

A Study of Relationship between Environmental Moral Reasoning and Scientific Attitude among Secondary Students

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Abstract

The present study is an attempt to study the relationship between environmental moral reasoning and scientific attitude among secondary students; to compare the environmental moral reasoning and scientific attitude between grade 9 and grade 11 (arts) students, to compare the environmental moral reasoning and scientific attitude between grade 9 and grade 11 (science) students; to compare the environmental moral reasoning and scientific attitude between grade 11 (science) and grade 11 (arts) students. Sample consisted of 154 students of Allahabad city. 69 students of class 9 general, 56 and 29 students of class 11 (science) and class 11(arts) respectively. The tools used for the study were environmental moral reasoning questionnaire and scientific attitude questionnaire of K. S. Misra. Product moment coefficient and t-ratio were computed for the analysis of data. The findings of the study revealed that secondary students environmental moral reasoning is positively related to scientific attitude ($r = 0.183$). It means that secondary students who have more scientific attitude gave more moral consideration to the environmental issues. It was also found that grade 9 students do not differ from those of class 11 (arts) students in both environmental moral reasoning ($t = 0.770$) and scientific attitude ($t = 0.392$); grade 9 students do not differ from those of class 11 (science) students in environmental moral reasoning ($t = 0.493$) but they differ in their scientific attitude ($t = 5.392$); grade 11 (science) students do not differ from those of class 11 (arts) students in Environmental moral reasoning ($t = 0.325$) but they differ in their scientific attitude ($t = 3.91$). This study reveals that exposure to science education from lower secondary to higher secondary tend to develop scientific attitude among students but not environmental moral reasoning ability. There must be inclusion of environment-related topics in subjects of higher secondary curriculum.

KEYWORDS: environmental moral reasoning, scientific attitude.

Introduction

Anthropogenic disturbances are the major factors causing deterioration to environmental health (WCED, 1987). Therefore, it can be concluded that how we deal with these problems largely depends on how we perceive our relationship with environment. Environmental moral reasoning is a process of determining whether an idea/ action are right or wrong for the sake of environment. Axelrod (1994) found that participants' dominant moral orientations influenced their decisions about ecological dilemmas. Studies of moral reasoning for environmental dilemmas are very important for the resolution of the social conflicts arisen around specific environmental issues. For example, construction of dams on river is social conflicts that arise around the dilemma of production of electricity or conservation of river.

Kortenkamp and Moore (2001) studied environmental moral reasoning among graduate students and coded the responses as ecocentric, anthropocentric and non-

environmental. The responses were categorised as ecocentric if it inferred that nature has moral consideration because it has intrinsic value, and its protection is necessary for its own sake, aside from its usefulness to human. The responses were categorised as anthropocentric if it indicated that nature has moral consideration because degrading or preserving nature can in turn harm or benefit humans. The responses were categorised as non- environmental moral reasoning when it use some other non environmental aspects such as laws, righteousness etc. to save the environment. They found that all three types of environmental moral reasoning are strongly, influenced by information about the environmental problems. Information related to environmental problems did cause participants to use more ecocentric moral reasoning and cause increase in anthropocentric moral reasoning but decrease in non-environmental moral reasoning. Kahn (1997) interviewed children about an environmental disaster (the Exxon oil spill disaster of 1989) and found that both type of reasoning increased with age. Misra (2009) constructed environmental moral reasoning questionnaire and determined six categories namely, personal orientation, instrumental- relativistic orientation, personal orientation, social orientation, legal orientation and ethical orientation on the basis of responses of students. Tuncay, Tuziin, Tekoz (2011) found positive relationship between ecocentric moral reasoning and environmental attitude of pre- service teachers. In addition to environmental moral reasoning, scientific attitude is a tendency to seek truth, think logically and act upon reasonably (Haney, 1954).It is the most important outcome of science teaching. Scientific attitude is wisdom to arrive at personal decisions based on the objective and evidence based evaluation of the situation. Zeidler and Schafer (1984) found that science- majors outperformed in moral reasoning on local environmental issues than non- science majors. Previous researches established the relationship between environmental awareness and environmental attitude with scientific attitude (Singh, 2010; Lahiri, 2011; Suhane and Narayane, 2011; Hasan and Ratnakar, 2012). The present study sought to answer the following research questions:

1. Is there any relationship between environmental moral reasoning and scientific attitude of secondary students?
2. Is there any difference in environmental moral reasoning and scientific attitude of secondary students in relation to their grades?
3. Is there any difference in environmental moral reasoning and scientific attitude of secondary students in relation to their streams of teaching?

Objectives of the study:

1. To find out the relationship between environmental moral reasoning and scientific attitude of secondary students.
2. To compare the environmental moral reasoning between grade 9 and grade 11 (arts) students.
3. To compare the scientific attitude between grade 9 and grade 11 (arts) students.
4. To compare the environmental moral reasoning between grade 9 and grade 11 (science) students.
5. To compare the scientific attitude between grade 9 and grade 11 (science) students.
6. To compare the environmental moral reasoning between grade 11 (science) and grade 11 (arts) students.
7. To compare the scientific attitude between grade 11 (science) and grade 11 (arts) students.

Hypotheses of the study:

The following hypotheses have been tested-

1. There is no significant relationship between environmental moral reasoning and scientific attitude of secondary students.
2. There is no significant difference between environmental moral reasoning of grade 9 and grade 11 (arts) students.
3. There is no significant difference between scientific attitude of grade 9 and grade 11 (arts) students.
4. There is no significant difference between environmental moral reasoning of grade 9 and grade 11 (science) students.
5. There is no significant difference between scientific attitude of grade 9 and grade 11 (science) students.
6. There is no significant difference between environmental moral reasoning of grade 11 (science) and grade 11 (arts) students.
7. There is no significant difference between scientific attitude of grade 11 (science) and grade 11 (arts) students.

Methodology:

Sample

The sample of the study comprised of 165 students studying in UP Board schools of Allahabad city. Out of 165, 79 were grade 9 students and 86 were grade 11 students. Out of 86 grade 11 students, 56 and 30 were science and arts students respectively.

Instruments

‘Scientific attitude questionnaire’ developed by K. S. Misra was used for measuring scientific attitude of grade 9 students. The scale was previously found to have test-retest reliability of 0.78 (Misra, 2009), Product- moment reliability values of 0.7236 (Gautam, 2001). Moreover, inter- dimension correlations among all the dimensions of scientific attitude were stated to provide evidence for the validity of the scale (Misra, 2009).

‘Environmental moral reasoning questionnaire’ developed by K. S. Misra has been used to measure environmental moral reasoning of secondary students.

Pearson’s product- moment correlation coefficient and t- ratio were calculated for the analysis of data.

Results and Discussion:

Table 1

Relationship between environmental moral reasoning and scientific attitude of secondary students

N	Value of Correlation
165	0.183*

*significant at 0.05 level

Table 1 show that the value of correlation between environmental moral reasoning and scientific attitude ($r = 0.183$) is significant at 0.05 level of significance. Thus, the null hypothesis that there exists no relationship between environmental moral reasoning and scientific attitude is rejected. It means that environmental moral reasoning is positively related to scientific attitude among secondary students.

Therefore, it can be stated that secondary students who have more scientific attitude gave more moral consideration to the environmental issues.

Table 2
Mean, SD and t- value showing the difference in environmental moral reasoning and scientific attitude of grade 9 and grade 11 (arts) students

	Grade	N	Mean	SD	t- ratio
Environmental moral reasoning	9	69	23.98	2.67	0.770
	11(arts)	29	24.44	2.50	
Scientific attitude	9	69	63.55	18.50	0.392
	11(arts)	29	65.14	16.37	

Table 2 shows that the t- ratio is not significant at 0.05 level for both environmental moral reasoning (t= 0.770) and scientific attitude (t= 0.392) .Thus, the null hypothesis no. 2 & 3 is accepted. It means that grade 9 students do not differ from those of class 11 (arts) students in both scientific attitude and environmental moral reasoning. It shows that exposure to education in arts subject does not bring any change in scientific attitude and environmental moral reasoning of students.

Table 3
Mean, SD and t- value showing the difference in environmental moral reasoning and scientific attitude of grade 9 and grade 11 (science) students

	Grade	N	Mean	SD	t- ratio
Environmental moral reasoning	9	69	23.98	2.67	0.493
	11(science)	56	24.23	2.91	
Scientific attitude	9	69	63.55	18.50	5.392**
	11(science)	56	81.46	18.42	

**significant at 0.01 level

Table 3 shows, that t-ratio is not significant for environmental moral reasoning (t= 0.493) but it is significant for scientific attitude (t=5.392). Thus, the null hypothesis no. 4 is accepted while hypothesis no. 5 is rejected. It means that grade 9 students do not differ from those of class 11 (science) students in environmental moral reasoning. Secondly, grade 9 students differ from those of class 11 (science) students in scientific attitude. This seems to reflect that more exposure to science education brings development of scientific attitude but it does not bring a change in environmental moral reasoning.

Table 4

Mean, SD and t- value showing the difference in environmental moral reasoning and scientific attitude of grade 11(science) and grade 11 (arts) students

	Grade	N	Mean	SD	t- ratio
Environmental moral reasoning	11(science)	56	24.23	2.91	0.325
	11(arts)	29	24.44	2.50	
Scientific attitude	11(science)	56	81.46	18.42	3.913**
	11(arts)	29	65.14	16.37	

**significant at 0.01 level

Table 4 reveals that the value of t- ratio for environmental moral reasoning is not significant at 0.01 level ($t=0.325$) but it is significant for scientific attitude ($t=3.91$). Thus, null hypothesis no. 6 stands accepted while hypothesis no.7 is rejected. It shows that 11th class students exposed to science education excel in scientific attitude than those not exposed to science education but the two groups differ in environmental moral reasoning.

Conclusion:

Findings of the present study revealed that environmental moral reasoning is positively related to scientific attitude among secondary students. This finding implies that efforts should be made by teachers and science curriculum to develop scientific attitude among students so that they can take informed decisions about environmental issues. Moreover, this study reveals that exposure to science education from lower secondary to higher secondary tend to develop scientific attitude among students but it does not help in development of environmental moral reasoning ability. Hurd (1997) stressed on the inclusion of environment related moral and ethical issues in science curriculum. It is argued by Zeidler & Keefer (2003) that science teachers should provide opportunities for students to deal sensibly with environment. There must be inclusion of environment- related topics in arts subjects of higher secondary curriculum.

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