

Development of a Tool for Measuring Ecocentrism as an Outcome of Environmental Communication



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ABSTRACT. Recent developments in Environmental Communication furthered the importance of tool development to measure practice with ecocentric orientation. This research aimed to develop a tool that can measure the level of ecocentrism. This research employed a descriptive research design, and a survey was used as the primary data gathering method. The ecocentric-driven environmental communication tool has undergone four phases: the development of indicators, generation of reliability evidence, and determination of limitations, and refinement of tool. The tool was administered to 225 fourth-year college students of De La Salle University-Dasmariñas (DLSU-D), a higher education institution that explicitly integrated ecocentrism in its curriculum. Mean, percentage, and frequency count were used to analyze the socio-demographic and environmental communication. Chi-square Likelihood Ratio was also used to analyze the relationship between environmental communication and ecocentrism. The novel output of this research was the identification of aspects of ecocentrism, namely, impacts of human activities on the environment,

environmental awareness, sustainable practices, environmental stewardship, collective action, and compliance with environmental laws. The research was able to develop probing items for each aspect. It was recommended that the probing items be developed based on the specific environmental contexts.

1.0. Introduction

As environmental communication research continues to develop, communication has become imperative in engaging the public. Environmental communication is used to construct environmental problems and eventually guides society's responses (Harris, 2014; Caron & Rezaee, 2012; Norton et al., 2011; Perkowitz, 2010; Volkmer et al., 2009; Cox, 2007; Flor, 2004). This calls for more research on the responses to environmental problems and more on understanding the values adhered to in the interaction between humans and the environment.

In the context of environmental education in a higher education institution, the exploration of ecocentrism as the desired graduate attribute has left an area for theorizing another aspect of environmental communication. Environmental practice is affected by environmental information communicated by environmental education (Magluyan, 2019; Cox, 2013; McPhail, 2009; Servaes & Malikhao, 2008; Alfonso, 2001). The analysis of a specific environmental orientation as an outcome of environmental communication has provoked the interest of this research because existing studies provided tools that measure the general scale of environmental attitudes. Kassing et al. (2010) developed an instrument that assesses the degrees to which people engage in daily environmental communication practices and environmental communication occurrence. Cordano et al. (2003) assessed people's attitudes and beliefs about the environment, while Price et al. (2014) studied how such attitudes and beliefs are influenced by culture. Mamat and Mokhtarb (2012) developed a similar tool that assesses environmental practice and attitude among society and the effectiveness of environmental education. Research works done by Liefländer and Bogner (2013) and Koprina (2017) used a two-dimensional scale of ecocentric and anthropocentric attitudes. One of the most notable tools created is the New Ecological Paradigm (NEP) Scale, a widely-used instrument to measure a person's endorsement of an ecological worldview. NEP provided a bipolar construct of environmental attitude from unconcerned to concerned about the environment (Liefländer & Bogner, 2013).

Existing tools only assess environmental attitudes as either ecocentric or anthropocentric, but they have yet to measure ecocentrism as a specific outcome of environmental communication. The



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analysis of an ecocentric worldview and its corresponding values in the context of environmental education will expand the terrain of environmental communication as a value-laden discipline. Thus, ecocentrism was the specific environmental orientation of interest. Ecocentrism recognizes the intrinsic value of nature and the role played by humans in protecting and conserving the environment (Kopnina, 2017; Cocks & Simpson, 2015; Imram et al., 2014; McDonald, 2014; Kaufman, 2003; Brady & Pratt, 2005). This view of an equal relationship between humans and the environment (Cocks & Simpson, 2015; Nauda, 2017; Sagy & Tal, 2015) is important in developing peoples' environmental attitudes towards environmental problems. As an attitudinal outcome, ecocentrism can be achieved through environmental education and environmental communication.

It is within this context that the study was conducted. This research aimed to develop a tool that measures ecocentrism as an outcome of environmental communication. To properly measure ecocentrism as a result of environmental communication, the researcher developed its indicators. The identified indicators of ecocentrism were analyzed. These are (1) impacts of human activities on the environment; (2) environmental awareness; (3) sustainable practices; (4) environmental stewardship; (5) collective action; and (6) compliance with environmental laws. These indicators of ecocentrism helped operationalize and measure the otherwise abstract concept of ecocentrism.

Likewise, the research also aimed to analyze environmental communication as a causal factor that brings about ecocentrism.

2.0. Framework of the Study

The study used the Elaboration Likelihood Model of Cacioppo and Petty (1984), which provided a foundational scholarship for understanding the concepts of the study.

Cacioppo and Petty's Elaboration Likelihood Model (ELM) explains how a person's attitude is changed through persuasive communication (Cook et al., 2004; Cacioppo & Petty, 1984). ELM suggests two persuasive ways of communication: a) central route and b) peripheral route. The central route represents the processes involved when elaboration likelihood is high. The peripheral route typifies the processes when elaboration likelihood is low (Petty & Wegener, 1998; Cacioppo & Petty, 1984). The model assumes that attitudes processed via the peripheral route are comparatively more susceptible to change than those processed centrally (Cook et al., 2004).

In this research, the communicative context analyzed is De La Salle University-Dasmariñas' (DLSU-D) environmental communication integrated into the curriculum. The context laid out environmental communication as the persuasive communication with ecocentrism as the key message. The concepts of 'motivation' and 'ability to process' were no longer determined as substantial variables in the study since they are already rooted in the presence of ecocentrism in the curriculum. The subject requirement was considered as a motivational factor, and exposure was observed as a factor for the students' ability to process. Environmental communication is considered the independent variable, and ecocentrism was the dependent variable. The framework guided the researcher through analyzing the observable aspects of environmental communication. Ecocentrism, as the desired graduate attribute, purports a carefully planned communication of environmental messages.

3.0. Methods

The researcher used a descriptive research design to pursue research objectives.

The research locale of the study was De La Salle University-Dasmariñas (DLSU-D) and involved 225 fourth-year college students from the seven colleges of the University. The respondents of the study were fourth-year college students under the old curriculum wherein a three-unit General Education Curriculum (GEC) with embedded ecocentrism was offered. 57% of the respondents were female with an average age of 22 years old and have been with the University for an average of 5 years. Fifty-four percent of the respondents are regular students, 25% are shiftees, and 21% are transferees.

After computing the sample size, the two-stage cluster sampling was done. The first stage involved choosing academic programs with large representations of fourth-year students per college. Large academic programs were chosen for the probability of getting more reliable results. Then, the second stage clustering was done by choosing the classes with the most fourth-year students per

program from each college. The second stage clustering was done by choosing the classes with the greatest number of fourth-year students per program from each college.

The data analysis was done in two phases: document analysis and statistical analysis. A document analysis worksheet was done to develop well-founded indicators for ecocentrism that were included in the questionnaire. The analysis of documents observed the eight category coding steps developed by Colorado State University (Colorado State University, 2020). The researcher analyzed the documents by looking for words or a set of words and phrases related to ecocentrism. The researcher considered other categories deemed relevant in the course of the analysis for coding. After coding a certain number and set of concepts, the researcher decided to code the frequency of a concept. In this research, frequency is considered indicative of importance. The researcher also considered words and phrases for the study in altered or collapsed forms. The phrase 'envi protection', for example, was considered as environmental protection under the category of the same name and not as a separate category. Furthermore, the researcher analyzed documents written in English, both hard copies and softcopies, for consistency purposes. Documents that did not contain environment or ecocentrism were considered irrelevant and were not used to re-examine the codes or alter the coding scheme. Then, the researcher focused on categorizing or clustering similar words or phrases. The analysis provided indicators for measuring the ecocentrism of students.

The indicators that were developed from the document analysis were included in the questionnaire. Based on the pre-test result, the Cronbach Alpha coefficient is 0.894 (extremely high), which means that the items on the scale are reliable.

To analyze the survey data, mean, percentage, and frequency count were used to analyze the socio-demographic and the aspects of environmental communication used in communicating ecocentrism. Mean was also used for the ecocentrism level of the respondents. Chi-square Likelihood Ratio was used for the analysis of the relationship between environmental communication and level of ecocentrism. The following relationship variables were subjected to the statistical test:

1. There is no relationship between environmental communication objectives and respondents' level of ecocentrism.
2. There is no relationship between environmental communication contents and respondents' level of ecocentrism.
3. There is no relationship between the essential skills of an environmental communicator and respondents' level of ecocentrism.
4. There is no relationship between environmental communication media and respondents' level of ecocentrism.
5. There is no relationship between the environmental communication approach and respondents' level of ecocentrism.

The researcher also sought ethical certification before the conduct of the survey. Respondents signed an informed consent form before participation in the study. The participation of the respondents in the study is entirely voluntary. A respondent code number was used in the survey questionnaire. The information is confidential, and the name of the respondent was reflected on the Certificate of Consent and not on any other forms. No one else except the researcher has access to the results of the survey. The respondents were also informed that they may stop participating in the research at any time they wish. The respondents were also allowed access to the results of his/her participation in the study.

4.0. Results and Discussion

The development of a tool to determine ecocentrism as an outcome of environmental communication was developed in four phases: development of indicators, generation of validity evidence, determination of tool limitations, and refinement of tool.

Phases of the Development Process of the Tool

A. Development of Indicators. The indicators that were frequently occurring responses of the respondents were considered indicators. For environmental communication, the parameters or indicators looked into were the objectives, contents, and skills of an environmental communicator. Indicators for analyzing ecocentrism, on the other hand, were developed based on document analysis. These indicators were (1) impacts of human activities on the environment; (2) environmental

awareness; (3) sustainable practices; (4) environmental stewardship; (5) collective action; and (6) compliance with environmental laws. The indicators are defined as the following:

Impacts of human activities on the environment. This refers to both individual and collective human activities that cause harm to the environment.

Environmental awareness. This denotes the awareness of the importance of behavioral change to mitigate negative human impacts on the environment. The results also include the importance of environmental preservation and environmental education in finding solutions to environmental issues.

Sustainable practices. This describes the use of green technologies or ecological-friendly products and pro-environmental activities like proper waste management.

Environmental stewardship. This refers to the responsibility of human beings to create a population that is environmentally aware (Hansen, 2015; Petrovic et al., 2011; Galang, 2010; Marcinkowski, 2009) and willing to participate in addressing environmental problems (Cox, 2013; Caron & Rezaee, 2012).

Collective action. This implies community involvement in environmental activities.

Compliance with environmental laws. This refers to the observance of environmental laws rooted in the desire to protect the environment.

These indicators were later re-named as ecocentrism because they are considered constitutive elements of ecocentrism and key messages on how ecocentrism was communicated. These aspects of ecocentrism helped operationalize and measure the otherwise abstract concept of ecocentrism.

The developed tool was composed of 30 probing items worded as declarative statements covering the five aspects of ecocentrism. Note that the initial part of the tool covered aspects of environmental communication because the relationship between environmental communication and ecocentrism was also analyzed.

B. Generation of Reliability Evidence. The 30 probing items were subjected to Cronbach Alpha and generated the coefficient result of 0.894 (extremely high). Consideration for other results (corrected item-total correlation) was also presented. Probable omission probing items with lower than 0.4 result probing items 4, 8, 16, 17, 19, 28, 29, and 30) which were construed as potentially redundant to increase Cronbach Alpha coefficient. The researcher, however, opted to maintain all probing items because the coefficient result was still extremely high at 0.894, and maintaining all the probing items will provide layers of descriptors for each aspect of ecocentrism.

C. Determination of the Limitations of the Tool. Limitations of the tool were also determined following the result of the survey. For one, the researcher crafted probing items using results from the document analysis and hence were quite theoretical. A similar process was observed in studies conducted by Price et al. (2014), Mamat and Mokhtarb (2012), and Cordano et al. (2003), where similar investigations provided a new perspective for an area of study and enriched the functionality of the tool.

Another potential limitation of this research is the sample used. While the sample size was sufficient, a larger sample might help develop the scale of the tool. A larger sample was not considered for this study as data gathering was also affected by the pandemic. Due to absolute community quarantine declared by the government, there was no chance for the researcher to do follow-up interviews.

The sample size was also a limitation identified by Kassing et al. (2010), who developed a tool for assessing the degree of people's engagement in environmental communication practices. Larger sample size is ideal for providing a more accurate result and identifying outliers, if there are any that could skew data.

D. Refining the Tool. The refined tool has two major parts: environmental communication and ecocentrism. The first part contains objectives, contents, essential skills of an environmental communicator, media, and communication approaches. The second part covered items on human impacts on the environment, environmental awareness, sustainable practices, environmental stewardship, collective action, and compliance with environmental laws.

Environmental Communication

The following are observed of DLSU-D’s environmental communication:

1. The identified objectives of environmental communication were (1) to promote a “*maka-kalikasan*” or ecocentric attitude, (2) to accomplish its environmental goal of being the greenest University in the Philippines, (3) to persuade students to take part in solving environmental problems, and (4) to help students understand environmental information and define environmental problems.
2. The contents of environmental communication were mainly about environmental policies and practices. Most of these policies aim to mitigate the plastic consumption of the academic community. Plastic pollution remains to be one of the biggest environmental problems in the country (Global Alliance for Incinerator Alternatives [GAIA], 2020; GAIA, 2019; United Nations Environment Program [UNEP], 2018). Other contents were environmental issues, solutions to environmental issues, and ecocentric ideology (environment has an equally important value like human beings).
3. The determined environmental communicator skills were (1) provides examples related to “love for the environment”, (2) shows familiarity with environmental laws on environmental protection, (3) exhibits an environment-friendly lifestyle, (4) uses various media in their environmental campaigns, (5) exhibits sensitivity to the diverse culture of the members of the academic community and partners with like-minded to forward the school’s environmental advocacy.
4. Environmental communication used mass media, social media, performing arts, and group communication to achieve its environmental communication objectives. Seventy-four percent of the respondents identified social media as the most effective media for the University’s environmental communication. This is attuned with the social media profile of the Philippines, where 81 percent of social media users are 18- to 24-year-olds (Sanchez, 2020a), and 93 percent (93%) are on Facebook (Sanchez, 2020b).
5. The communication approaches employed were class discussions, environmental campaigns, social mobilization, participation in environment-related celebrations, alliances or partnerships, and University fairs and exhibits.

Ecocentrism

The respondents’ level of ecocentrism, on the other hand, was measured as low, moderate, high. Table 1 presents the rating scale that was used to measure the level of ecocentrism.

Table 1. Rating scale

Score	Qualitative Description
3.68-5.00	High
2.34 - 3.67	Moderate
1.0 - 2.33	Low

For ecocentrism, on the other hand, respondents showed a high level of ecocentrism with a 4.46 mean. The level was analyzed using probing items on impacts of human activities on the environment, environmental awareness, sustainable practices, environmental stewardship, collective action, and compliance with environmental laws.

Relationship between Environmental Communication and Ecocentrism

The relationship between environmental communication and ecocentrism was analyzed. The analysis used the following ratio scale:

Table 2. Interpretation of Relationship

Score	Interpretation
<0.1	Very Significant
0.1 to 0.2	Significant
0.2 to 0.5	Moderate
0.5 to 1.0	Low

1. Relationship between environmental communication objectives and respondents' ecocentrism. Results revealed that only 1 out of the 4 environmental communication objectives was significantly related to the level of ecocentrism. This was 'to promote a "maka-kalikasan" or ecocentric attitude' with 0.175 significant value.
2. Relationship between environmental communication contents and respondents' ecocentrism. Results showed that 1 out of the 4 contents was found to have a moderate relationship to the level of ecocentrism with a 0.433 value. 'Environmental issues' was the only environmental communication content that was moderately related to the level of ecocentrism. This supports the earlier analysis of DLSU-D's environmental communication contents, which focused on the gravity of environmental problems and the importance of increasing students' environmental awareness.
3. Relationship between essential skills of an environmental communicator and respondents' ecocentrism. Results revealed that 4 out of 6 communicator skills were found to have a moderate relationship with ecocentrism. These were 'familiar with environmental laws on environmental protection' with 0.439 value, 'provide examples related to love for the environment' with 0.349 value, 'partner with like-minded to forward the school's environmental advocacy' with 0.211 value, and 'use various media in their environmental campaigns' with 0.298 value.
4. Relationship between environmental communication media and respondents' level of ecocentrism. Results showed that 1 out of 8 communication media showed a very significant relationship with ecocentrism. This is performing arts with a .077 value.
5. Relationship between environmental communication approach and respondents' ecocentrism. Results showed that 2 out of 6 communication approaches with a very significant relationship with ecocentrism. These were 'university fair and exhibit' with a .092 value and 'social mobilization' with a .065 value.

The relationship between environmental communication and ecocentrism ranged from low (0.5 to 1.0) to moderate (0.2 to 0.5). This means further scientific investigation should be carried out to prove any causal relationship between the said environmental communication and level of ecocentrism.

5.0. Conclusion

The ecocentric-driven environmental communication tool features the five aspects of ecocentrism: (1) impacts of human activities on the environment; (2) environmental awareness; (3) sustainable practices; (4) environmental stewardship; (5) collective action; and (6) compliance with environmental laws. These aspects are the key features in enhancing the level of ecocentrism of the public.

When the relationship of environmental communication and respondents' ecocentrism was measured, values only ranged from low (0.5 to 1.0) to moderate (0.2 to 0.5). Further investigation is needed to prove any causal relationship between the said environmental communication and ecocentrism.

Despite these, the tool developed is still a good starting point for establishing a practical instrument for assessing ecocentric-driven environmental communication. And with the aspects of ecocentrism and the additional indicators of eccentric-driven environmental communication identified in this research, the tool can ideally be improved by developing additional context-sensitive probing items. This is to cover other ecocentric-driven environmental communication issues.

Thus, the tool can be used in its current form when there is a need to analyze ecocentrism as an outcome of EC initiatives in academic institutions. As earlier described, the specificity of environmental issues would help conceive a more value-laden perspective tool.

6.0. Ecocentric-Driven Environmental Communication Tool

Part I. Environmental Communication Approach

1. Are you aware of the school's environmental communication efforts to imbibe ecocentrism among its students? ___ Yes ___ No
2. Do you think the school is taking deliberate actions to communicate ecocentrism among its students? ___ Yes ___ No

A. Objectives

2.1. If yes, which of the following objectives do you think are being pursued by the schools' environmental communication towards ecocentrism? Please check all that apply:

- To persuade students to take part in solving environmental problems
- To accomplish its environmental goal of being the greenest University in the Philippines.
- To promote a "*maka-kalikasan*" or ecocentric attitude
- To help students understand environmental information and define environmental problems
- Others, please specify: _____

3. Were these objectives explained to you in class? ___ Yes ___ No

B. Content

4. What are contents or messages being shared to students by the school's environmental communication?

- Environmental policies and practices of the University
- Environmental issues
- Solutions to environmental issues
- Others, please specify: _____

5. Have these topics influenced your viewpoint about the environment? ___ Yes ___ No

5.1. If yes, which of the viewpoint below do you adhere to? Please check only one.

- Environment has an equally important value like human beings
- Humans have more important value than the environment.

6. What other topics do you think should be included to enhance the school's content/messages about the environment?

C. Essentials of Environmental Communicators

7. Which of the following attributes characterize the teachers handling environmental communication in your school? Check all those that apply.

- Familiar with environmental laws on environmental protection
- Provide examples related to "love for the environment"
- Sensitive to the diverse culture of the members of the academic community
- Partner with like-minded to forward the school's environmental advocacy
- Use various media in their environmental campaigns
- Exhibit an environment-friendly lifestyle (e.g., do not use plastics, segregate wastes, patronize recyclable products, etc.)

8. What suggestions do you have so that the teachers will become more effective as environmental communicators?

D. Media

9. What various media do the school employ in its environmental communication campaigns?

Please check all that apply.

- Radio (Green FM radio)
- Printed material (*Heraldo Filipino* publication)
- Social media (Facebook, Twitter, Instagram, etc.)
- Exhibit
- Posters
- Seminars, meetings, conferences
- Video
- Performing arts (songs, dances, poetry)

10. Among the above media, which do you consider most effective for imbibing ecocentrism among students? Why?

E. Approach

11. How does the school undertake its environmental communication activities? Please check all items that you have experienced or know the school has engaged in.

- Environmental campaigns; please specify what campaign(s) _____
- Partnership with environmental organizations with similar advocacies; please specify which organization _____
- Class discussions; please specify which subject _____
- University fairs and exhibits; please specify which event _____
- Participation in national and international celebrations; please specify which celebration (e.g. Earth Day, Environmental Awareness Month, etc.) _____
- Social mobilization through collective action and special events (river clean up, Fun Run for an environmental cause, etc.); please specify the event _____

12. Which among these approaches has been effective so far in advancing ecocentrism?

13. In your little way, what activities are you willing to do in your everyday life that you think will propagate ecocentrism among others? _____

Part II. Ecocentrism. Please express your degree of agreement with the items using the scale from 1 to 5 (1- strongly disagrees, 2 - disagree, 3 - neither agree nor disagree, 4 – agree, and 5 - strongly agree) by checking the box of your answer.

	Statements	5	4	3	2	1
1.	Environmental stewardship means we have to treat nature with care and respect.					
2.	Environmental concern without action is detrimental to both humans and nature.					
3.	I believe that our natural resources should be preserved.					
4.	Nature is inherently valuable, independent of human interest.					
5.	Solutions to environmental problems should focus on the interrelation of humans with the natural environment.					
6.	I believe that true progress is achieved when there is a balance between environmental protection and human quality of life					
7.	Environmental concern without action is detrimental to both humans and nature.					
8.	Environmental protection is important for the survival of humans and animals alike.					
9.	Protection of animal rights is as important as the protection of human rights.					
10.	Animal testing is still cruel, even if it claims to help develop medicines for humans.					
11.	It is important to create mitigating measures to solve environmental problems.					
12.	The impact of human activities should be considered in any structural project.					
13.	I am fully aware of the risk and serious impact of the increasing use of plastic on the environment and human health.					
14.	Deforestation endangers the existence of many animal species.					
15.	It makes me sad to see forests cleared for human needs like residence and agriculture.					
16.	Zero waste management should be fiercely implemented at the household level.					
17.	I believe that zero waste management will protect the health of communities					
18.	The danger and harm of plastic pollution on the environment and human health discouraged me from using plastic materials.					
19.	Indiscriminate disposal of garbage is harmful to human health and the environment.					
20.	I buy ecological-friendly products to reduce my carbon footprint.					
21.	I appreciate the University's sustainable practices like its paperless transactions.					
22.	Green technologies like solar-powered lamps should be aggressively promoted.					
23.	Compliance with environmental laws not only means conforming to government regulations but also protecting the environment.					
24.	All societal actors (e.g., schools, industries, local government units) should comply with environmental laws.					
25.	Environmental preservation should start at the community level.					
26.	Communities should be involved in environmental activities like tree planting and coastal clean-up.					
27.	Various societal actors (e.g., schools, industries, local government units) need to be involved in addressing plastic pollution.					
28.	Environmental education should discuss how environmental facts, concepts, theories, and principles affect the environment.					
29.	Major environmental problems like climate change are discussed in various venues, both inside and outside the classroom.					
30.	There is a need for behavioral change in addressing the serious problem brought by environmental degradation.					

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