4, 5, 7, 8 and 10 are always practiced by the respondents. Recycling of notebooks and the using both sides of the paper were always practiced and may indicate that these two practices are the closest to their roles as students and these materials are common things utilized daily. Giving unused or grown out clothes than throwing it away is always performed because it is charitable on the part of the respondents.

Table 1
Solid Waste Management Practices based on the Anthropocentric Theory of Moral Responsibility

Practices	WM	VI
1. Participation in newspaper and bottle collection campaign.	2.33	N
2. Damaged items repaired first before buying new ones.	1.71	S
3. Reminding somebody who burns garbage on its effect to human health.	2.08	S
4. Recycling of notebooks instead of buying new ones.	1.44	A
5. Use of both sides of the paper before throwing it away.	1.60	A
6. Preference to big containers of shampoo, lotion, and conditioners than sachet.	2.13	S
7. Avoiding using of toxic chemical (such as hair dyes) which when drained pollute the waterways.	1.65	A
8. Not throwing garbage in the river or sea because it destroys its beauty.	1.54	A
9. Discouraging households to use sewers since they spread diseases.	2.08	S
10. Giving unused or grown out clothes to others than throwing it away.	1.08	A
Composite Mean	1.76	S

On the other hand, items 2, 3, 6 and 9 are only practiced sometimes. Participation in newspaper and bottle collection campaign scored the lowest weighted mean and revealed to be never practiced by the students. This may be attributed to the lack of organization of such activities. Having damaged items repaired is sometimes practiced which can be attributed to aspects such as accessibility to repair shop as well as time and financial concerns.

Additionally, the preference to big containers for shampoo instead of the ones in sachets and discouraging households to use sewers since they spread diseases is sometimes practiced. Due to budgetary constraints, especially since the respondents are students, there is a preference to sachets and other sacheted commodities without consideration to the volume of garbage. Reminding someone not



to burn garbage as well as discouraging household sewers are practiced only sometimes which may imply that students have difficulty relaying these to others or are not confident in discussing such matters.

1.2. Solid Waste Management Practices according to the Biocentric Theory of Moral Responsibility

Table 2
Solid Waste Management Practices based on the Biocentric Theory of Moral Responsibility

Practices	WM	VI
1. Feeding leftover foods to pets	1.08	A
2. Not feeding spoiled or about to spoil food to animals	2.08	S
3. Not throwing garbage in an open dump to avoid scavenging by insects and rodents	1.96	S
4. Participation in tree-planting activities	1.85	S
5. Reminding individuals who raise livestock in residential areas that it can cause diseases	2.27	S
6. Not disposing batteries and other chemicals into the ground as they poison other organisms	1.67	S
7. Not throwing garbage into the sea as these may be mistaken as food by sea animals	1.42	A
8. Not draining liquids that contain chemicals such as cooking oil unto plants and trees	1.58	A
9. Reporting smoke belchers because it can affect other organisms, trees and plants	2.44	N
10. Burying biodegradable wastes to feed the compost to plants instead of using chemical fertilizers	2.02	S
Composite Mean	1.84	S

The Biocentric Theory proposes that mankind has a moral responsibility to all biotic factors in the environment. Table 2 presents that students' practices based on biocentric moral responsibility obtained an overall weighted mean of 1.84, interpreted as sometimes practiced. Three items were revealed to be constantly practiced by the respondents including feeding of

leftovers to pets or animals, non-disposal of garbage into the sea and non-draining of liquids that contain chemicals unto plants and trees.

The highest among these practices entailed that students' practices of feeding leftovers to pets or animals which may show both the students' love for their pets and their moral responsibility towards the environment.

Remarkably, reporting of smoke belchers was shown to be never practiced with a weighted mean of 2.44. Information such as where and how to report smoke belching vehicles, including contact numbers of concerned agencies, what details to report, may be less and/or lacking which may explain why this practice is almost never practiced.

The practices that are sometimes practiced, whose mean average ranges between 1.66 to 2.32, include the not feeding of spoiled or about to spoil food to animals, not throwing garbage in an open dump to avoid scavenging, reminding individuals who raise livestock in residential areas that it can cause diseases, the burying biodegradable wastes to feed the compost to plants instead of using chemical fertilizers, non-disposal of batteries and other chemicals into the ground, and participation in tree-planting activities. Not feeding spoiled or about to spoil food to animals and not throwing garbage in an open dump to avoid scavenging are sometimes practiced owing to the immediate consequence it bears as wells as its moral toll. The lack of information on the procedure on composting, as well as its exhaustive nature may explain why the burying biodegradable wastes or composting is only sometimes done by the respondents. Participation in tree planting activities are low which may simply be due to the lack of these organized activities. Burying garbage are also seldom done probably owing to the exhaustive nature of the task. It is far less easy compared to the other items.

Reminding individuals who raise livestock in residential areas that it can cause diseases is revealed to be only done sometimes. Most items that involved reminding family and friends of their environmental responsibilities were interpreted as only sometimes or never practiced at all. This may signify that students find it difficult to relay



these to others or they may not be confident to discuss these practices.

1.3 Solid Waste Management Practices according to the Ecocentric Theory of Moral Responsibility

Table 3
Solid Waste Management Practices based on the Ecocentric Theory of Moral Responsibility

Practices	WM	VI
1. Avoiding throwing garbage anywhere	1.71	S
2. Burying of garbage	2.15	S
3. Not performing open burning of garbage	2.17	S
4. Buying products with packaging and container that are biodegradable	1.90	S
5. Joining clean-up drives	1.81	S
6. Picking up pieces of papers or wrappers littering the house	1.33	A
7. Picking up pieces of papers or wrappers littering the school or any public place	1.98	S
8. Seeing to it that our trash is picked up by the garbage truck.	2.04	S
9. Seeing to it that there are appropriate segregation containers	2.06	S
10. Segregating trash before throwing them	1.96	S
Composite Mean	1.91	S

The Ecocentric Theory of Moral Responsibility asserts that human beings have a direct responsibility to the environment. Table 3 displays the ecocentric practices of the respondents that are interpreted as sometimes practiced with a composite mean of 1.91. Only one item was revealed to be always practiced by the respondents. Respondents frequently picking up pieces of paper or wrapper that litter their household. This maybe because the practice requires less effort and is easy to do. The other nine items in the category are only sometimes practiced by the respondents.

Students' responses also showed that they sometimes burn garbage despite the clear scope of the Clean Air Act of the Philippines and segregating trash before throwing them is also not frequently being done. This may indicate that awareness campaigns in the school especially on these items are not highly effective.

Picking up pieces of papers or wrappers littering the school or any public place, is sometimes being done as well as seeing to it that the trash is picked up by the garbage truck or there are appropriate segregation containers and the segregation of trash before throwing. This entails that campaign against littering at school or in any public place need to be strengthened and reinforced.

1.4 Overall Practices on Solid Waste Management according to the moral responsibility to the environment

Table 4
Overall Mean Score of Solid Waste Management Practices

Practices	CM	VI
Anthropocentric	1.76	S
Biocentric	1.84	S
Ecocentric	1.91	S
General Mean Score	1.84	S

As flashed in Table 4 and based on the three theoretical categories of the moral responsibility to the environment, the students' general weighted mean for each theory ranged between 1.76 to 1.91 which is likewise inferred as 'sometimes' being done. The overall level of ecological waste management among the students showed a mean score of 1.84, interpreted as 'sometimes' being practiced. This implies that the respondents generally only perform ecological solid waste management practices sometimes. Therefore, there is a need to further strengthen and reinforce ecological solid waste management.

2. Students' performance on the Ecology subject



Table 5
Interpreted Final Grades of the Respondents on the Ecology Subject

Final Grades for Ecology		
Interpretation	No. of Students	Percentage
Excellent	0	0
Superior	25	52
Very Good	21	44
Good	2	4

The performance of the students in the Ecology subject is based on their final grade. The grades were interpreted and categorized based on the standard verbal interpretation of the CTU system. One hundred percent of the students passed the subject. Also, all the students were categorized in the upper range of the performance interpretation. The respondents fell under the categories of Superior, Very Good and Good. Twenty-five (25) students performed as "Excellent", 21 students performed as "Very Good" and two (2) students as "Good".

3. Relationship between the performance of the respondents and their practices on solid waste management

Table 6
Chi Square Test of the Relationship between the Performance of the Respondents and their Practices on Solid Waste Management

Practices	Df	χ^2	Pvalue	Significance
Anthropocentric	4	16.42	0.0025**	Highly significant
Biocentric	4	37.78	0.0000**	Highly significant
Ecocentric	4	29.66	0.0000**	Highly significant

* - significant at 5%
** - Highly significant at 1%

To determine the relationship between the performance of the respondents on the Ecology subject and their practices on solid waste

management, Chi Square Test was applied. Table 6 illustrates the correlation between the performance of the respondents on the Ecology subject and their practices on solid waste management. In the anthropocentric category, the lowest chi square value among the three is 16.42 with a df of 4. The p-value of 0.0025 is lesser than either margins of error at 1% or 5% level of significance, respectively. Hence it is highly significant. The Biocentric category is interpreted as highly significant as well with a chi square value of 37.78 and a df of 4. The p-value (0.0000) is also smaller compared to the level of significance at both 0.01 and 0.05. Similarly, the ecocentric theoretical category of the students' practices has a p-value (0.000) which is lesser than the said margins of error.

4. Issues and concerns on solid waste management

Table 7
Issues and Concerns on Solid Waste Management

Item	Rank
Reporting smoke belchers because it can affect other organisms, trees, and plants	1
Participation in newspaper and bottle collection campaign	2
Reminding individuals who raise live stocks in residential areas that it can cause diseases	3
Preference to big containers of shampoo, lotion, and conditioners than sachet	4
Burying of garbage	5
Not performing open burning of garbage	6
Reminding somebody who burns garbage on its effect to human health	7
Discouraging households to use sewers since they spread diseases	
Not feeding spoiled or about to spoil food to animals	10
Seeing to it that there are appropriate segregation containers.	

Table 7 ranks the ten least performed practices of the respondents based on the weighted mean for each item. One of the 30 items recorded 'never' and scored the lowest weight mean is the practice of reporting of smoke belchers because it can affect other organisms, trees, and plants. The following practices, though interpreted 'sometimes', have the lowest weighted mean: participation in newspaper and bottle collection campaign, reminding individuals who raise live stocks in residential areas that it can cause diseases, preference to big containers of shampoo, lotion and conditioners than sachet and not performing open burning of garbage. Other practices that are also of concern consist of burying of garbage, reminding somebody who burns garbage on its effect to human health, discouraging households to use sewers since they spread diseases, not feeding spoiled or about to spoil food to animals and seeing to it that there are appropriate segregation containers.

CONCLUSIONS

With the keen consideration of the data and careful analysis of the findings of this research, the following conclusions are drawn.

1. Students' solid waste management practices are sometimes performed so even they are practicing their responsibilities to the environment, there is a need for improvement in the awareness of students in environmental management.
2. Students possess an equal perception on their moral responsibilities to the environment whether it be human-centered, affecting all biotic factors of the environment or their direct responsibility to the environment. .
4. The study identified the issues and concerns on solid waste management which imply the need to promote such identified least performed practices.
5. There is a marked significant relationship between students' performance in the Ecology and their environmental practices. Therefore, the higher the students' grades in Ecology, the more likely that they will observe their moral responsibilities to the environment.

Equally, when students are performing low in the subject, they are likely to be practicing less of such. Having identified that there is a relationship between performance in the subject and their practices, information education campaign materials can be designed to answer the issues and concerns.

6. The student's learnings and insights from Ecology subject can improve their performance on solid waste management practices.

RECOMMENDATIONS

Information education campaign materials are recommended to further reinforce knowledge on solid waste management. Specifically, the following recommendations were developed and aligned from the results of this study:

1. Information Education Campaign materials stressing the least practiced items are suggested to further motivate students in fulfilling their responsibilities to care for the environment by carrying proper solid waste management.
2. IEC materials are recommended to be used especially in the lower education years, elementary and high school which can be used as learning and supplementary materials.
3. IEC materials are recommended to be placed in conspicuous areas in the school such as in the library, bulletin boards, classrooms, and school clinic.
4. IEC materials are recommended for the community and is ideally placed in accessible public areas such as public library and museum, near garbage collection sites, relaxation and amusement areas such as parks.
5. IEC materials are also recommended for teachers handling Ecology subjects as well as teacher education students since they can use these materials as basis for creating and designing their own Information Education materials.

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AUTHOR'S PROFILE

Jleian Mard Loseñara is a Biology and Natural Sciences faculty at the College of Arts and Sciences in Cebu Technological University – Tuburan Campus. He is presently pursuing his Ph.D. in Science Education major in Biology at the University of San Carlos – Talamban Campus.



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