

## **Turkish Students' Views on Environmental Challenges with respect to Gender: An Analysis of ROSE Data**

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### **Abstract**

*This paper examined high school students' attitudes toward the environment and their interest in learning about environmental protection with respect to gender. The questionnaire-based Relevance of Science Education (ROSE) Project data of 9th grade students were collected in Turkey from 1,260 students. Statistical analysis included tabulation of frequency distribution, descriptive statistics chi-square and multivariate analysis of variance. The findings of this study revealed that (i) Turkish students have favourable attitudes toward environmental issues, (ii) students are eager to find solutions to environmental problems and show optimistic trends about the future, (iii) students' interests in learning about environmental protection issues are moderate level, and (iv) statistically significant differences were found in environmental attitudes and interests in learning about environmental protection mean scores of students regarding gender. The authors offer suggestions, based on the results, for further research to identify reasons for differences between boys and girls so as to improve environmental education in Turkish schools.*

**Key words:** *attitudes toward environment, interest, environmental protection, gender, high school students, Relevance of Science Education.*

### **Introduction**

Investigating individuals' attitudes towards the environment has had a long tradition in environmental education research. Studies generally tended to examine students' environment attitudes in relation to environmental knowledge, behaviour as well as socio-economic variables (e.g., Gooch, 1995; Worsley & Skrzypiec 1998; Bergh, & Huub Van Den Lagerweij, 1999; Eagle & Demare, 1999; Kuhlemeier, Leung & Rice, 2002; Huang & Yore, 2003; Makki, Abd-El-Khalick, & Boujaoude, 2003; Negev, Sagy, Garb, Salzeberg & Tal, 2008). In one of the earlier study, Hess-Quimbata and Pavel (1996) examined the factors affecting the college students' environmental attitude in relation to demographic variables, socio-economic status, and institutional characteristics. Their results revealed that male and liberal students were more likely to develop favourable attitudes toward the environment. They also reported that the number of science courses and human ethical/social activist values play crucial roles in the improvement of favourable environmental attitudes. In another study,

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Bradley, Waliczek, and Zajicek (1999) assessed high school students' environmental knowledge and attitudes before and after exposure to a 10-day environmental science course. Analyses suggested statistically significant differences in both knowledge gained and attitudes of students after the course. Moreover, a statistically significant relationship was reported between knowledge and attitude scores. Students who held higher knowledge scores were found to have more positive attitudes toward the environment than students having lower knowledge scores. In a similar study, Lemming and Porter (1997) found a significant effect from the Caretaker Classroom Program, which was aimed to encourage elementary students to engage in pro-environmental activities, on students' attitudes toward the environment. Research by Kuhlemeier, Bergh, and Huub Van Den Lagerweij (1999) undertaken by examining Dutch secondary education students' environmental knowledge, attitudes and behaviours indicated that the participants generally held favourable attitude toward the environment, had incorrect environmental knowledge and expressed inadequate environmentally responsible behaviour. In her study, Weaver (2002) conducted a cross-national research to examine the effects of background characteristics, religious orientation, political value orientation, and knowledge on pro-environmental attitudes. Environmental knowledge, scientific knowledge, belief in the sacredness of nature, and liberal values were found to be significant determinants of pro-environmental attitudes among participant countries (i.e. West Germany, Japan, Great Britain, Russia and United States). In another multi-country research, DeChano (2006) examined the relationship between high school students' environmental knowledge and attitude. Her study showed that although participants had a favourable attitude toward the environment, they had a low level of environmental knowledge. In a comparative study by Huang and Yore (2004), they reported that both Canadian and Taiwanese 5<sup>th</sup> grade students held positive behaviour and attitudes towards the environment. Moreover, they expressed a high emotional disposition toward the environment and high concern about environmental problems and issues as well as a moderate level of environmental knowledge. Makki, Abd-El-Khalick, and Boujaoude's (2003) study showed that Lebanese high school students held positive environmental attitudes but had inadequate environment knowledge.

As part of ROSE (The Relevance of Science Education) study<sup>†</sup>, Schreiner and Sjøberg (2005) examined how students relate to environmental challenges. They found that students did not seem to be pessimistic about the global future. They put trust in themselves that they personally could influence what happens with the environment. However, the study showed no significant gender differences regarding environmental issues. By using ROSE data, Uitti, Juuti, Lavonen, and Meisalo (2004) examined the Finnish students' environmental attitudes with respect to four factors, namely, positive attitudes towards environmental responsibility, negative attitudes towards environmental responsibility, nature-centric attitudes towards environmental values, and anthropocentric attitudes towards environmental values. While girls' attitudes towards environmental responsibility were found to be higher than those of boys, the girls' negative attitudes were reported to be lower than those of the boys. Jenkins and Pell's (2006) study with English students indicated statistically significant effect of gender on environmental attitudes and environmental concern.

Young students' environmental attitudes were also investigated by many Turkish researchers (e.g., Alp, Ertepinar, Tekkaya, & Yilmaz, 2007; Taskin, 2009; Tuncer, Ertepinar, Tekkaya &

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<sup>†</sup> This paper is based on data gathered in Turkey through the international ROSE Project (The Relevance of Science Education) which has about 40 participating countries. It was initiated by Svein Sjøberg and Camilla Schreiner at the University of Oslo and was supported by the Research Council of Norway. Reports and details are available at <http://www.ils.uio.no/english/rose/>

Sungur, 2005; Uzun & Saglam, 2005; 2007; Yilmaz, Boone & Andersen, 2004). In one of these studies, Yilmaz, Boone and Andersen (2004) reported that students attending elementary school had positive attitudes toward population growth and energy conservation. They found that young students in Turkey tended to agree with the importance of environmental education and the need for an emphasis on pollution, soil erosion, and prevention of habitat destruction. These students were not willing to give environmental protection precedence over economical growth and industrialization although they emphasized the importance of environmental issues. This study also indicated a significant gender difference in environmental attitudes in favour of girls. Later, Tuncer, Ertepinar, Tekkaya and Sungur (2005) revisited Turkish elementary and secondary school students' attitudes toward the environment by using a questionnaire including four dimensions, namely, awareness of environmental problems, national environmental problems, solutions to the problems and awareness of individual responsibility. Tuncer and others stated that respondents were not in a position to differentiate between economic growth, industrialization and environmental protection. Participants considered the importance of individual responsibility in protecting environmental degradation yet were unable to grasp the link between life-styles and environmental concern. In a separate study, Alp, Ertepinar, Tekkaya, and Yilmaz (2007) revealed a statistically significant effect of grade level on students' environmental knowledge and attitudes. The effect of gender on attitudes toward the environment was found to be statistically significant in favour of girls. More recently, Taskin (2009) demonstrated that high school students' attending public high schools, girls, lower and middle class students, students with well educated parents in white-collar professions, and those with liberal parents reported to have more pro-environmental attitudes compared to others.

Although environmental issues are of considerable interest to Turkish researchers, almost no study has been realized to find out the current status of Turkish students' attitudes towards environmental problems nationwide. The present study, therefore, aims to examine high school students' views on environmental challenges as surveyed in the ROSE questionnaire and to determine how these views change with respect to gender.

### **Research questions**

This study aims to explore ninth grade students' attitudes toward the environment and their interest in learning about environmental protection with respect to gender. This study therefore addresses the following research questions:

1. What are students' attitudes toward the environment?
2. What are the students' levels of interest in learning about environmental protection issues?
3. Is there any difference between mean scores for boys' and girls' on test items related to determining attitudes toward the environment?
4. Are there any differences between the mean scores of boys and girls on the interest in learning about environmental protection issues?

### **Method**

In this study, The Relevance of Science Education (ROSE) questionnaire<sup>‡</sup> was used to obtain data from students who have finished their compulsory schooling. ROSE questionnaire is a Likert-type scale and includes "What I want to learn about" "My future job", "Me and the environmental challenges", "My science classes", "My opinion about science and

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<sup>‡</sup> ROSE questionnaire is available at <http://www.ils.uio.no/english/rose/key-documents/key-docs/master-rose-q.doc>

technology", "My out-of-school experiences" and "Me as a scientist requires students" sections. In the present study, Turkish students' attitude scores were obtained from "Me and the environmental challenges" section "D" (18 items) and 9 items related to environmental protection from "What I want to learn about" section "E" of the ROSE questionnaire. These nine items were selected according to the classification of the ROSE items undertaken by Schreiner and Sjoberg (2004). It is expected that these parts of ROSE questionnaire will shed light on how young students relate to environmental issues and its protection. Students were asked to indicate their response by putting tick marks in the appropriate column ranging from disagree to agree, scoring from 1 to 4.

### **Sample**

The ROSE questionnaire was translated from English to Turkish by five researchers working in the fields of Science Education, Turkish language and English language. The Turkish version of the ROSE questionnaire was conducted in 63 high schools from 21 cities which are located at seven different geographic regions in the 2003-2004 teaching semester. The selection of cities in each region was designed according to the socio-economic structure of each city (low, moderate and high GDP rate). The questionnaires were sent to schools officially by the Educational Research and Development Centre (EARGED) of the Ministry of Education in the framework of an agreement between Dokuz Eylul University and the Ministry of Education. The resulting data set was not collected in different cities and all regions of Turkey. For that reason, the sample of the study does not fully represent the Turkish population. Therefore, the results cannot be totally generalized to the country population as a whole. On the other hand, there is a centralized national curriculum throughout the country which provides some degree of uniformity across schools in Turkey. Application of the questionnaires in the classroom took one-class hour. The sample of the study consists of 1260 students (680 girls and 580 boys) who were enrolled in the 9<sup>th</sup> grade.

### **Data Analyses**

In this study, data analyses were conducted both in regard to items and total scores. Descriptive statistics, agreement index, Chi-Square test and one-way multivariate analysis of variance (MANOVA) were used to analyse data.

### **Results**

Table 1 presents the percentages of the agreement, disagreement and agreement index related to statements of the "Me and the Environmental Challenges" section according to gender. Agreement index was calculated as percentage agreeing minus the percentage disagreeing. Gender differences were also examined by using Chi-Square test to present differences in each item.

As shown in the Table 1, both boys and girls expressed favourable attitudes in general towards the environment ( $\bar{X}=2.95$ ,  $SD= 0.29$  for girls and  $\bar{X}= 2.81$ ,  $SD=0.63$  for boys). Participants strongly agreed (above 80%) with different items such as finding solutions to environmental problems, caring more about protection of the environment and contributing to environmental protection personally. The highest disagreements (above 70%) were found in the items related to environmental threats, the exaggeration of environmental problems and hopes and visions for the future. Concerning gender difference, a statistically significant difference in favour of girls was found for most items. For example, more girls than boys agreed that "Environmental problems make the future of the world look bleak"; "I think each of us can make a significant contribution to environmental protection" and "People should care more about protection of the environment". Similarly, compared to boys, girls disagreed

with the statements that “Threats to the environment are not my business”; “Environmental problems are exaggerated” and “Environmental problems should be left to the experts”.

**Table 1. Descriptive Statistics of “Me and the environmental challenges”**

Items	Girls (N=680)			Boys (N=580)			Chi-Square Test
	Disagree	Agree	Agreement Index (%)	Disagree	Agree	Agreement Index (%)	
D1. Threats to the environment are not my business	79.1	19.7	<b>-59.4</b>	72.6	26.9	<b>-45.7</b>	0.001*
D2. Environmental problems make the future of the world look bleak	24.5	73.8	<b>49.3</b>	32.7	66.2	<b>33.5</b>	0.000*
D3. Environmental problems are exaggerated	78.4	19.9	<b>-58.5</b>	67.9	29.8	<b>-38.1</b>	0.000*
D4. Science and technology can solve all environmental problems	44.3	52.7	<b>8.4</b>	41.2	56	<b>14.8</b>	0.655
D5. I am willing to have environmental problems solved even if this means sacrificing many goods	17.5	80.9	<b>63.4</b>	26.2	70.7	<b>44.5</b>	0.000*
D6. I can personally influence what happens with the environment	42.7	53.8	<b>11.1</b>	43.8	52.2	<b>8.4</b>	0.535
D7. We can still find solutions to our environmental problems	13.3	85	<b>71.7</b>	21.6	76.2	<b>54.6</b>	0.000*
D8. People worry too much about environmental problems	56.5	41.1	<b>-15.4</b>	47.3	48.9	<b>1.6</b>	0.001*
D9. Environmental problems can be solved without big changes in our way of living	33.6	64	<b>30.4</b>	38.8	57	<b>18.2</b>	0.004*
D10. People should care more about protection of the environment	5.9	93.1	<b>87.2</b>	12.6	83.3	<b>70.7</b>	0.000*
D11. It is the responsibility of the rich countries to solve the environmental problems of the world	83.5	15	<b>-68.5</b>	68.2	28.9	<b>-39.3</b>	0.000*
D12. I think each of us can make a significant contribution to environmental protection	8.5	89.8	<b>81.3</b>	15.7	81	<b>65.3</b>	0.000*
D13. Environmental problems should be left to the experts	81.8	16.8	<b>-65</b>	67.6	29.3	<b>-38.3</b>	0.000*
D14. I am optimistic about the future	42	56.2	<b>14.2</b>	41.7	55	<b>13.3</b>	0.469
D15. Animals should have the same right to life as people	52.9	44	<b>-8.9</b>	51.5	45.6	<b>-5.9</b>	0.779
D16. It is right to use animals in medical experiments if this can save human lives	38.6	48.2	<b>9.6</b>	40.1	45.6	<b>5.5</b>	0.114
D17. Almost all human activity is sacrificed for the sake of environment	57.5	32.9	<b>-24.6</b>	53.6	39.7	<b>-13.9</b>	0.001*
D18. The natural world is sacred and should be left in peace	9.3	86.3	<b>77</b>	14	83.3	<b>69.3</b>	0.000*

\* p<0.05

As can be seen from Table 1, there was only one statement in which girls and boys expressed different belief. While girls did not agree with the statement that “People worry too much about environmental problems”, boys agreed with this statement.

Table 2 depicts students' mean scores and differences in environment-related items with respect to gender. Results show that students' interests in environmental protection based issues were at a moderate level ( $M=2.72$ ,  $SD=0.30$ ). Generally, boys were more likely to be interested in environmental protection issues than girls ( $M=2.77$ ,  $SD=0.30$  for girls and  $M=2.84$ ,  $SD=0.61$  for boys). Especially boys tended to learn about effective usage and new sources of energy and farming. Only in two topics do, girls had higher mean scores than boys. These topics included ensuring clean air and safe drinking water, and protecting endangered species of animals.

**Table 2.** Students’ Interests in Learning about Environmental Protection Items

Items	Girls		Boys		Chi-Square Test
	M	SD	M	SD	
E3. The ozone layer and how it may be affected by humans	2.95	1.054	2.96	1.033	0.803
E4. The greenhouse effect and how it may be changed by humans	2.31	1.047	2.53	1.055	0.000*
E5. What can be done to ensure clean air and safe drinking water	3.08	1.008	2.96	1.012	0.028*
E6. How technology helps us to handle waste, garbage and sewage	2.64	1.071	2.67	1.048	0.566
E16. How to protect endangered species of animals	3.14	.985	3.13	.966	0.833
E19. Organic and ecological farming without use of pesticides and artificial fertilizers	2.20	1.083	2.44	1.081	0.000*
E20. How energy can be saved or used in a more effective way	2.71	1.088	2.94	1.001	0.000*
E21. New sources of energy from the sun, wind, tides, waves, etc.	2.77	1.074	3.00	1.023	0.000*
E33. Benefits and possible hazards of modern methods of farming	2.10	1.058	2.48	1.089	0.000*

\* p<0.05

A summary of one-way MANOVA results comparing mean scores regarding gender with respect to the collective dependent variables, attitude and interest in learning environmental protection is displayed in Table 3.

**Table 3.** Follow-Up Pairwise Comparisons

Variables	Gender	N	F	p	$\eta^2$
MEC <sup>a</sup>	Girls	680	70.35	0.000*	0.05
	Boys	580			
WIWLAEP <sup>b</sup>	Girls	680	4.36	0.037*	0.003
	Boys	580			

\* Analysis was performed at a 0.05 significance level

a. Me and Environmental Challenges; b. What I Want to Learn About Environmental Protection

Statistically significant differences were found in both students’ mean scores of environmental attitudes and interest in learning environmental protection topics (Wilks’  $\Lambda=0.94$ ,  $F(2,1257)=39.04$ ,  $p=0.000$ , partial eta squared= .06). While boys’ interests in learning about environmental protection are higher than girls, girls’ attitudes toward environment are more positive than their counterparts. The magnitude of the differences in the interest mean scores was very small (partial eta squared= .01). Therefore, it should be interpreted with caution. However, effect size for the environmental attitudes mean score can be accepted as a moderate effect (partial eta squared= .05) (Cohen, 1988).

### Conclusions and Implications

The findings revealed that Turkish students generally have favourable attitudes and interest toward environmental issues. They seemed to be eager to find solutions to environmental problems and show optimistic trends about the future. When Turkish data on attitudes toward environmental issues were compared with the data obtained by the other countries, Turkey had common findings with countries such as Greece, Portugal, India and Spain. Although there are some similarities in the mean scores with other countries, there are significantly

differences with the developed countries such as Norway, Denmark, Sweden, Japan, Finland (Sjøberg, 2008).

As far as gender differences are concerned, the present study indicated a statistically significant gender difference with respect to attitudes toward the environment and interest in learning environmental protection. More specifically, while, girls tended to have more favourable attitudes toward the environment, boys appeared to express higher interests in learning environmental protection. The result related to attitudes toward the environment is in line with other studies reported in the literature (e.g., Huang & Yore, 2004; Tikka et al., 2000; Zelezny et al., 2000). Tikka et al. (2000), for example, these found that girls had more positive environmental attitudes and a sense of responsibility toward the environment. While boys were more likely to emphasize mastering nature and taking benefits from natural resources, girls had more emotional attitude toward nature. A similar result was also found in the studies conducted with different levels of Turkish samples (Tosunoglu 1993; Taskin, 2009; Tuncer et al. 2005; Tuncer et al., 2009; Yilmaz, Boone & Andersen, 2004). For instance, a research conducted by Tuncer et al. (2005) indicated that girls attending middle school showed more environmental concern than did boys. Alp et al.'s study (2006) indicated that compared to boys, girls had more favourable behavioural intentions, environmental friendly behaviours and affects. Available research suggested that orientation of environmental education in Turkey should consider students' attitudes toward the environment based on gender differences. The authors attributed students' positive attitudes toward the environment both to their willingness to preserve nature linked to a strong emotional bonding to animals and to their higher environmental sensitiveness.

One possible explanation for the different tendencies of boys and girls towards the environment was that girls have been traditionally responsible for looking after the home and children. Therefore, such behaviours could be perceived as a way of taking care of their offspring (Tikka et al., 2000). In fact, both socialization-based theories and structural theories proposed in the literature have been used to explain the gender difference in environmental variables. The findings of the current study could be explained by considering the propositions of both theories. Based on socialization theory, girls were directed towards a caregiver role which enabled them to become more nurturing, protective and cooperative compared to boys (see Blocker & Eckberg, 1997). As mentioned by Blocker and Eckberg, this type of 'motherhood mentality' promoted development of protective attitudes towards the environment. On the other side, boys were directed toward an economic provider role which encouraged them to become more rational, masterful and competitive compared to girls. This 'marketplace mentality' promoted the development of a lower level of attitudes that was related to economic growth, technical mastery of the earth and exploitation of resources. Apart from socialization-based theory, structural theory focused on the nature of the occupational and economic position that resulted in gender differences in environmental attitudes of girls and boys (Blocker & Eckberg, 1997). While boys were assigned to the breadwinner role and controlled the techno-scientific realm, girls kept their nurturance roles with the responsibility of housework and childcare. For that reason, boys held favourable orientations toward economic growth which resulted in lower levels of environmental concern. However, girls' nurturance role made them more likely than boys to favour health and safety issues and in turn enhance their environmental concerns (Blocker & Eckberg, 1997; Zelezny, Chua, & Aldrich, 2000).

Findings of the current study concerning students' interest in learning environmental protection supported this argument. Chi-squared analysis revealed that while boys were

interested in effective usage and new sources of energy and farming, girls were interested in ensuring clean air and safe drinking water, and harmful effect of loud sound and noise on hearing. In a similarly vein, Bord and O'Connor (1997) found that girls' concerns about environment was greater than that of boys when the risk to health and personal well being was related to environmental issues. According to Tikka et al. (2000, p.18) "the concern felt by women for nature and the environment could be seen as a way of taking care of their offspring, because a clean and safe environment was a precondition for welfare and survival".

Further studies, however are needed to clarify this result by using multiple methods and measures. Conducting qualitative studies in future research provides more comprehensive information about how students' environmental attitudes are formed and changed. Considering the fact that significant changes in attitudes may occur over a long period of time, longitudinal research is encouraged to investigate deeply an enhancement of Turkish students' environmental attitudes. Findings of the study can be used for the development and improvement of environmental educational programmes in Turkey. It is necessary to further develop positive attitudes of students, especially boys, because all will ultimately be responsible for making decisions about environmental issues and problems. For that reason, educational researchers in Turkey should focus on the disparities between boys and girls and find alternative ways to enhance the environmental attitudes and interest in learning environmental protection in both genders.

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