

The Relationship between Environmental Moral Reasoning and Environmental Attitudes of Pre-Service Science Teachers*

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Abstract

The aim of the present study was to investigate the relationship between environmental moral reasoning patterns and environmental attitudes of 120 pre-service science teachers. Content analysis was carried out on participants' written statements regarding their concerns about the presented environmental problems and the statements were labeled as ecocentric, anthropocentric, and non-environmental according to their meanings. Then, descriptive and inferential analyses were conducted on the calculated frequencies of each moral consideration category and participants' responses to Environmental Attitudes Scale. The results revealed a significant positive correlation between ecocentric moral reasoning and environmental attitudes, whereas there was not a statistically significant relationship between neither of anthropocentric nor non-environmental moral reasoning and environmental attitudes. Findings of the study support the argument that an environmental ethic, which extends moral consideration beyond human beings to the nature as a whole, is necessary to overcome many of the environmental problems.

Keywords: environmental attitudes, environmental moral reasoning, teacher education.

Introduction

Environmental Moral Reasoning and Environmental Attitudes

Today's world in which we live is confronted by increasing number of environmental problems such as deforestation, desertification, loss of

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biodiversity, pollution, and global warming (O'Neill, Holland, & Light, 2008). Moreover, it has long been known that most of the environmental problems are mainly caused by human activities (United Nation the World Commission on Environment and Development [WCED], 1987). Therefore, it can be concluded that in order to find solutions to the environmental problems, one of the prerequisites is creating changes in behaviors of people (Yeung, 2002).

In this respect, many research studying the factors that have influences on people's environmental behaviors have been conducted in all over the world. When these research findings are examined, it is seen that among the factors related to environmental behaviors, ethics and values are frequently highlighted. For instance, in her study, Tilbury (1995) stated that decisions of people to participate in environmental improvement depend mostly on personal motivation resulting from the development of a personal environmental ethic. Similarly, Sosa (1996) stressed the importance of creating changes in beliefs and values of people to guide their behaviors and overcome environmental problems. Moreover, different people may have different motives, or reasons, for valuing nature (Bjerke & Kalternborn, 1999). Accordingly, it is possible to find quite a large number of researches examining human-environment relation and trying to find the underlying factors resulting in differences in people's reasoning regarding their perceptions of this relationship. Kahn and his colleagues (Kahn, 1999; Kahn & Lourenco, 2002) are among the most known researchers who conducted research in this field. The researchers mainly examined how children comprehended and evaluated their relationships with nature by using moral dilemmas on different environmental topics such as impact of throwing garbage into a local river and value of animal life vis-à-vis human life.

Correspondingly, moral reasoning, which is defined as a thinking process with the objective of determining whether an idea is right or wrong (Littledyke, 2004), constituted one of the focus of the present study. More specifically, environmental moral reasoning, which can be defined as the process of determining whether an idea/action is right or wrong for environmental improvement and protection, was investigated throughout the study. In the study, three categories were used for moral reasoning patterns of participant pre-service science teachers for their concerns about the presented environmental problems (i.e. deforestation of Amazon rain forests, electronic waste (e-waste) in China, Exxon Valdez oil spill, melting of glaciers): ecocentric, anthropocentric, and non-environmental. In ecocentric moral reasoning, idea of establishing equivalences between human and non-human life forms and valuing biological life and natural processes is the main concern. Valuing nature for its own sake (Thompson & Barton, 1994; Gardner & Stern, 1996; Karpiak & Baril, 2008), and equivalence and justice in the relationship between humans and the nature (Kahn, 1997), and concern for nonhuman objects (e.g., animals, ecosystems,

biosphere) (Stern & Dietz, 1994) are frequently emphasized by people who exhibit ecocentric moral reasoning. On the other hand, anthropocentric moral reasoning is the belief that nature is important because it is central to human wellbeing and utility to humans (Karpiak & Baril, 2008). Moreover, Thompson and Barton (1994) defined anthropocentric moral reasoning as valuing nature due to its material and physical benefits it can provide for humans. Furthermore, it was defined as the idea that people should care about environmental quality because a degraded environment poses a threat to people's health (Franson & Gärling, 1999). Finally, non-environmental moral reasoning is labeled for people who concentrate on non-environmental aspects of environmental problems such as laws rather than effects of the environmentally damaging actions on humans or on environment itself (Kortenkamp & Moore, 2001).

In addition to moral reasoning, environmental attitude, which is defined as sets of values and feelings of concern for the environment (UNESCO/UNEP, 1978) and accepted to be a powerful predictor of environmental behavior (Kaiser, Wölfing, & Fuhrer, 1999), was the other focus construct of the study. In addition to the important role of values in definitions of both of the constructs, the intimate relationship between environmental moral reasoning and environmental attitudes is also implied by some of the previous research that focused on the underlying moral reasoning of environmental attitudes and ecological belief structures of people (Evans, Brauchle, Haq, Stecker, Wong, & Shapiro, 2007). Furthermore, both of the environmental attitude and environmental moral reasoning constructs were shown to have similar characteristics in that both environmental attitudes (e.g., Schultz, 2000) and environmental moral reasoning (e.g., Berenguer, 2008) were shown to have connections with empathy, which refers to an emotional response congruent with the perceived welfare of another (Berenguer, 2008).

Aside from the importance of the constructs being studied and their relationships, the present study is believed to have additional importance owing to its sample, pre-service science teachers. Madsen (1996) stated that universities have the power and the responsibility to promote environmental awareness and responsible environmental behavior in the society since they are proper places to instill certain values in their learners. Education faculties also have an additional importance in environmental education because teachers of future, who will have active roles in environmental education and be role models for their own students in the future, are educated in these faculties. Thus, if effective environmental education is provided to pre-service teachers, the ultimate goal of environmental education, which is educating environmentally responsible citizens, can be achieved (Culen, 2001).

In sum, as demonstrated by previous research, environmental moral reasoning and environmental attitude constructs are the two important

determinants of environmental behavior and these two constructs have common points. Accordingly, the researchers of the present study sought answers for the research questions of: (1) What are environmental moral reasoning patterns of pre-service science teachers regarding the presented environmental problems? (2) Is there a relationship between environmental moral reasoning patterns and environmental attitudes of pre-service science teachers? Studying the relationship between environmental moral reasoning patterns and environmental attitudes is believed to be important because understanding this relationship will be helpful to clarify the process of environmental moral reasoning, which in turn may contribute to the development of pro-environmental behaviors in the society. In addition, this study will also have important implications for the possible effect of culture on environmental moral reasoning since there is not enough research related to this subject, especially in nonwestern countries.

Method

Sample

The sample of the study constituted 120 pre-service science teachers who were enrolled in freshmen, sophomore, junior, and senior classes of elementary science education department of one of the largest universities of the country where the study took place. According to the data collected on their date of birth information the mean age of the sample was calculated to be 22 years with a standard deviation of 1.46. The participants were volunteers and no extra credit was given for their participation.

Instruments

In the study, the researchers of the study prepared four cases about four environmental problems (i.e. deforestation of Amazon rain forests, e-waste in China, Exxon Valdez oil spill, melting of glaciers) for collecting data about participants' environmental moral reasoning. The reason for researchers' preference for using real environmental cases rather than hypothetical environmental dilemmas was to eliminate the limitation of the possible difference between people's reasoning toward real-life and hypothetical issues (Kortenkamp & Moore, 2001). In addition, the selection of the four environmental problems was mainly based on the familiarity of the environmental cases to the participants. In order to attract respondents' attention and thus make them respond to the cases in a more enthusiastic way, environmental problems which took place frequently in newspapers, web-pages of non-governmental organizations such as Greenpeace, TEMA, and Doğa Derneği were selected and included in the study. All of the cases except from Exxon Valdez oil spill case (it was taken from Kahn's (1997) study and used with some adaptations) were prepared

by the researchers of the present study in a very iterative process including the detailed review of research conducted to include similar environmental, social, and economical aspects in all of the environmental cases.

Although it is known that providing all the relevant information to the decision maker is impossible (Gore, 1992), while developing the content of the environmental problems, all aspects (e.g., environmental, social, economical) of the problems were tried to be included. After the cases were prepared by the researchers and an agreement was established between them, the final structures of the cases were presented to an expert committee in order to assure the validity. Experts were asked to evaluate the prepared texts in terms of appropriateness of the language and sufficiency of the given information about each environmental problem. Moreover, they were asked whether effects of the environmental problems on people and on environment itself were given equal weight while explaining the problems. According to the taken feedbacks, necessary adaptations were made and the cases were distributed to the participants.

As a second data collection instrument, Environmental Attitudes Scale (EAS) developed by Ebenbach, Moore, and Parsil (1998) was used to measure participants' environmental attitudes. The scale was previously found to have an EAS-Internal Cronbach's alpha value of 0.90 and EAS-External alpha value of 0.85. Moreover, appropriate correlation with other environmental attitudes scales (Dunlap & Van Liere, 1978) and measures of pro-environmental behavior (Maloney & Ward, 1973) was stated to provide evidence for the validity of the scale (Ebenbach, 1999; Ebenbach, Moore & Parsil, 1998).

Data Collection and Analysis

For data collection, four cases about the four environmental problems and Environmental Attitudes Scale (EAS) were distributed to the participants in 2008-2009 Fall semester of the university, where the study was conducted. Environmental Attitudes Scale (EAS) was a 9 point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (9) (On the scale range there was also a title for "neither agree nor disagree" (5)). On the other hand, regarding the distributed environmental cases, the participants were asked to list and explain their considerations that concerned them most about each case in written forms. It took about 40-45 minutes for participants to response to the environmental cases and Environmental Attitudes Scale (EAS).

After data collection, content analysis was carried out on the written statements of the participants and each statement was coded as ecocentric, anthropocentric or non-environmental. Participants' statements, which emphasized the intrinsic value of nature, value aside from its usefulness to humans, were coded as ecocentric; statements that focused on the utility of

the environment for the well-being of people were coded as anthropocentric; statements that concentrated on non-environmental aspects of the given environmental problems such as laws rather than effects of the environmental problems on humans or on environment itself were coded as non-environmental moral reasoning. To test the reliability, data gathered from 40 of the participants (10 participants from each of the four grade level) were coded by two the authors, and percent agreement was found to be 95 %.

Based on the content analyses, frequencies of each statement reflecting ecocentric, anthropocentric, non-environmental moral reasoning were counted for each respondent and entered to Statistical Package for Social Sciences (SPSS) version 15.0 for Windows. Then, mean values of the respondents' statements regarding each of the environmental moral reasoning category were calculated. Further analyses that included data regarding environmental moral reasoning were carried out on these calculated mean values in addition to the participants' responses to Environmental Attitudes Scale (EAS).

Results

Before investigating the correlation between the three environmental moral reasoning patterns (i.e. ecocentric, anthropocentric, non-environmental) and environmental attitudes of the pre-service science teachers, descriptive analyses were carried out in order to investigate their moral reasoning patterns and environmental attitudes in general. Analyses of the responses revealed that participants mostly exhibited ecocentric moral reasoning toward the given environmental problems than anthropocentric and non-environmental moral reasoning respectively.

Moreover, the sequence of moral consideration categories from the most frequent to the least frequent was the same for all of the environmental cases, except from the "Exxon Valdez Oil Spill" case. For " Deforestation of Amazon", "E-waste in China", and " Melting of Glaciers" cases the most frequent moral reasoning pattern was ecocentric moral reasoning, and the least frequent moral reasoning pattern was non-environmental moral reasoning, showing that participants of the study mostly concentrated on the effects of environmental problems on environment. However, for the "Exxon Valdez Oil Spill" case, participants concerns about the effects of the environmental problem on humans (mean value = 1.77) were higher than their concerns about the effects of the problem on environment itself (mean value = 1.73). Nevertheless, it should also be noted that the two mean values are very near to each other. Mean values for ecocentric, anthropocentric, non-environmental, and total moral considerations for each of the distributed environmental cases as well as average values corresponding to them are tabulated in Table 1.

Table1.
Mean Number of Moral Considerations

	Deforestation of Amazon	E-waste in China	Exxon Valdez	Melting of Glaciers	Average
Ecocentric	1.92	2.10	1.73	2.25	2.00
Anthropocentric	1.38	1.33	1.77	1.43	1.48
Non-environmental	0.32	0.21	0.17	0.03	0.18
Total	3.58	3.56	3.65	3.68	3.62

In addition, as have been stated previously, researchers examined the relationship between moral reasoning patterns and environmental attitudes of the participant pre-service science teachers by investigating the corresponding Pearson Correlation values. Analyses resulted in a statistically significant positive correlation between ecocentric moral reasoning and positive environmental attitudes, which means that participants who have more ecocentric concerns and thus value nature without considering its usefulness to humans had higher positive environmental attitudes.

On the other hand, according to the analyses there was not such a statistically significant relationship between neither of anthropocentric moral reasoning nor non-environmental moral reasoning and environmental attitudes of the pre-service science teachers. Pearson Correlation (r) values for the relationships between environmental attitudes (EAS), ecocentric moral reasoning (M.R.eco), anthropocentric moral reasoning (M.R.anthro), non-environmental moral reasoning (M.R.NE), and total environmental concerns (M.R.total) are given in Table 2.

Table2.
Correlations between Moral Reasoning Patterns and Environmental Attitudes

	EAS	M.R.eco	M.R.anthro	M.R.NE	M.R.total
EAS	1.000	.266(**)	.053	-.040	.213(*)
M.R.eco	.266(**)	1.000	-.035	-.122	.742(**)
M.R.anthro	.053	-.035	1.000	-.127	.565(**)
M.R.NE	-.040	-.122	-.127	1.00	.061
M.R.total	.213(*)	.742(**)	.565(**)	.061	1.000

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Discussion and Conclusions

Findings of the study reveal that pre-service science teachers who participated in the present study mostly believe that nature merits moral consideration owing to its intrinsic value, which is its value aside from its usefulness to humans. Then, they concentrate on the effects of environmental problems on humans and think that environmental quality is important because a degraded environment possesses a threat to the well-being of people. Finally, it is seen that they pay minimum attention to the non-environmental aspects of these issues such as being illegal. When the related literature is reviewed, it is seen that these findings are contrary to the findings of some other studies. For instance, in their study, Kortenkamp and Moore (2001) found that their participants exhibited mostly non-environmental moral reasoning toward the presented environmental dilemmas. Moreover, their participants, who were also college students as in the present study, had more anthropocentric concerns than ecocentric concerns. Although there may be various reasons for the differences found in these moral reasoning patterns, they may also be an indication of the effect of culture on environmental moral reasoning patterns because the study of Kortenkamp and Moore (2001) was conducted in a western country whereas the participants of the present study belong to a non-western culture. On the other hand, the low frequency of the stated non-environmental concerns in the present study may be due to participants' unawareness about the presence of the environmental laws or the deficiencies in the implementation of these laws in the country.

Moreover, in the study a statistically significant positive correlation between ecocentric moral reasoning and positive environmental attitudes of the participants was found whereas there was not such a significant relationship between positive environmental attitudes and anthropocentric or non-environmental moral reasoning. Therefore, it can be stated that participants of the study who gave more attention to the effects of environmental problems on environment itself had higher positive attitudes toward environment than the ones who concentrated more on environmental problems' effects on humans or problems' other aspects such as being illegal. In fact, this finding has important implications such as the necessity of improvement in the coverage of environmental issues in mass media and environmental education. Accordingly, it can be concluded that promoting ecocentric concerns in people results in higher positive attitudes toward environment. Similarly, in the literature, research show that information enhancement about the effects of environmental issues on environment, results in more ecocentric moral reasoning (Kortenkamp & Moore, 2001), and increased knowledge about environment establishes higher pro-environmental attitudes in the society (Ramsey & Rickson, 1976). Therefore, if we emphasize impacts of environmental problems on nature itself and educate students who value nature due to its intrinsic

value, not for its usefulness for humans or the damages people have to face due to degradation of environment, we can develop higher positive environmental attitudes and environmentally friendly behaviors in the society.

This approach may have additional importance for the environmental education programs implemented in universities, which are accepted as places that have fundamental responsibility to promote environmental awareness and responsible environmental behavior in the society (Madsen, 1996). Furthermore, as have been stated previously, more emphasis should be given in the implementation of environmental education programs and necessary revisions should be made accordingly in education faculties because teacher candidates who graduate from these faculties will have active roles in the education of their own students when they begin their profession.

To conclude, the present study contributes to the literature with its findings including the effect of culture on environmental moral reasoning patterns owing to the found differences from some other research carried out in different countries such as the study of Kortenkamp and Moore (2001). Furthermore, it supports the argument that a new environmental ethic, which extends moral consideration beyond human beings to non-human world, is needed (O'Neill, Holland, & Light, 2008) and should be utilized in environmental education, including education for pre-service teachers owing to the importance of teacher education for an overall success in environmental education. On the other hand, some important points should also be discussed while interpreting the findings of the study as well as their implications. First of all, the respondents who participated in the study were limited to 120 pre-service science teachers enrolled in one of the universities of Turkey. In addition, the obtained environmental moral reasoning patterns are valid within the framework of the environmental cases used in the study and it is possible to find different patterns in the use of different environmental cases. Therefore, further research with broader and more diverse samples is required in order to explain environmental attitude and environmental moral reasoning constructs as well as the nature of their relationships in a more sound way and make generalizations properly.

Biographical statements

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References

- Berenguer, J. (2008). The effect of empathy in environmental moral reasoning. *Environment and Behavior*, *42*(1), 110-134.
- Bjerke, T. & Kaltenborn B.P. (1999). The relationship of ecocentric and anthropocentric motives to attitudes toward large carnivores. *Journal of Environmental Psychology*, *19*, 415-421.
- Culen, G. R. (2001). The status of environmental education with respect to the goals of responsible citizenship behavior. In H. R. Hungerford, W. J. Bluhm, T.L. Volk & J. M. Ramsey (Eds.), *Essential Readings in Environmental Education* (pp. 37-45). Stipes, IL.
- Dunlap, R. E., & Van Liere, K. D. (1978). A proposed measuring instrument and preliminary results: The 'new environmental paradigm'. *Journal of Environmental Education*, *9*, 10-19.
- Ebenbach, D. H. (1999). Behind beliefs and controversies: The relationship between motivation and the expression of pro-environmental attitudes. Unpublished doctoral dissertation, University of Wisconsin-Madison.
- Ebenbach, D. H., Moore, C. F., & Parsil, S. A. (1998). Internally and externally motivated environmental attitudes. Paper presented at the annual convention of the Midwestern Psychological Association, Chicago, IL.
- Evans, G. W., Brauchle, G., Haq, A., Stecker, R., Wong, K., & Shapiro, E. (2007). Young children's environmental attitudes and behaviors. *Environment and Behavior*, *39*(5), 635-659.
- Franson, N., & Garling T. (1999). Environmental concern: Conceptual definitions, measurement methods, and research findings. *Journal of Environmental Psychology*, *19*, 369-382.
- Gardner, G. T., & Stern, P. C. (1996). *Environmental problems and human behavior*. Boston: Ally and Bacon.
- Gore, A. (1992). *Earth in the balance*. New York: Plume Books.

- Kahn, P. H., Jr. (1997). Children's moral and ecological reasoning about the Prince William Sound oil spill. *Developmental Psychology, 33*(6), 1091-1096.
- Kahn, P. H., Jr. (1999). *The human relationship with nature*. Cambridge, MA: MIT Press.
- Kahn, P. H., Jr., & Lourenco, O. (2002). Water, air, fire, and earth: A developmental study in Portugal of environmental moral reasoning. *Environment and Behavior, 34*, 405-430.
- Kaiser, F. G., Wölfing, S., & Führer, U. (1999). Environmental attitude and ecological behavior. *Journal of Environmental Psychology, 19*, 1-19.
- Karpiak, C. P., & Baril, G. L. (2008). Moral reasoning and concern for the environment. *Journal of Environmental Psychology, 28*(3), 203-208.
- Kortenkamp, K. V., & Moore, C. F. (2001). Ecocentrism and anthropocentrism: Moral reasoning about ecological commons dilemmas. *Journal of Environmental Psychology, 21*, 261-272.
- Littledyke, M. (2004). Primary children's views on science and environmental issues: Examples of environmental cognitive and moral development. *Environmental Education Research, 10*(2), 217-235.
- Madsen, P. (1996). What can universities and professional schools do to save the environment In J. B. Callicott, F. J. R. da Rocha (Eds.), *Earth summit ethics: Toward a reconstructive postmodern philosophy of environmental education* (pp.71-91). New York: State University of New York Press.
- Maloney, M. P., & Ward, M. P. (1973). Let's hear from the people: An objective scale for the measurement of ecological attitudes and knowledge. *American Psychologist, 28*, 583-586.
- O'Neill, J., Holland, A., & Light, A. (2008). *Environmental values*. London; New York: Routledge.
- Ramsey, C. E., Rickson, R. E. (1976). Environmental knowledge and attitudes. *Journal of Environmental Education, 8*, 10-18.
- Schultz, P. W. (2000). Empathizing with nature: The effects of perspective taking on concern for environmental issues. *Journal of Social Issues, 56*, 391-406.
- Sosa, N. M. (1996). The ethics of dialogue and the environment: Solidarity as a foundation for environmental ethics. In J.B. Callicott, F.J.R. da Rocha (Eds.), *Earth summit ethics: Toward a reconstructive postmodern philosophy of environmental education* (pp.47-70). New York: State University of New York Press.
- Stern, P. C., & Dietz, T. (1994). The value basis of environmental concern. *Journal of Social Issues, 50*, 65-84.
- Thompson, S. C. G., & Barton, M. A. (1994). Ecocentric and anthropocentric attitudes toward the environment. *Journal of Environmental Psychology, 14*, 149-157.

- Tilbury, D. (1995). Environmental education for sustainability: Defining the new focus of environmental education in the 1990s. *Environmental Education Research*, 1(2), 195-212.
- UNESCO/UNEP (1978). The Tbilisi Declaration. *Connect*, 3(1), 1-8.
- WCED (1987). *Our common future*. Oxford: Oxford University Press.
- Yeung, S. P. (2002). Teaching approaches and the development of responsible environmental behaviour: The case of Hong Kong. *Ethics, Place and Environment*, 5(3), 239-269.