

**RELATIONSHIP BETWEEN PRIMARY SCHOOL STUDENTS'
ENVIRONMENTAL LITERACY AND SELECTED VARIABLES IN
BODRUM**

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ABSTRACT

RELATIONSHIP BETWEEN PRIMARY SCHOOL STUDENTS' ENVIRONMENTAL LITERACY AND SELECTED VARIABLES IN BODRUM

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The purpose of this thesis was to investigate environmental literacy of 6th, 7th and 8th grades primary school students in public schools of Bodrum, Turkey. The study was carried out during the spring semester of the 2006-2007 academic years. A total of 848 students enrolled in four public primary schools completed the 49-item Environmental Literacy Questionnaire (Kaplowitz & Levine, 2005).

The components of environmental literacy which are defined as knowledge, attitude, use and concern of students about environmental issues were examined by means of frequency distributions. Results displayed that although students had low levels of knowledge about the environment, they displayed positive attitudes and high levels of concern toward the environment. They were also aware of the importance of interaction between humans and the environment.

Relationships among the components of the ELQ (knowledge, attitudes, uses, and concerns) have been analyzed by means of zero order correlations. The strongest correlation found between 'attitude and use' and 'use and concern' variables among the components of the ELQ indicating that the students with positive attitude towards environmental issues have positive views on environmental uses and service and

students concerning about environmental problems have more positive views on environmental use and service.

Canonical correlation analysis was used to examine the relationship, if any, between the background characteristics of students and the set of environmental literacy variables in the questionnaire. The results showed that students who were interested in environmental issues, who gave importance to environmental problems, who thought they had good knowledge about environmental issues, whose parents' were interested in environmental issues and involved in environmental activities had better knowledge about environmental issues, more positive attitude towards environmental issues, more positive view on environmental uses and service and concern environmental problems.

In addition, the results of analysis by means of Multivariate Analysis of Variance (MANOVA) demonstrated that female students had more positive attitudes towards environmental issues, more positive views on environmental use and more concern about environmental problems than male students' had but same level of knowledge on environmental issues.

Keywords: Environmental education, environmental literacy, primary school students, sustainable development.

ÖZ

BODRUMDAKİ İLKÖĞRETİM OKULU ÖĞRENCİLERİNİN ÇEVRE OKURYAZARLIĞI VE SEÇİLMİŞ DEĞİŞKENLER ARASINDAKİ İLİŞKİSİ

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Bu çalışmanın amacı Bodrum'daki 6., 7. ve 8. sınıf ilköğretim öğrencilerinin çevre okur yazarlığını incelemektir. Çalışma 2006–2007 öğretim yılı ilkbahar döneminde uygulanmıştır. Toplamda dört devlet ilköğretim okulunda okumakta olan 848 öğrenci 49 maddelik çevre okuryazarlığı anketini doldurmuştur (Kaplowitz & Levine, 2005). Çalışmanın amacı için, Öğrencilerin çevre okuryazarlık boyutları (bilgi, tutum, kullanım ve ilgi) yüzdeler oranlarla sınanmıştır. Sonuçlara göre öğrencilerin çevre hakkındaki bilgi düzeylerinin zayıf olmasına rağmen, çevreye karşı olumlu tutum ve yüksek ilgileri olduğu bulunmuştur. Aynı zamanda, insan ve çevre etkileşimlerinin önemi konusunda farkındalıkları fazladır.

Pearson momentler çarpım korelasyonu analizi ile çevre okuryazarlığı boyutları (bilgi, tutum, kullanım, ilgi) arasındaki ilişki hesaplanmıştır. En büyük ilişkinin tutum-kullanım ve kullanım-ilgi arasında bulunması çevreye karşı olumlu tutumu olan öğrencilerin çevre kullanımı hakkında olumlu görüşe sahip olduklarını ve çevreye karşı ilgisi olan öğrencilerin çevre kullanımı konusunda daha olumlu görüşleri olduğu bulunmuştur.

Öğrencileri çevre okur yazarı yapabilecek etkenler ve çevre okuryazarlığı değişkenleri arasındaki ilişki Kanonik korelasyon analizleri ile hesaplanmıştır.

Sonuçların gösterdiğine göre, çevre konularına ilgili olan ve önem veren, çevre konusunda iyi bilgiye sahip olduğunu düşünen, ebeveynleri çevre konularında ilgili olan ve çevresel aktivitelere katılan öğrencilerin çevre konusunda daha iyi bilgiye, olumlu tutum ve görüşe ve ilgiye sahip oldukları bulunmuştur.

Ek olarak, tek yönlü MANOVA analizi kız ve erkek öğrencilerin aynı seviyede çevre bilgisine sahip olmalarına karşı, kız öğrencilerin çevreye karşı daha olumlu tutum, görüş ve ilgisi olduğu bulunmuştur.

Anahtar Kelimeler: Çevre eğitimi, çevre okuryazarlığı, ilköğretim okulu öğrencileri, sürdürülebilir kalkınma.

To my mother and father...

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CHAPTER 1

INTRODUCTION

Regardless of the country (developing or industrialized) or area (urban or rural) where we live, humans are all faced with environmental problems in different levels but affected by each other. It is well known that the key to these problems to a large extent lies in social, economic and cultural factors, which are at the roots of environmental problems. Therefore, it is not possible to prevent or solve these problems solely by technological means; we know that we have to act primarily on the values, attitudes and behavior of individuals and groups in respect of their environment (UNESCO-UNEP, 1987).

Fortunately, citizens of the today's global world increasingly became aware of the role of education for the solutions of environmental problems. More to say, lifelong education on the environment is a growing necessity (Coyle, 2005). However, so far, Environmental Education (EE) has not given enough importance as a part of learning among other subjects such as mathematics or science (DiEnno & Hilton, 2005). It is hard to find the basis of an education that EE contributes to promote an integral human development (Barraza et al., 2003). According to Roth (1996, p.4);

Environmental education is a process aimed at developing a citizenry that is aware of and concerned about the total environment and its associated problems, and which has the knowledge, attitudes, motivations, commitments and skills to work individually and collectively toward the solution of current problems, as well as the prevention of new ones.

In order to provide the necessary knowledge, understanding, values and skills for the participation of general public and many occupational groups in seeking solutions to environmental questions, integration of environmental education into the whole system of formal education at all levels is necessary (UNESCO, 1978).

As Hungerford et al. (1980) suggested, the goal of environmental education curricula should be based on four levels: While the first level should be focusing on knowledge about ecological concepts, the second level should help students to value the environment. Besides, the third level should give students the ability to explore and find solutions to environmental issues. Finally, the last level should lead students to gain skills needed to take action through environmental problems (As cited in Morrone et al., 2001).

Moreover, EE should be various in its delivery from region to region including ecological, social, political, economic, historical and cultural aspects, instead learners should be supported to find their own way while constructing their understanding about environmental issues which is based on their decisions about the context and the need for change (Barraza et al., 2003).

The basic aim of EE is to produce environmentally literate citizens (Chu et al., 2007). It is vitally important for the children of today to be environmentally literate since they will be the leaders in government and business or the professions in the health and education sector of the future. As a term, literacy is defined as the ability to read and write. Besides it has degrees ranging from the minimal ability for decoding signs on words to the ability to read and comprehend complex scientific journals (Moseley, 2000). Similarly, the development of Environmental Literacy (EL) has levels from simple to complex as it takes place over a life-time (Roth, 1996). According to Roth (1996, p.4), "*Environmental education is designed to foster and nurture growth of ENVIRONMENTAL LITERACY throughout human life span*". Moreover, the importance to improve environmental literacy from a young age is related to help children to develop appropriate knowledge and attitude about preserving the environment for the future (Chu et al., 2007). Although gaining knowledge about the environment may result in environmentally literate individuals, it may also have short effects with very little understanding (Coyle, 2005).

A strong form of EL involves taking actions with respect to the environment (Stables & Bishop, 2001). EL can lead to change in the way that environmental issues are conceived (Clair, 2003). Environmentally literate citizens should be able to engage in ecological issues at a high level (Stables and Bishop, 2001). In addition, environmentally literate citizens should combine knowledge with values, attitudes and skills which in turn leads to action (Morrone et al., 2001). Because, the environmental problems of the day will change over time, but the environmental literacy gained in schools will last a lifetime (Salmon, 2000).

Therefore, teaching about environmental issues and the preservation of the world's environment has become increasingly important across the globe because of ecological crisis and environmental deterioration (Ko & Lee, 2003). To ensure a healthy and sustainable environment for present and future generations it is very important to provide every citizen with awareness, knowledge and problem solving skills so as to allow them to make informed decisions and act responsibly concerning environmental issues (Yang, 2004).

In the public, on the other hand, a deeper and wider understanding of environmental sciences and related issues have a growing importance since most environmental issues which are caused by individuals are getting complex and difficult to manage (Coyle, 2005). EE seeks to empower people to understand, and take action on, environmental issues that has implications for the quality of life or the sustainability of the ecosystem (Stables & Bishop, 2001). Educating students about environmental issues has a big importance since human effect on the environment is increasing day by day. Children's perceptions, knowledge and understanding of the world are affected by environmental problems (Barraza & Cuaron, 2004). Present-day national or local environmental issues are most likely to enhance students' interest and lead to active participation in issue investigation-evaluation and environmental action since they are of immediate concern to them (Hsu, 2004).

Thus, the local residents should be aware of the value of the environment so that they can support to the improvement of their area. Although not many people in the public are prepared for the complex environmental issues and decisions of the future, the solutions of many environmental problems such as water quality or ecosystem management will depend on the efforts of individuals not only experts (Coyle, 2005).

As for the case in Turkey, in many countries systematic efforts are not being made to incorporate environmental concepts in any way to school curriculum, which is evident in the lack of investigations and studies undertaken on specific issues related to environmental education (Tuncer et al., 2005).

The formal science education curriculum in Turkey for grades 6–8 prepared by the Ministry of National Education has been changed recently based on the constructivist approach. The new curriculum is required students to gain the knowledge and understanding of the nature of and relationship between science and technology and also the interactions between and among science, technology, society and environment (STSE). The objectives related to STSE are highly emphasized with the examples of projects for the solution of environmental problems.

The new curriculum for grades 6-8 includes 4 main topics that are the “living organisms and life”, “matter and change”, “physical phenomena” and “earth and universe”. Since the education system in Turkey is centralized, in all public and private schools, students are taught these topics. Especially in the “living organisms and life”, most of the concepts are related to environmental issues. Students learn the special features, diversity, reproduction, growth, development and change of living organisms as well as their interaction between and among other organisms. Some examples of the concepts related to environmental issues for grades 6-8 are given in table 1.

Table 1. Concepts related to environmental issues for grades 6-8

Grade	Concept
6	Life-cycle of plants and animals
	Air-water and soil pollution
	Global warming
	Natural resources
7	Ecosystems
	Biodiversity
	Nuclear wastes
	Ozone depletion
8	Acid rain
	Recycling
	Water cycle
	Energy resources

As a developing country facing several serious environmental problems, the topics covered in the curriculum constitute a big importance in order to maintain the sustainable future of the residents. Furthermore, EE for local residents stressing the importance of natural, cultural and social resources leads them to seek for the ways to minimize the environmental degradation which in turn change their knowledge into economic gain from tourism (Pipinos & Fokiali, 2007). The concentration of large numbers of tourists in certain areas of the world in the last few decades, associated with interventions in the natural environment undertaken to serve the needs of mass tourism and negative environmental impacts on multiple levels and the quality of tourist resorts' environment, affects the number of tourists visiting and expansion of that area which also makes it popular (Pipinos & Fokiali, 2007).

Bodrum as a popular touristic place of Turkey has thousands of visitors every year and is a very good example for detecting the impacts of mass tourism on the environmental destruction.

Thus, in line with the above information about the need for the EE for enhancing environmental knowledge and awareness of especially young people and taking the development and current content of the related studies both in international and national content, this study aimed to assess primary school students' EL by 4 components; knowledge, attitudes, uses and concerns about the environment, in Bodrum which is one of the most popular touristic place for many people around the world. An attempt is made through this study to investigate environmental literacy of 6th, 7th and 8th grade students in the public schools of Bodrum presuming to facilitate planning efforts of the future EE programs and projects for the improvement of students' environmental literacy and thus sustainable development of this region in touristic, economic and social manners.

1.1 Purpose of the Study

The overall purpose of this thesis is to investigate environmental literacy of 6th, 7th and 8th grades students in public schools of Bodrum. One of the purposes is to examine the components of environmental literacy which are defined as knowledge, attitude, use and concern of students about environmental issues. Another purpose is to determine the relationships between students' environmental literacy components (knowledge, attitude, use and concern) and their background characteristics which are self-assessment of their interest in environmental problems (perception of interest), their views on the importance of environmental problems (perception of importance), their self evaluation of their environmental knowledge (perception of knowledge), their involvement in outdoor activities (activities), perception of their parents' interest in environmental problems (parents' interest) and their perception of their parents' involvement in environmental activities (parents' involvement).

In addition, this study investigates the differences between the female and male students' knowledge, attitude, use and concern on environmental issues.

1.2 Research Questions

For solving the problem defined above, the following specific research questions were examined:

1. What is the environmental literacy level of the 6th, 7th and 8th grade students?
2. What are the relationships, if any, across and between environmental literacy components such as environmental knowledge, attitudes, uses, and concerns?
3. What is the relationship, if any, between students' backgrounds and their environmental literacy?
4. What is the effect, if any, of gender on the environmental literacy of 6th, 7th and 8th grade students?

CHAPTER 2

LITERATURE REVIEW

Since the purpose of this study is to assess environmental literacy of students in terms of knowledge, attitudes, uses and concerns about the environment, the definitions, historical changes, declarations and the relevant studies realized so far about EE and EL both in international and national content can help the reader to gain more insight to this study. The review of the literature therefore, will present a detailed look at the relevant literature related to environmental education and environmental literacy in the following sections:

1. Development of Environmental Education
2. Research Studies on Environmental Education
3. Development of Environmental Literacy
4. Research Studies on Environmental Literacy
5. Development of and Research Studies on EE and EL in Turkey

2.1 Development of Environmental Education

Through the years there has been different goals defined for environmental education (EE). Concerns about environmental degradation and decreasing quality of life that were expressed by scientists in the 1960s led to environmental education (EE) as a formal education movement (Gough, 2002). As Disinger (1983) explained, environmental education in the 1960's included nature study, conservation education, outdoor education and environmental movement have provided it with varied and divergent perspectives and philosophical foundations (Lee & Williams, 2001). The explicit aims of environmental education are concerned with:

- *stimulating a sense of individual responsibility for the physical and aesthetic quality of the total environment based on a knowledge of general ecological principals,*

- *an understanding of the impact of human society on the biosphere,*
- *an awareness of the problems inherent in the environmental change in its early formulations (Gough, 2002).*

Indeed, Gough (1997, 2002) stated that environmental education initially entered school curricula in the early 1970s through science education attempting to answer the question “*What is environmental education?*” (Lee & Williams, 2001). During 1970s the goals and objectives for environmental education changed to emphasize more explicitly values and attitudes clarification, decision-making skills, and an action component (Tuncer et al., 2005). The reports from conferences such as the Belgrade workshop (UNESCO-UNEP, 1975) and the Tbilisi conference (UNESCO, 1978) recognized that the traditional formulations of the academic disciplines are individually inadequate for achieving the aims of environmental education and proposed an interdisciplinary approach rather than a new or separate subject (Gough, 2002).

In the 1980s the Chernobyl explosion which is resulted in death, injury and disease as well as harm to the environment, drew international attention and the societies became more concerned about the relationship between localized environmental problems and public health (Weaver, 2002). Thus, as also stated by Lee & Williams (2001), in the 1980’s Lucas (1980/81) popularized the distinction between education *about*, *in* and *for* the environment. As stated by Lucas, education *about* the environment provides cognitive understanding, including the development of skills to obtain this understanding (Lee & Williams, 2001). Education *in* the environment is the use of real-life situations as a basis for inquiry learning (Ko & Lee, 2003). Education *for* the environment, as Robottom (1987) argues, promotes well-being as its goal (Ko & Lee, 2003). While there are different approaches supporting the use of education about, in and for the education, some educationalists argue that environmental education should adopt an integration of all (Lee & Williams, 2001). As Sterling (1990) and Tilbury (1995) suggested such a holistic approach should take into account the followings: (Lee & Williams, 2001, p.223).

- (1) Environmental education is not a subject in itself but rather a function of education that is drawn from across the whole of the school curriculum.*
- (2) Investigation of environmental issues should range from local, regional, national to global scales.*
- (3) Integration of education about, in, for the environment is required. Environmental education should encompass the whole development of environmental awareness, knowledge, values, responsibility and action. Socially critical skills should also be cultivated to empower the students.*

The aim of environmental education is seen as vital for learners to explore and develop positive attitudes and values about the world in which they live and to gain the necessary skills to enable them to be confident to take action for their communities and environment, as well as learning facts (McNaughton, 2004). Also, the critical objectives developed at the Tbilisi Intergovernmental Conference on Environmental Education in 1977 were awareness, sensitivity, attitudes, skills and participation (Knapp, 2000).

The first Intergovernmental Conference on Environmental Education was organized by UNESCO in co-operation with the United Nations Environment Programme (UNEP) in Tbilisi, from 14 to 26 October 1977 (UNESCO, 1978). As it was stated in “The United Nations Conference on the Human Environment” in Stockholm (UNEP, 1972), the Tbilisi Conference also stated that environmental education should be provided to people of all ages, all levels of academic aptitude and must be delivered in both formal and non-formal environments (Wright, 2002). Moreover, the declaration promoted environmental teaching, research, and training, as well as technical and vocational education and recognized the interdisciplinary nature of environmental education (Calder & Clugston, 2003). Also, an international and holistic approach was taken for the environment within higher education institutions by recognizing the requirements of faculty, students and staff (Wright, 2002).

According to the guiding principles developed for EE in the Tbilisi Conference (UNESCO, 1978); all of the aspects of the environment such as natural and built, technological and social in plans for development and growth should be a part of it.

Also it should be a continuous process that begins at pre-school and goes on through life with the help of formal and non-formal education. Moreover, while being interdisciplinary in its approach, it should help students to gain a different perspective about local, national, regional and international environmental issues taking into account the historical perspective. Furthermore, EE should emphasize the importance of local, national and international co-operation toward the prevention and solution of environmental problems while enabling learners to discover the reasons and causes of those problems. Additionally, as well as sensitivity, knowledge, and values clarification, EE should foster the critical thinking and problem-solving skills at every age. Finally, EE should help the learners to create their own learning experiences with diverse learning environments so that they are provided with the opportunity to learn about and from the environment. As a result they can make decisions and accept their consequences with practical activities and hands-on experience.

In the conference the goals of EE are stated as follows:

- (a) to foster clear awareness of, and concern about, economic, social, political and ecological interdependence in urban and rural areas;*
- (b) to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment;*
- (c) to create new patterns of behavior of individuals, groups and society as a whole towards the environment. (UNESCO, 1978, p. 26)*

Another conference on the environment that was called “The International Conference on Environment and Society: Education and Public Awareness for Sustainability”, organized by UNESCO and the Government of Greece, in Thessaloniki, Greece, in 1997, brought together representatives from United Nations (UN) system, governments, non-governmental organizations (NGOs), experts, and other interested parties to celebrate the 20th anniversary of the Tbilisi Doctrine and to reorient education for sustainability in the 21st century (Knapp, 2000).

The declaration recognized that sustainability initiatives must take place at all levels of society and must be interdisciplinary in nature and poverty, population, food security, democracy, human rights, peace and health and a respect for traditional cultural and ecological knowledge must link with the concept of sustainability (Wright, 2002).

As a result, it can be inferred that EE aims to produce environmentally literate citizens who are creative and responsible (NAAEE, 1996). For this aim, it should be multidimensional and these dimensions should include the social and natural aspects of the human environment (UNESCO-UNEP, 1987). Besides, the interdisciplinary approach of the EE takes into account the “complexity of the environmental problems” and the “multiplicity of factors accounting for them” thus, EE should be developed for all categories of the population both in- and out-of-school (UNESCO-UNEP, 1987). All members of the society, “different age groups and socio-occupational categories”, should have a role according to their abilities in the improvement of relationships with their environment so that EE can be effective. Besides, different socio-economic and cultural contexts and living conditions as well as regional and national differences should be taken into account for the adaptation of EE (UNESCO-UNEP, 1987).

2.2 Research Studies on Environmental Education

There has been a great focus of attention on environmental education (EE) research (Lee & Williams, 2001). There is not a precise relationship between and among attitudes/values, knowledge and environmental activity. However, most studies found that the attitudes, knowledge, beliefs/values and activity levels of students on the environment are all depended on each other. This section is a summary of research studies on EE with chronological order.

The study of Fortner (1978) investigated the knowledge and attitudes of 787 tenth grade students about marine issues (as cited in Hoody, 1995, p.6). The researcher used three types of surveys covering 63 items. The result of the study demonstrated that students' *knowledge level* of marine issues was fifty percent (%50) and also they had positive *attitudes* toward marine issues.

Eagles and Demare (1999) made a research with 72 sixth-grade students at Wilmot Senior Public School in the Waterloo County Board of Education who took part in the Sunship Earth camp program. The students were given the pretest survey 1 week before their participation in the camp program and a posttest was given in the week after their return from the camp. The survey consisted of 8 personal information questions and 30 environmental attitude (ecologicistic attitudes, moralistic attitudes) questions. It was found that talking about the environment at home, watching nature films, and reading about the environment correlated with ecologist and moralistic *attitudes* toward the environment. Although girls showed higher moralistic attitude scores, there were no *gender differences* in ecologicistic attitude. Moreover, no measurable differences in ecologist or moralistic attitudes were observed after a week-long Sunship Earth program at a residential camp. Results indicated that family, media and previous school-based environmental education programs influenced the students' moderate levels of these attitudes.

Similarly, Kruse and Card (2004) investigated the effects of a camp program on 383 (between ages of 10 to 18 years) students' knowledge, attitude and behavior. According to the results, the camp program affected the *knowledge, attitude and behavior* of the students.

Another study done by Palmnerg and Kuru (2000) investigated the students' *self-confidence and action skills, relationship to the natural the environment, knowledge of and values in the protection of nature, and environmentally responsible actions and action skills*. A total of 36, 11–12 years old students were selected based on their experiences with outdoor education and outdoor life conducted in school in Rovaniemi and Vaasa, Finland.

The research included questionnaires, individual interviews, drawings, photographs of landscapes and participant observations during camps. The comparisons between students with and without outdoor education experience revealed that, experiences in nature developed pupils' self-confidence and feelings of safety, which in turn increased their willingness to participate in future outdoor activities. Besides, the experienced pupils seemed to have a strong and clearly definable empathetic relationship to nature and they exhibited better social behavior and higher moral judgments. Furthermore, the experienced pupils expressed their feelings towards other people and organisms. In general, the students' knowledge of the problems is on the current topics that they can mention but not explain them or something not concerning them. On the other hand, they easily worry about the things that they do not fully understand or things they do not have any action strategies. In addition, the results indicated that primary school students had difficulties in thinking of some actions to help nature.

In addition, Tikka, Kuitunen and Tynys (2000) investigated the effects of educational background on students' *attitudes, activity levels and knowledge* concerning the environment. 464 students from a variety of educational establishments in the county of Central Finland were surveyed. The survey consisted of 87 questions that assessed students' involvement in nature and environment related activities, their knowledge of environmental issues, and their attitudes toward nature and environment. Also, the effects of respondent's *age, gender, hometown or municipality, home county, and professions of their parents* on students' attitudes, activity levels and knowledge concerning the environment were investigated in the survey. The results indicated that there were differences among students according to their backgrounds and gender. It was evident in the study that, the educational background affected attitudes, activity levels and knowledge concerning the environment. Furthermore, the study showed that, attitudes, quantity of nature related activities and knowledge about environment or nature-related issues had a correlation with each other.

Of the different educational groups studied, students majoring in biology had the most positive attitudes toward the environment and the greatest levels of knowledge and also they participated in many nature-related activities. However, students of subjects related to technology and economics had more negative attitudes toward the environment and in general; they had fewer nature-related hobbies than the other students. Despite the fact that, students coming from the metropolitan area in southern Finland had the most positive attitudes toward environment, the students coming from farming families were the most active. Besides, the older the students were the more active and aware of biological and environmental facts. Although no gender-related differences were found in the total activity, female students were tended to be more responsible toward the environment than male students. On the other hand, male students gained higher scores for knowledge than female students.

Furthermore, Weaver (2002) compared the effects of background characteristics, religious orientation, political value orientation, and knowledge on pro-environmental attitudes —about both the consequences of human actions toward the environment and the consequences of environmental problems on human health— across the United States, Great Britain, West Germany, Russia, and Japan. The results of the study indicated that both level of environmental knowledge and level of scientific knowledge are significant predictors of pro-environmental attitudes, regardless of region. Additionally, gender, age, and employment status were found to affect pro-environmental attitudes among all the countries examined, with some variation in significance and direction of influence.

Moreover, Dimopoulos and Pantis (2003) measured knowledge and aspects of *attitudes (knowledge, issue concern, locus of control, and verbal commitment)* of 332, 5th and 6th grade students regarding sea turtle conservation on Zakynthos, Greece. A 32-item survey instrument was used. The results indicated low knowledge scores, but high score levels for attitudes. Overall, a significant positive correlation between knowledge and attitudes was demonstrated.

There was no significant correlation between *gender, father's occupation, and geographic setting of the school* and any of the four subscales. However, knowledge, issue concern, and locus of control were positively correlated with *grade*.

In 2004, Littledyke investigated the understanding and views of 138 primary school students (years 1 to 6) on science and environmental issues. Although most of the students were found to have limitations in their understanding of the environmental issues, they were highly interested and concerned about environmental issues. Also, few of them were aware of the impact of science on society or the environment. Furthermore, older students displayed more understanding on the global concepts than the younger ones.

In another study done by Barney et al. 2005, the knowledge, attitudes and behaviors of elementary, secondary and college-age students concerning dolphins were explored. It was found as a result that the environmentally friendly behavior of the students toward dolphins was related to their knowledge and attitudes. Besides, the highest scores for the knowledge, attitude and behavior dimensions were associated with the college-age students as opposed to the elementary school students who had the lowest scores.

Kaplowitz and Levine (2005) examined the environmental knowledge level of Michigan State University (MSU) students mostly aged between 18 and 24 (undergraduate, graduate and professional) and a national sample of 2000 adults in the United States. They also examined the variation of environmental knowledge levels of the students within different majors. In the academic year 2001-2002 19,890 students completed the MSU-WATER survey by either email or by US mail which is contained 10 brief sections of questions including 12 environmental knowledge questions with a total of 56 items. Other than the first item that asks students to rate their own level of knowledge about environmental issues and problems, the remaining 11 items asked about specific questions about the environment. Students' responses on the self-evaluation of the environmental knowledge item indicated that most of the students (41.5%) reported that they have "only a little" knowledge.

Besides, while 39.7% of the students reported that they have “a fair amount” of environmental knowledge, only 8.2% of them reported having practically no environmental knowledge. Among the remaining 11 environmental knowledge items, 74% of them received correct responses. The highest percentages of the correct responses received were about household hazardous wastes (82.8%) and biodiversity (86.4%). On the other hand, the items that students responded incorrectly with the lowest scores concerned electricity generation (55.8%) and non-point source pollution (43.5%). Furthermore, differences were found between the students’ environmental knowledge and their college of major study. The students in the Colleges of “Osteopathic Medicine”, “Human Medicine” and “Agriculture and Natural Resources” were the highest scored ones. However, the College of Education students displayed relatively low level of environmental knowledge among MSU students.

In addition, the environmental knowledge levels of MSU students and the sample of adult Americans compared. The results showed that students at MSU are more knowledgeable about environmental issues and problems than the national sample of adult Americans. Indeed, MSU students gave more correct responses than the national sample on 10 items (out of 11).

Moreover, Jenkins and Pell (2006) investigated students’ attitudes towards environment. The questionnaire-based Relevance of Science Education (ROSE), a project carried out in England in the latter half of 2003 as part of a wider international comparative study in the University of Oslo. Of the 1,277 students who completed questionnaire 1180 of those were 14 or 15 years old, and 86 were aged 16, 10 were 13 years old, and one was aged 17. There was a significant difference between boys and girls in attitudes towards the environment and students seem to be willing to make to address environmental concerns.

DeChano (2006) investigated the relationship between *environmental knowledge* and *attitudes* of 229 students in their final year of secondary school (17–19 years) in Chile, England, Switzerland and the United States. The questionnaire was administered via the World Wide Web.

The first section of the instrument consisted of standard demographic information, such as the respondent's city and country of residence, age, gender and political orientation. The second section included 12 of the 20 broad-based environmental knowledge questions from the 1997 survey administered by NEETF and the Roper Group that assessed basic environmental literacy and the remaining 8 questions were designed by the researcher. Results revealed that none of the groups demonstrated a statistically significant relationship between knowledge about the environment and positive attitude towards the environment. It was indicated that, the students are not well prepared in their basic knowledge about the environment. While Swiss students achieved the highest scores, Chile students attained the lowest scores on the knowledge base section of the survey. On the other hand, students demonstrated a positive attitude toward the environment.

Finally, in the study of Pipinos and Fokiali (2007) on the attitudes and perceptions of the local residents of the region of Northern Karpathos, Greece, it was found that the participants have high levels of awareness and positive attitude toward the conservation of the natural and cultural environment of their area. Considering the level of education, there was no difference in the attitudes of people with the primary and secondary education levels. However, the ones who received an education up to tertiary level showed more positive attitudes than the others. Furthermore, there was no significant difference between the views of females and males both being highly sensitive in environmental issues.

The details of the research studies mentioned above are reflecting the way that EE goes through within years. Based on the literature review, most of the research studies related to EE are focused on the attitudes, knowledge, beliefs/values and activity levels of students.

Moreover, students' background characteristics such as their age, gender, hometown or municipality and professions of their parents were investigated in many research studies. Even though there are some attempts for research on EE in developing countries, most of the studies were done in developed countries such as the US or England.

2.3 Development of Environmental Literacy

As a result of the work of Charles E. Roth (1968), the definition of the term EL have emerged in the late 1960s (Clair, 2003) and a variety of definitions have been made over 30 years. In order to use in goal and objective planning and assessment of programs to promote environmental literacy, educators in the field of environmental education made attempts for the clarification and definition of the term environmental literacy (Moseley, 2000). EL is defined as a multi-dimensional guideline by leading environmental educators (Hoody, 1995). As it is theorized by many education experts, EL has many dimensions rather than just knowledge about environmental issues (Morrone et al., 2001). The stages of accomplishment in developing environmental literacy are depended on four components which are awareness, concern, understanding and action (Moseley, 2000) Environmental Assessment Consortium (ELAC) developed Environmental Literacy Framework in which the dimensions of EE are cognitive and affective. The cognitive dimensions include knowledge and skills while affective dimensions include the responsible behavior and involvement through environment (Hoody, 1995). These dimensions are dependent on each other to create environmentally literate citizens.

The key role of educators to build environmental literacy is to show learners why they should care about the environment because people tend to learn about and act upon the issues that they care about (Clair, 2003). In order to create more widespread environmental literacy, development of environmental education programs should be in a way that makes a real change that gives the learner a sense of ownership, skills and hands-on experience (Coyle, 2005). Conventional

educational approach characterized by passive learning, competition and individualistic goals do not support children to develop positive beliefs about the change they can make for environmental problems (Devine-Wright, 2004). “Environmental literacy is a resource for linking experience to action”, thus the development of programs and materials should be based on the learners’ experiences (Clair, 2003).

Although different definitions of EL stress the importance of environmentally- based actions, most of the assessments for levels of EL appear to measure content instead of action (Hoody, 1995). A variety of environmental educational materials and strategies such as field trips, storybooks and television programmes about the environment should be developed in order to improve environmental literacy of students (Chu et al., 2007). It can not be assumed that several years of formal education is guaranteed for students to gain all the knowledge and skills needed for environmental literacy (Hsu, 2004). Even though schools have a key role, all parts of the society have a great role for the development of el (Roth, 1996). For instance, parents should be a part of environmental education programmes in schools since environmental literacy of students is affected by parent’s behavior and thinking about the environment (Chu et al., 2007).

Besides, the study of Chu et al. (2007) found that Korean childrens’ environmental literacy is affected by their culture, social characteristics and the school curriculum. Since EL is affected by different variables in different countries, EE for advanced countries should differ from the developing countries (Chu et al., 2007) “In many places, real environmental literacy could boost the capacity of local governments to maintain healthy and economically viable living conditions”(Coyle, 2005, p.49).

To sum up, maintenance of the environmental literacy people gained through school should be provided by non-formal EE so that it becomes a part of life-long learning (Hsu, 2004). For the knowledge aspect of the environment, environmental education

should promote understanding of specialists, non-specialists, children and adults, both in and out of the formal education system about the role of the various biological, physical and socio-economic factors. It should also help to promote attitudes which lead individuals to play a positive role in improving the quality of the environment (UNESCO, 1978).

2.4 Research Studies on Environmental Literacy

Culen and Mony (2003) made a study to obtain data on *the level of environmental literacy* of students aged 11-17 among Florida who enrolled in nonformal *environmental education activities* and who did not. The Middle School Environmental Literacy Instrument (MSELI) which was developed by Hungerford, Ramsey, Volk, and Bluhm in 1993 was used in the study. For the initial part, 170 youth in 11 Florida countries were surveyed. As a follow-up study, 66 youth were surveyed in 2001-2002. The results from the 1998 study indicated that the participant who enrolled in environmental education activities scored higher on all sections of the survey than those who did not. The comparison of 1998 and 2001-2002 study revealed that for most predictors of *responsible environmental behavior*, the differences between groups were greater in the 2001-2002 study than those reported in 1998 study as a result of the curricula used or teaching methods employed since 1998. However, both studies did not show any difference between the level of responsible environmental behavior of the environmental education group and the control group. Additionally, the difference between the groups on the *ecological concepts* variable decreased marginally in the 2001-2002 study from the 1998 study. Also, the study showed that other variables such as; *environmental issue awareness, knowledge and skill in the use of environmental action strategies and evaluation of environmental issues* did not increase. As a result of the study, the authors assumed that the environmental education curricular materials were designed to address basic science/ecological knowledge with little attention given to environmental issues or the skills thought to promote responsible citizenship action.

Another study in 2004 was designed by Barraza and Cuaron amongst 246 students aged 7-9 years from five mixed primary schools in Mexico and three in England. In the study, two methods were designed to evaluate whether Mexican and English children were familiar with environmental terms and to what extent they understood them. In the first part, children were asked about their *familiarity* with environmental concepts (habitat, pollution, recycling, global warming, deforestation, solar energy, endangered species, extinction, nuclear power station and ozone layer) and they were asked about the *source of their knowledge*. In the second part, a multiple choice test was used to assess the *understanding of environmental concepts* of children. The study showed that there was a strong correlation between children's familiarity with the words and their understanding. Children who were familiar with more of the terms tended to know the meaning of more. In addition, the level of understanding was lower than the level of familiarity. In general, the study revealed that children of this age have a low to moderate level of *environmental literacy*. Only 16.2% of the children had heard all the terms, and just 4.4% knew the meaning of all of them. Furthermore, '*school*' (*teacher*) and *television* were the most frequent choices made by children when asked to select how they had heard these terms (29.8% and 29.4%, respectively). *Parents* were third (25.6%); and *books* were only mentioned in 15.6% of the answers. A very small proportion of the responses (0.4%) referred to other sources, mainly *science clubs and shops*.

Also, in his study Hsu (2004) assessed the effects of an environmental education (EE) course on college students' responsible environmental behavior (REB) and associated environmental literacy variables (locus of control, environmental responsibility, intention to act, perceived knowledge of environmental issues, and perceived knowledge of and skills in using environmental action strategies). Of the 121 students participated in the study who were predominantly junior- and senior-level tourism majors, 64 students received EE instruction for 16 weeks and 57 students received the control instruction (i.e., research methods) during the same semester.

The results of the study showed that the course significantly promoted the students' responsible environmental behavior, locus of control, environmental responsibility, intention to act, perceived knowledge of environmental issues, and perceived knowledge of and skills in using environmental action strategies.

Shepardson (2005) investigated students' *ideas about environment* and how these ideas change across grade level and educational experience. A total of 81 junior–senior high school students; 18 seventh graders, 20 eighth graders, and 24 ninth graders from general biology, and 19 ninth graders from college preparatory biology who came from four randomly selected, intact classrooms in a rural, agricultural community in Indiana were sampled. The environments task was designed in which students were asked to draw a picture of an environment and to explain their drawing in the first part and in the second part they were shown a series of photographs and asked to indicate whether the photograph depicted an environment and to explain their response. The results of the study revealed that students' mental models about the environment differed but most of them placed the humans apart from the environment. In general, students understood an environment from a limited ecological perspective; that is, an environment is a location where animals live and/or an area that supports animal life not a natural landscape; human-managed or built landscapes. 88% of all drawings reflected a forest or tree environment that reflects the students' first thoughts about what constitutes an environment center on a terrestrial environment. Also humans were not common in the students' drawings. Only 11% of students in seventh grade, 5% of students in eighth grade, 13% of students in general biology, and 5% of students in college preparatory biology drew humans in the environment. It has shown that, for these students, humans did not appear to be apart of an environment but are separate from it. Moreover, students did not refer to pollution or polluted environments. Additionally, students' ideas were consistent with their ideas expressed in the draw and explain portion of the task. As a result of the study the authors indicated that, the students did not possess the knowledge necessary to be *environmentally literate* as described by the NAAEE (1999) guidelines for excellence instead, they see the environment as providing the resources for living things.

Chu et al. (2007) investigated environmental literacy levels and the variables that affect environmental literacy of third-grade elementary school students aged 8–9 years in Seoul and the Kyunggi-do region in Korea. The Environment Literacy Instrument for Korean Children (ELIKC) was developed and administered to 969 students, of whom 475 students were from large cities, 400 were from medium-sized cities and 94 were from rural areas. The survey consisted of 69 items in four scales which are *environmental knowledge, environmental attitude, skills to solve environmental problems, and behaviors to solve environmental problems*. Moreover, 13 demographic variables which include *gender, the source of environmental information, the main solver of an environmental problem, residential area, mother's and father's educational background, favourite subjects in school, environmental education before schooling, and the role of technology and science in solving environmental problems, and cognition of science* were investigated. Analysis of the questionnaire of *environmental knowledge* indicates that young children lack knowledge concerning several aspects about the environment, such as the interrelationship among creatures and between plants and animals, energy sources of plants and humans or animals, food chains, and the roles of unattractive animals. Also, young children are not well informed about environmental issues, such as endangered animals, wild animals, and other topical environmental issues affecting society. However, they are relatively familiar with issues of environmental pollution such as air pollution and water pollution, which have been introduced in their integrated curriculum.

Analysis of the *environmental attitude and behavior* categories indicates that young Korean children are not yet very responsive to environmental issues. Regarding environmental attitude, the children generally gave positive answers to all items except for one item relating to their internal locus of control that referred to children's views about the relative importance of human beings and animals.

For environmental behavior, children displayed negative responses about persuading their parents not to buy fur coats because children generally have less opportunity to persuade their parents. There was a lower rate of positive answers about persuading family and friends not to harm wild animals because children rarely meet wild animals in everyday life. Also, children showed a lower rate of positive answers for active participation in environmental issues.

In the research, a broad range of *skills* was not considered because of the students' age. Only a simple strategy of problem-solving was used, which required students to identify and define problems that were associated with specific stories. Based on analyzing the skills category in this research, children showed good skills except when they did not consider the given story.

Considering the demographic variables all categories of environmental literacy are affected by *gender differences, parents' educational background, and source of environmental information*. Girls, students whose parents have higher educational background, and students who obtained environmental information from field trips, books, or newspapers all displayed higher environmental literacy. Also, *environmental education before schooling* had an influence on attitude, skill, and behavior, but not for knowledge. Additionally, results of the survey indicated that, the correlation between attitude and behavior is the strongest while that between knowledge and behavior is the weakest. Also, correlations were weak between knowledge and attitude and between environmental skills and attitude. Despite of the correlation between skill and behavior, all the correlations for the other pair of scales of the environmental literacy measures were statistically significant and positive.

2.4.1 Factors affecting Environmental literacy

Even though people learn the subjects that matter to them outside school which takes over 90% of their lifetime, students are not challenged to build environmental literacy and not getting enough EE in school to become community-minded or to

develop respect and responsibility toward the people and places around them (Coyle, 2005). During the lifetime, as well as school, the media, personal reading, family members and friends, outdoor activities, entertainment outlets, and personal experiences will help an individual accumulate environmental knowledge (Coyle, 2005).

The way how children learn environmental concepts is affected by the educational system and pedagogical approach as well as culture (Barraza & Cuaron, 2004). Although there are many goals of EE, the integration of environmental education into school curriculum has been a major goal of EE community (Yang, 2004). Enhancing of environmental awareness of students is dependent on schools (Barraza & Cuaron, 2004).

An effective EE program that influences attitudes should be a part of holistic EE curricula which will continue over many years (Eagles & Demare, 1999) Besides, environmental policies of the schools should be considered for promoting environmental knowledge and awareness in the school population because children seem more capable of understanding the environmental concepts when the schools have a strong orientation towards the environment (Barraza & Cuaron, 2004).

Various efforts have been made to promote environmental education in many countries such as the incorporation of EE into primary and secondary school curricula and the development of EE at the university and post-graduate levels with the pre- and in-service training of educators (UNESCO, 1978).

In the Tbilisi Conference (1977) it is suggested for environmental sciences and EE to be a part of curricula for pre-service teaching. Moreover, it is suggested that “the implementation and development of in-service training, including practical training, in environmental education be made in close co-operation with professional organizations of teachers, both at the international and national levels and also it should take into account the characteristics of the area where teachers work” (p.35-36).

Well-developed strategies and curricula, texts, learning facilities, natural areas, field experts, and non-formal institutions should be a part of EE so that students receive an adequate base of environmental knowledge (Coyle, 2005). In the Tbilisi Conference (1977) it is recommended for formal and non-formal environmental education to:

- *promote deeper understanding of the natural aspects of the environment;*
- *develop a systems approach to the analysis and management of natural and human ecosystems;*
- *take into consideration the temporal (past, present and future) dimension of each environment (p. 29).*

Furthermore, different strategies are important for students to show positive attitudes and for their feelings while engaging in and acquiring new knowledge about the environment (DiEnno & Hilton, 2005). Children should be provided by creative and interesting teaching in order to develop the knowledge, skills, values and attitudes toward environment (Barraza & Cuaron, 2004).

The study of Österlind (2005) showed that pupils have difficulty in understanding specific concepts or facts such as the ozone depletion or greenhouse effect which seems as a result of poor teaching. Thus, the role of teachers and their education in the environmental education should be investigated (Kaplowitz & Levine, 2005).

The study of May (2000) identified the elements that contribute most to effective environmental education by interviewing with 18 experienced environmental educators from 11 states. Then the author developed elements-of-success framework in environmental education consisting of 42 elements arranged in three categories: *teaching conditions*, *teacher competencies* and *teaching practices*. The elements of teaching conditions include varied forms of support, resources, flexibility and climate. The elements of teacher competencies include breadth and depth of knowledge and skills. The practices category consists of elements that describe the ways effective environmental educators apply their competencies in context.

As a result of the study these three elements were found to act synergistically to make effective environmental education possible.

Another study done by Ko and Lee (2003) investigated the factors affecting teachers' perceptions of teaching environmental issues. The authors used questionnaire survey and interview to develop a framework for the relationship between teachers' perceptions of and practices in environmental education by modifying the model of EE commitment (MEEC) which was developed by Shuman and Ham (1997). According to the framework, the *attitudes* and *self-efficacy* of teachers affect their *intentions of teaching*. The survey showed that teachers' intention on teaching environmental education significantly scored higher than their current practice. In general, teachers intended to put most emphasis on attitudes instead of knowledge as in their actual practice and the least emphasis was given to skill. Teachers' intended teaching style was more student-centered than their self-reported practice. However, teachers' intentions can be influenced by *barriers* so that their *practice of teaching* changes. In the study it was found that the lack of class time, inadequate environmental education knowledge and training, readily usable materials and safety problem are the main barriers. Also, the study indicated that teachers tended to believe that they had enough knowledge to teach EE but they were not very confident of their skills on teaching environmental education. Moreover, Ko and Lee (2003) found that teachers' attitudes toward environmental education and their feeling of responsibility for the environment is one of the most important factors related to environmental education. In the study, teachers with favorable attitudes had strong intentions to teach environmental issues. Besides, teacher training is another issue of importance for environmental education. Many studies (Lane et al., 1994; World Wildlife Fund, 1994) showed that the amount of time teachers spend teaching about environment increases with the amount of in-service/ pre-service training they receive (Knapp, 2000).

In order to increase the environmental literacy of students, educators should be supported from kindergarten through twelfth-grade (Kaplowitz & Levine, 2005). Although many research showed that different teaching methodologies contribute to environmental education, traditional methods are still favorable among the teachers.

For effective EE programs teachers should be trained to give student-directed instruction including hands-on activities, investigational approaches and out-of-the-classroom experiences (Coyle, 2005).

A literature review done by Moseley (2000) states that environmental awareness and knowledge models were the ones which are mostly used instructional techniques in the past (Moseley, 2000). Also, lectures and experiments were mostly used teaching methods (Ko & Lee, 2003).

Likewise, the study of DiEnno and Hilton (2005) indicated that the students who are taught with constructivist method gained more knowledge and their attitude change were higher than the students who are taught traditionally.

One of the methods to enhance students' understanding of environmental issues offered by Gurwick and Krasny (2001) was the science research on EE. The authors investigated the affect of environmental science research on students' understanding on environmental problem. They found that students gain an appreciation for the decision making and subjectivity entailed in conducting environmental research.

Another method used in environmental education is educational drama (McNaughton, 2004). The author suggests 'giving the children a context for research and in helping them to plan solutions and to suggest alternatives, the drama allows the participants opportunities to rehearse active citizenship and facilitates learning in Education for Sustainability'.

Likewise, experiences in outdoor activities can foster environmental education by giving students the opportunity to learn and experience nature as well as developing action strategies to protect it (Palmberg & Kuru, 2000). Different environmental experiences will empower the students' conceptions about the environment (Shepardson et al., 2007). Students' knowledge of environmental issues, self-confidence, environmental sensitivity, action skills, responsible action in nature and social relationship are the main goals of outdoor activities (Palmberg & Kuru, 2000).

Also, in the study of Palmberg and Kuru (2000), the authors found that the students who are experienced in outdoor activities display strong and emphatic relationship to nature as well as better social behavior and moral judgments and also they have more comprehensive definitions and conceptions about the environment. However, outdoor play is about to extinct because of electronics, cyberspace and increased parental concern to keep their children in safer places so indoors (Coyle, 2005).

On the other hand, since children spend many hours watching television the impact of the media on students' environmental interest is inevitable (Barraza & Cuaron, 2004) Students' conceptions about the environment are influenced by the nature programs and movies (Shepardson et al., 2007). The number of opportunities that media offers to strengthen environmental literacy are as follows:

- * Media coverage of issues raises awareness and familiarity with ongoing environmental problems.*
- * In-depth TV documentaries or newspaper articles can provide a more detailed understanding of an environmental issue.*
- * Media coverage can generate a feeling of larger communal support for action, helping individuals feel that their actions make a difference, and thereby eliciting more environmentally-friendly behavior (Coyle 2005, p.46)*

On the contrary, “the common view among environmental educators is that the media does not supply much actual education; instead, the media is a powerful form of environmental information” (Coyle, 2005). However it is not only the media that gives incorrect information, it is also individuals who gets the information and assimilate them in their own way (Coyle, 2005).

A wide range of sources help individuals to learn about the environment those are mostly referred to as free-choice learning resources including environmental organizations, state, regional and national parks, natural history museums, science centers, zoos, aquariums, youth groups, public television, libraries (Falk, 2005).

Additionally, the NEETF/Roper and Roper Green Gauge studies found that Internet is became to be used widely as a source of environmental information and it is mostly used to do research .by teachers and students (Coyle, 2005).

In addition, in recent years a number of programs have evolved such as eco-labeling which was introduced in Europe in the early 1980s, telling the consumers to buy the products that are environmentally “friendly” and “they have been found to produce measurable environmental results” (Coyle 2005, p.37).

Finally, when the effect of gender on environmental literacy of students considered, almost in all of the studies done during the 1970’s, females showed the same levels of concern with males on general environmental concerns as opposed to the studies involving environmental risks in which females were more concerned than males (Bord & O’Connor, 1997).

Additionally, the review of the studies done in the 1980s and 1990s on gender differences by Davidson and Freudenburg found that females had greater concern than males (as cited in Bord and O’Connor, 1997). When the surveys include environmental risk items then females tend to express more concern than males (Bord & O’Connor, 1997). Although women are more concerned on the nature they show less knowledge than men (Robinson & Crowther, 2001; Tikka et al., 2000; Tuncer et al., 2005).

2.5 Development of and Research Studies on EE and EL in Turkey

“Environmental education in schools is an important strategy in achieving environmental protection and improvement” (Loughland et al., 2003, p.3). However,

“there is no formal environmental education in Turkey and that we are at the stage of just beginning” (Tuncer et al., 2005, p.16). The National Science Curriculum of elementary level schools has changed recently. Solomon (1999) mentions the reasons for science curriculum change include problems with the perceptions of science among young people, problems with international test scores broadly interpreted as a problem of standards, distress about social and community-based issues such as adolescent health and environmental deterioration, and a desire to make science and mathematics more authentic, that is, more genuine and pertinent for students and more like “real” science, as practiced by scientists (Hart, 2002).

The environmental issues integrated into our school curriculum in the form of STSE (Science, Technology, Society and Environment). Foshay (1993) mentioned that adding the E to STS means explicitly adding values to the curriculum, those personal, social, and environmental values (Hart, 2002). Although, current school curriculum includes environmental subjects, they have not gone beyond the sixth, seventh, and eight grades (Tuncer et al., 2005).

There is little research on environmental education in Turkey. One of the studies done by Tuncer et al. (2005) investigated the effect of school type (private and public) and gender on sixth, seventh, eight and tenth grade students’ attitude toward the environment in Ankara. A total of 1497 students participated in the study and completed a 45-item Environmental Attitude Questionnaire (EAQ) to measure their environmental attitudes.

The results of the study showed that most of the subjects are environment oriented and school type and gender had a significant effect on students’ attitudes toward the environment. Because of the greater resources of the private sector in financial, physical, and functional terms students attending private schools are more aware of environmental problems and have more positive attitudes toward solving the problems. In addition, the effect of parents’ educational level and employment had an effect on environmental awareness of the students.

Students from private schools had parents who were more educated and who tended to be employed. Furthermore, girls appeared to be more aware of environmental problems and individual responsibilities and to have more positive attitudes because for females, once risk to health and personal well-being become linked to environmental issues, their levels of concern tend to surpass those of males. Although there is no EE curriculum currently in Turkey the reason why most of the respondents were so environmentally oriented is possibly explained by the number of campaigns and projects in the country in the issue.

Despite the fact that students agree on the importance of individual responsibilities in protecting the environment in Turkey, the lack of target, strategy, and educators in the field causes students not to be sure about both the meaning and content of the individual responsibilities.

In another study, Yilmaz, Boone and Anderson (2004) investigated the intensity of elementary and middle school Turkish students' views with regard to environmental issues presented in the national curriculum and determine how these views differ by gender, grade level, previous science achievement, socio-economic status (SES), and school location. A total of 458 students (between 4th and 8th grades) completed a 51-item Attitude Toward Environmental Issues Scale (ATEIS). The result of the study indicated that there was no significant difference between female and male students' attitudes in elementary grades. On the contrary, middle school female students exhibited more environmental concerns than male students. The result of the study indicated that students in many grades have positive attitudes toward environmental issues. On the other hand, young students displayed more positive attitudes than older ones. In other words high school students had the lowest scores while the elementary students were found to be most committed to environmental issues. Besides, students whose previous science achievement was high displayed more positive attitudes than others whose previous science achievement was low. The study also found no significant difference in terms of students' socio-economic status and school location for middle school students but elementary school students whose parents' socio-economic status is high and those students living in urban areas had

more positive environmental attitudes than students whose parents' socio-economic status is low and those students living in rural areas. Moreover, students tended to place economical growth as being more important than environmental protection. Berberoglu and Tosunoglu (1995) concluded that students give priority to economical growth rather than environmental protection as a result of Turkey's status as a developing country (Yilmaz et al., 2004).

CHAPTER 3

METHOD

This study was designed through the environmental literacy questionnaire (ELQ) with the intention of assessing students' knowledge, attitudes, uses and concerns about the environment. The data collected during the study were expected to provide a better understanding of the students' knowledge, attitudes, uses and concerns about the environment so that it can provide important information in planning and implementation of strategies for environmental education that in turn leads to more environmentally literate citizens for Turkey. The six sections addressed in this chapter include area of study, participants, variables, instrument, data collection procedure and data analysis.

3.1 Area of Study: Bodrum

The area chosen for the study was Bodrum Peninsula that is in the southwestern Aegean Region of Turkey with an area of 700 km² (Kayalar, 1995) (Figure 1).



Figure 1. Map of Bodrum, Turkey

(Source: Retrieved August 27, 2008, from <http://www.turkuaz-guide.net/bodrum.html>)

Physical feature of earth surface is rough and interior segments contain grassy plains. The coastline is indented and ribbed. There is not another coast in Turkey that is cleaner and clearer than Bodrum that also offer up a variety of aquatic life. Besides, 61.3% of the town is surrounded with forests that house a variety of plants and animals.

The current permanent population for the town of Bodrum was recorded as 32,227 in 2000 census. However, because of the touristic activities, population increases up to 500,000 in summer season. Now, although the majority of the current residents are Turkish people also English, American, Australian, Austrian, Belgian, Dutch, French, Finnish, German and even Japanese nationals live in Bodrum.

Bodrum is a very valuable and popular town with its rich historical and cultural heritage and natural beauty. Throughout history Carians, Lelegians (the earliest inhabitants of the Bodrum peninsula), Dorians, Lydians, Persians, Medes, Macedonians, Romans, the Mentese clan of the Seljuk Turks, Knights of St. John (these were composed of the English, French, Italian, German and Spanish contingents) and Turks of the Ottoman Empire and the Republic lived in Bodrum and during this period it was called by various names such as, Zephyria, Halicarnassus, Mesy, Castrii Sancti Petri, Petronion, Petrum, Burdum (<http://www.bodrumlife.com/nuggets.htm>). Before the birth of Christ, Bodrum played a significant role in the exchange of ideas, philosophic thought, scientific developments, theatrical and musical performance (Ataker & Marsinerek, 2000). Moreover, Bodrum is the birth place of Herodotus who is awarded as the 'Father of History'. Besides, the remains of Mausoleum that is one of the seven Wonders of the Ancient World and one of the oldest amphitheatres of Anotolia can be seen in Bodrum (Unus, 2007). Besides, the impressive castle built by the Knights of St. John at the beginning of the fifteenth century dominates the Bodrum bay in which the Aegean and the Mediterranean Seas meet that also houses a world famous museum of underwater archaeology.

When it was a small fishing, sponge diving and agricultural village 1925, a writer named Cevat Sakir Kabaagacli who is also known as "The Fisherman of Halicarnassus" was exiled to Bodrum due to his unpopular political expressions. Then his stories about the natural beauty of Bodrum attracted the attention of tourists. Now, it is one of the international centers of Turkey for tourism and yachting. As well as its' own attractions, most of the popular tourist destination with many attractions are located around Bodrum such as Ephesus, islands of Greek (Rhodes, Cos).

To conclude, as one of the most important tourism centers in Turkey, it is very important for students and people that live in Bodrum to be environmentally literate for the sustainable development of this region in touristic, economic and social manners. In other words, it is important for the future to examine the environmental literacy levels of students who live in this valuable region that is under stress because of tourism and resource management which in turn will lead to create more environmentally literate citizens and to manage the resources of Turkey in a sustainable way. The decisions we make today affect the future of us and next generations (Roth, 1996). So, "we must conscientiously supply our children with the education and tools they will need to clean up the mistakes, and to rebalance the overarching relationship between society and the natural world in the years ahead"(Coyle, 2005).

3.2 Participants

The target population of this study was primary school students (6th, 7th and 8th grades) studying in public schools in Bodrum. There were 29 public primary schools with a total of 12096 students (6347 male and 5749 female) in Bodrum as for declined for the 2006-2007 academic year. The accessible population for the study was calculated to be 7%; the number of students completed questionnaires (848) divided by the total number of students enrolled in the public schools at the time (12096).

After receiving the Ministry of Education’s permission, the researcher randomly sampled four public primary schools students currently enrolled in the spring semester of the 2006-2007 academic years. Then the researcher visited the classes. The students were informed about the study, and invited to complete and submit the questionnaire on their own. On average, it took respondents about 15-20 minutes to complete the questionnaire. The participants of this study were 848 students (446 females and 402 males) enrolled in four public primary schools submitted a completed questionnaire for this study. The sample population consisted of 288 6th graders, 261 7th graders and 299 8th graders. The age of the participants ranged from 10 to 14 years with a mean age of 12 years (Table2).

Table 2. Demographic information about the participants (n=848)

Variable	n	%
Gender		
Male	402	47.4
Female	446	52.6
School		
A	219	25.8
B	237	27.9
C	243	28.7
D	149	17.6
Grade		
6	290	34.2
7	259	30.5
8	299	35.3
Mean Age	12.16	

3.3 Variables

3.3.1 Independent variables

Students' parents' educational background and gender as well as students' perception of interest, perception of importance, perception of knowledge, parents' interest in environmental issues, parents' involvement in environmental activities and environmental importance are set up as the independent variables.

3.3.2 Dependent variables

The 4 components of the environmental literacy, knowledge, attitude, concern and use was set up as the dependent variables.

3.4 Instrument

The questionnaire used in this study was Environmental Literacy Questionnaire (ELQ) which was designed to measure four components of environmental literacy. These components are knowledge, attitudes, uses and concerns about the environment. The ELQ which was originally developed in English by Kaplowitz and Levine (2005), translated, adapted, and evaluated in Turkish by three experts in the field of science education and one expert in environmental science. Then Turkish version of the questionnaire revised and pilot tested. The internal consistency of the knowledge, attitudes, uses, and concerns dimensions were found to be 0.88, 0.64, 0.80, 0.88, using Cronbach alpha respectively (See Appendix).

A total of 49 questions were asked the students. In order to assess respondents' knowledge of current environmental issues as draws on the work of NEETF (2005) the knowledge dimension consisted of 11 multiple choice items in which a correct, three incorrect and an 'I don't know' choices are included for each set of items (Table 3). For the scoring of each item, a numeric value of 1 were given if response

was correct, and 0 if response was incorrect. Thus, the lowest score was 0 (no correct responses) and the highest score was 11 (all correct responses).

Table 3. Description of Knowledge Items in Questionnaire

DIMENSION 1:	Environmental knowledge
TARGET	Students' knowledge levels on environmental issues
SAMPLE ITEMS	What is the most common cause of pollution of streams, rivers and oceans?
	Which of the following is a renewable resource?
	How is most electricity in Turkey generated?

For the questionnaire sections concerning respondents' environmental attitude students answer on a 5-point Likert-type scale from "I strongly agree" to "I strongly disagree". 5 points were given to "strongly agree", 4 to "agree", 3 to "undecided", 2 to "disagree", 1 to "strongly disagree". For consistency in analyses, the coding of responses was reversed if they contain a "negative" statement. The environmental attitude dimension consisting of 10 items targeted feelings and values related to environment (Table 4).

Table 4. Description of Attitude Items in Questionnaire

DIMENSION 2:	Environmental attitude
TARGET	Students' feelings and values on environment
SAMPLE ITEMS	Plants and animals have as much right as humans to exist.
	The balance of nature is strong enough to cope with the impacts of modern industrial nations.
	We are approaching the limit of the number of people the earth can support.

For the questionnaire section concerning respondents' environmental uses students also answer on a 5-point Likert-type scale from "I strongly agree" to "I strongly disagree". As mentioned above, for the scoring purposes, 5 points were assigned to "strongly agree", 4 to "agree", 3 to "undecided", 2 to "disagree", 1 to "strongly disagree". The environmental use component consisting of 19 items measured individuals' responsibility toward the environment and intention to be a part of responsible environmental behavior (Table 5).

Table 5. Description of Use Items in Questionnaire

DIMENSION 3:	Environmental use
TARGET	Students' responsibility and intention to act toward environment.
SAMPLE ITEM	People should be held responsible for any damages they cause to the environment.

Similarly, the questionnaire section concerning respondents' environmental concerns, students answer on a 5-point Likert-type scale from "very concerned" to "unsure". For the analysis of this section, 5 points were assigned to "very concerned", 4 to "somewhat concerned", 3 to "a little concerned", 2 to "not at all concerned", 1 to "unsure". The concern dimension consisting of 9 items focused on participants' sensitivity toward environmental (Table 6).

Table 6. Description of Concern Items in Questionnaire

DIMENSION	Environmental concern
3:	
TARGET	Students' sensitivity toward environmental problems
SAMPLE ITEMS	Global warming
	Water pollution
	Ozone depletion

In addition, in order to obtain demographic information, 13 questions were asked including students' self evaluation of their environmental background, age, grade, gender, outdoor activities and parents' level of education.

3.5 Data Collection Procedure

A proposal was submitted to the Ministry of Education requesting approval for the study. Upon this approval, the proposal was submitted to the officials of the four public schools. Once the two approvals secured, the questionnaire was administered to the students in the classrooms. The questionnaire is consisted of a 2-page double sized sheet including a description of the purpose of the study (Appendix 1).

Students were informed about Environmental Literacy Questionnaire (ELQ) and they were asked to complete the questionnaires in its entirety, not to discuss their responses with others, to be as sincere as possible. Besides, participants were assured that the responses would be kept confidential. The procedure of data collection took place during April-May 2007.

3.6 Data Analysis

MS Excel and Statistical Package for Social Science (SPSS 11.0 for Windows) were used to conduct statistical analysis including bar graphs, pie charts, frequency distributions, one-way multivariate analysis of variance (MANOVA), zero order correlation and canonical analysis. The data collected in the study were analyzed in two phases. In the first phase of analysis, descriptive statistics were used to calculate the frequency and percentage values for self-assessment, knowledge, attitude, use, concern and demographic variables. In the second phase, inferential statistics were used to find the relationship between the four dimensions of environmental literacy (knowledge, attitude, uses and concern) and the demographic variables of the students such as gender. Analyses were conducted using such independent variables as the four components of the environmental literacy, knowledge, attitude, use and concern and dependent variables as parents' educational background and gender. In addition, sets of student characteristics (e.g., perceptions, outdoor activities, and parents' interest/involvement in environmental problems) and sets of environmental literacy variables (e.g., environmental knowledge, attitude, use, and concern) were used to conduct Canonical Analysis. The results of these analyses are reported to be significant at the $p < 0.01$ level.

This chapter has presented how the participants were sampled, how the instrument was developed and how the data were collected and analyzed. The next chapter presents the results of the study.

CHAPTER 4

RESULTS

The present study was intended to assess primary school students' environmental literacy by means of four components as, knowledge, attitudes, uses and concerns about the environment. The purpose of this chapter is to present the results of the data which was collected from 848 primary school students enrolled in four public schools in Bodrum (Turkey) during April-May 2007.

Participants' self assessment on their environmental perception and knowledge, engagement in outdoor activities, area of living, parents' perceptions about environmental problems and behavior towards environmental protection, level of environmental knowledge, attitudes, uses and concern were analyzed by means of the frequency distributions. Results were organized under eight subheadings and only selected results are discussed in detail. Inferential statistical analyses were conducted in some instances to examine possible relationships among study variables.

4.1 Students' self assessment on their environmental perception and knowledge

Participants' responses to the item (item no. 1) of the ELQ, pertaining their self assessment on their level of environmental concern revealed that 54 % of the respondents evaluated themselves as having 'a fair amount of' concerned about environmental problems, only 12% of respondents reported that they had 'a lot' of concern about environmental problems. When participants were asked about their perception on the importance of environmental problems (item no 2.), the results

revealed that 62% of the students view environment as one of the ‘most important’ problems that humans face with currently, with the remainder (31%) believing that it is important but there are other more important problems. Only 4% of the respondents do not view environment as a problem.

The results also indicated that 61% of students evaluated their level of environmental knowledge (item no 3.) as ‘a fair amount’. Respondents did not indicate a strong confidence in the extent of their environmental knowledge, with 14% of respondents indicating that they have ‘a lot’ of knowledge about environment.

4.2 Students’ engagement in outdoor activities

Students are also asked about their engagement in outdoor activities; camping, walking, bird watching, fishing and hunting (item no 21.). When asked about their engagement in camping, the results indicated that 60 % of the participants engaged in camping ‘frequently’, with the remainder (26 %) stated that they engaged in camping ‘usually’. In addition, 10% of the students reported that they engaged in camping ‘sometimes’ and only 4% of the respondents stated that they ‘never’ engaged in camping.

When asked about their engagement in walking, the results indicated that only a small portion (3%) of the participants ‘frequently’ engaged in walking, with the remainder (17 %) stated that they ‘usually’ engaged in walking and 33% of the students reported that they engaged ‘sometimes’ in walking. On the other hand, 47% of the respondents stated that they ‘never’ engaged in walking.

Moreover, the result of students’ engagement in bird watching indicated that 38% of the participants engaged in bird watching ‘frequently’, with the remainder (31 %) stated that they engaged in bird watching ‘usually’ and 22% of the students reported

that they engaged in bird watching 'sometimes'. Less than 10% of the respondents stated that they 'never' engaged in bird watching (9%).

In addition, students are asked about their engagement in fishing. While 32% of the students reported that they 'frequently' engaged in fishing, 26% of them stated that they 'usually' engaged in fishing and 24% of the students reported that they engaged 'sometimes' in fishing. Additionally, 18% of the respondents stated that they 'never' engaged in fishing.

Finally, students' responses on their engagement in hunting indicated that 80% of the students engaged in hunting 'frequently'. Only 10% of them reported that they engaged in hunting 'usually' and less than 10% reported that their engagement as 'sometimes' (5%) and 'never' (5%).

4.3 Students' living area

The students are also asked about their area of living (item no 22.) The results indicated that, 67% of the students spent most of their childhood in a small town up to then. In addition, 21% responded that they spent most of their childhood in a metropolitan area. Only 12% of the students responded that they spent most of their childhood in rural area or farm.

4.4 Students' view on their parents' perceptions about environmental problems and behavior towards environmental protection

When students are asked about their parents' perceptions about environmental problems (item no 23.) 53% of the students indicated that their parents concerned 'a fair amount' about environmental problems.

Furthermore, 22% of the students responded that their parents concerned ‘a lot’ about environmental problems. Only 2% of the students responded as ‘don’t know’ for their parents’ perceptions about environmental problems.

Besides, students responded on their parents’ behavior towards environmental protection (item no 24). 51% of respondents stated that their parents were somewhat active in promoting environmentally friendly behavior with remainder (30%) indicating that their parents are very active in promoting environmentally friendly behavior. Only 4% of the respondents stated that their parents were not active at all in promoting environmentally friendly behavior.

To sum up, the results indicated that 54 % of the respondents evaluated themselves as having ‘a fair amount of’ concerned about environmental problems and 61% of students evaluated their level of environmental knowledge as ‘a fair amount’. The highest rated activities that students engage in frequently were hunting (80%) and camping (60%).

Moreover, most of the students (67%) spent most of their childhood in a small town up to then. The remaining students spent most of their childhood in a metropolitan or rural area (21% and 12% respectively). While 53% of the students indicated that their parents concerned ‘a fair amount’ about environmental problems, 51% of respondents stated that their parents were somewhat active in promoting environmentally friendly behavior.

4.5 Environmental Literacy

4.5.1 Environmental Knowledge

In order to assess the students’ level of environmental knowledge, they are asked 11 environmental knowledge items (from item no 4 to 11). Each item included one

correct and three incorrect choices as well as an ‘I don’t know’ choice. The correct response of each item was evaluated by percentages (Table 7).

Table 7. Percentage of correct environmental knowledge items

Item number	Item topic	% correct response
4	Definition of biodiversity	58
5	Motor vehicles as the largest contributor of carbon monoxide	12.7
6	Electricity generation in Turkey by hydroelectric power plants	13.3
7	Industrial discharges as one of the major sources for surface water pollution	2.6
8	Trees are renewable resources	63.9
9	Role of ozone as a protective layer from cancer-causing sunlight	43.2
10	Most garbage in Turkey ends up in solid waste storage areas	19.7
11	Primary governmental agency for environmental protection in Turkey is the Ministry of Environment and Forestry	40.3
12	Batteries are household hazardous waste	59.5
13	Human activities of habitat is the major reason for animal extinction	53.5
14	The common method for storing nuclear waste throughout the world is storing and monitoring	13.5

The environmental knowledge item that great majority of the respondents answered correctly concerned the trees as *renewable resources* (item no.8) with almost 64% of respondents getting it right. Furthermore, more than half of respondents correctly answered the questions concerning *definition of biodiversity* (58 %) (item no.4); batteries as *household hazardous waste* (59.5 %) (item no.12); and *human activities* (item no.13) of habitat as the major reason for animal extinction (53.5 %).

Besides, the knowledge item most often answered incorrectly concerned the major *source of carbon monoxide* (item no.5). 74.7% of the students chose factories and businesses as the largest contributor of carbon monoxide. Also, 55.1% of the students answered incorrectly the common *cause of pollution of streams, rivers and oceans* (item no.7) as waste dumped by factories. Additionally, another knowledge item answered incorrectly was the *electricity generation* (item no.6) in Turkey. Thirty six percent of the students thought that most electricity in Turkey is produced by hydro electric power plants. Finally, 32.1% of the students answered incorrectly that most of the *garbage in Turkey* (item no.10) end up in recycling centers instead of solid waste storage areas.

The knowledge item with the largest number of ‘don’t know’ responses concerned the common method for storing *nuclear waste* (item no.14) throughout the world (49.1%). However, there are not many ‘don’t know’ responses with high percentages. For example, following the item mentioned above, the knowledge item that respondents choose ‘don’t know’ choice was the *definition of biodiversity* (item no.4) with 19.6%. Similarly, *electricity generation* (item no.6) in Turkey was the item with 18% ‘don’t know’ responses. In addition, *renewable resources* (item no.8) were another item with 16.2% ‘don’t know’ responses.

The aggregate number of correct responses for each student was ‘graded’ or categorized as evidencing acceptable or unacceptable levels of environmental knowledge in line with previous studies (Kaplowitz & Levine 2005; NEETF & Roper, 2005). NEETF and Roper (2005) calculated letter grades (e.g., A, B, C, and F) based on the percentage of respondents’ correct answers and determined that aggregate scores of greater than 70% as passing or acceptable levels of adequate environmental knowledge. Scores below 69% are, on the other hand, categorized as inadequate (unacceptable) level of environmental knowledge (Table 8).

Table 8. NEETF and Roper Starch Worldwide National Survey Grading Scale

Letter Grade	Number of Questions Answered Correctly	Percentage Score	Adequacy of score
A	10 or more	90%-100%	Adequate
B	9	80%- 89%	Adequate
C	8	70%- 79%	Adequate
D	7	60%- 69%	Inadequate
F	6 or fewer	50% or less	Inadequate

To sum up, as Figure 2 illustrates 42% of the students received a passing grade based on the NEETF and Roper Starch grading scale. In other words 68% of the students have inadequate level of knowledge about environment.

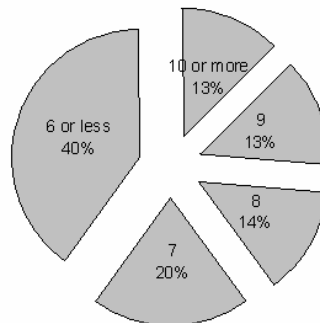


Figure 2. Respondents' percentages of correct answers for environmental knowledge items

4.5.2 Environmental Attitude

The environmental attitude dimension consisted of 10 items targeted feelings and values of the students related to environment (Table 9). The adaptation of environmental attitude items used in the questionnaire was made from NEEFT and Roper (Kaplowitz & Levine, 2005) with the study titled “Environmental Literacy in America”. Students answer on a 5-point Likert-type scale that each item includes “strongly agree”, “agree”, “undecided”, “disagree” and “strongly disagree” choices.

In this section, the “strongly agree” and “agree” responses of students on attitude statements were summed up.

Table 9. Percentage of respondent agreement with environmental attitude statements

Item	Strongly Agree	Agree	Undecided	Disagree	Strongly disagree
We are approaching the limit of the number of people the earth can support.	21	32	32.3	7.8	2.6
When humans interfere with nature it often produces disastrous consequences.	28.7	33.7	16.6	14.0	4.3
The earth has plenty of natural resources if we just learn how to develop them.	40.2	30.4	15.5	8.2	3.5
Plants and animals have as much right as humans to exist.	64.8	19.3	8.3	3.5	1.5
The balance of nature is strong enough to cope with the impacts of modern industrial nations.	8.5	20.5	43.1	16.5	7.4
Despite our special abilities humans are still subjects to the laws of nature.	21.7	34.9	22.4	10.6	4.9
The so-called ‘ecological crisis’ facing humankind has been greatly exaggerated. *	12.4	19.8	35.2	18.2	10.6
Humans were meant to rule over the rest of nature.	24.7	29.7	24.4	9.9	6.8
Humans will eventually learn enough about how nature works to be able to control it.	22.4	26.0	21.9	17.0	8.9
If things continue on their present course, we will soon experience a major ecological catastrophe.	54.3	20.5	13.8	4.0	4.7
Sample Average	29.8	26.6	23.3	10.9	5.5

- Response category inverted (i.e., “agree” = respondent disagreed with statement)

According to the results, most of the responses were above 50% when the “strongly agree” and “agree” percentages of the responses were summed up. The eco-centric worldview is one of the main perspectives for the evaluation of relationship between society and the environment in that natural environment has valued for its own sake not only for human usage (Tuna, 2005).

The results indicated that students seem to have eco-centric worldview since the highest percentage of agree response (84.1%) among the environmental attitude statements was “*Plants and animals have as much right as humans to exist*” (item no 15-D).

The next statement with 74.8% was “If things continue on their present course, we will soon experience a major *ecological catastrophe*” (item no 15-J). Moreover, 70.6% of the students were agreed on the item stating that, “The earth has plenty of *natural resources* if we just learn how to develop them” (item no 15-C) and 62.4% of the students were agreed that “When humans interfere with nature it often produces *disastrous consequences*” (item no 15-B). Also, while 56.6% of the students were agreed upon the statement that is “Despite our special abilities humans are still subjects to the *laws of nature*” (item no 15-F), 54.4% of them agreed that “Humans were meant to rule over the *rest of nature*” (item no 15-H). Additionally, 53% of the respondents were agreed that “We are approaching the *limit of the number of people* the earth can support” (item no 15-A).

Besides, the “disagree” and “strongly disagree” percentages of the responses were also summed up. Most of the responses were below 30%. For instance, the statement that students disagreed with highest percentage (28.8%) was “The so-called ‘*ecological crisis*’ facing humankind has been greatly exaggerated” (item no 15-G) that is followed by the statement “Humans will eventually learn enough about *how nature works* to be able to control it” (item no 15-I) with 25.9%. Another statement that students disagreed with was “The *balance of nature* is strong enough to cope with the impacts of modern industrial nations” with 23.9% (item no 15-E).

Moreover, there were not many statements that students were undecided about, thus only items disagreed over 30% were discussed. For example, the highest percentage of the statements that students were undecided about was “The *balance of nature* is strong enough to cope with the impacts of modern industrial nations” with 43.1%.

Similarly, 35.2 % of the students were undecided on the statement that is “The so-called ‘*ecological crisis*’ facing humankind has been greatly exaggerated” (item no 15-E). In addition, 32.3% of the students undecided if “We are approaching the *limit of the number of people* the earth can support” or not (item no 15-A).

In summary, this section addressed the students’ feelings and values related to the environment. There were 10 items in the attitude part of the questionnaire that students answer on a 5-point Likert-type scale. Thus, the total lowest score could be 10 and the total highest score could 50 with an average of 25. According to the results, the mean score of the students were 36.58 with the 4.37 standard deviation indicating that students have positive attitude toward environment.

4.5.3 Environmental Use

The students were asked a series of questions about their views on environmental uses and service. The environmental use component consisting of 19 items measured individuals’ responsibility toward the environment and intention to be a part of responsible environmental behavior. These items were adapted from the ones used by NEEFT and Roper (2005) for the study titled “Environmental Literacy in America”. As students answer on a 5-point Likert-type scale for the environmental attitude items they also answered the environmental use items in the same way that each item includes “strongly agree”, “agree”, “undecided”, “disagree” and “strongly disagree” choices. Also, in this section, the “strongly agree” and “agree” responses of students on attitude statements were summed up. Table 10 presents respondents’ agreement with the items related to environmental uses and services.

Table 10. Percentage of respondent agreement with environmental use statements

Item	Strongly Agree	Agree	Undecided	Disagree	Strongly disagree
Special areas should be set aside for endangered species.	64.7	23.3	7.1	1.3	1.5
Laws regarding water quality should be stricter.	35.5	38.6	17.9	3.9	1.5
Wild animals that provide meat for people are the most important species to protect.	29.4	29.1	21.2	13.3	4.1
Poisonous snakes and insects that pose a threat to people should be killed.	13.0	11.4	16.4	23.7	32.8
Landowners should be allowed to drain wetlands for agricultural or industrial uses.	23.5	27.9	30.3	8.0	6.9
It is important that everyone be aware of environmental problems.	62.9	22.2	7.3	1.9	3.0
Individuals should be allowed to use private land as they see fit.	11.1	15.1	22.9	23.4	23.7
I feel personally responsible for helping to solve environmental problems.	43.9	31.3	14.3	4.3	2.8
Government should regulate the use of private land to protect wildlife habitat.	38.2	32.2	19.8	4.4	2.4
People should be held responsible for any damages they cause to the environment.	50.2	29.4	11.8	3.5	2.4
All plants and animals play an important role in the environment.	60.9	22.9	8.3	2.8	1.9
Technological changes often do as much harm to the environment as they do well for the environment.	40.4	33.3	15.9	4.1	3.4
Government should pass laws to make recycling mandatory.	37.8	26.8	24.3	4.3	2.7
Air pollution laws are already strict enough.	8.5	14.6	29.4	25.6	17.9
Science and technology will be very important in solving our environmental problems.	26.7	35.4	23.9	6.8	3.2
Cultural changes will be very important in solving environmental problems.	21.0	30.0	31.7	9.2	4.6
Changes in people's values will help solve environmental problems.	26.2	33.7	29.0	5.1	2.3

Table 10 (cont'd)

Collective action (i.e. movements) is central to solving environmental problems.	27.5	35.6	25.0	5.0	3.3
Lifestyle changes (i.e., consumption) will help solve environmental problems.	28.6	27.0	30.1	6.5	4.3
Sample Average	34.2	27.4	20.4	8.3	6.6

Recalling that the “strongly agree” and “agree” responses of students on use statements were summed up, the results indicated that percentages of agreement to those items evidencing pro-environmental awareness, values, cultural change, individual responsibility, life style changes, collective actions, technology, and protective laws were mostly over 60%. Indeed, students agreed on more than half of the items (11 out of 19) with over 60%. According to the results, 88% of respondents agreed that *special areas* should be set aside *for endangered species*. Besides, the importance for everyone to be *aware of environmental problems* was another statement that students agreed upon (85.1%). Also they are agreed upon the statement that all *plants and animals* play an important role in the environment (83.8%). Another statement that students agree on with a high percentage (79.6%) was “people should be held *responsible for any damages* they cause to the environment”. Similarly, they feel *personally responsible* for helping to solve environmental problems (75.2%). Additionally, they think that laws regarding *water quality* should be stricter (74.1%). Finally, they see *technological changes* (73.7%), *protection of plants and animals* by the government (70.4%), laws to make *recycling* mandatory (64.6%), collective action (63.1%), *science and technology* (62.1%), changes in people’s values (59.9%) and lifestyle changes (55.6%) as important items for environmental problems.

In addition, the “disagree” and “strongly disagree” percentages of the responses were also summed up. Most of the responses were below 10%. Only 5 items out 19 was above 10%. For instance, the statement that students disagreed upon mostly was “*Poisonous snakes and insects* that pose a threat to people should be killed”(56.5%)

that is followed by the statement “*Wild animals* that provide meat for people are the most important species to protect” with 17.4%. Other statement that students disagreed with was “Landowners should be allowed to drain *wetlands* for agricultural or industrial uses” with 14.9%. Moreover students were disagreed on the statement that “*Cultural changes* will be very important in solving environmental problems” (13.8%). Additionally, students are disagreed that “Lifestyle changes will help solve environmental problems” with 10.8%.

For the statements that students were undecided on them, only the ones that are over 20% were discussed. For example, the highest percentage of the statements that students are undecided about was “*Cultural changes* will be very important in solving environmental problems” with 31.7% followed by the statement “Landowners should be allowed to drain *wetlands* for agricultural or industrial uses” with 30.3 %. Also, 30.1 % of the students were undecided on the statement that is “*Lifestyle changes* will help solve environmental problems”. In addition, 29.4% of the students were disagreed that “Air pollution laws are already strict enough” and 29.0% of the students were undecided if “*Changes in people’s values* will help solve environmental problems” or not. Besides, 25% disagreed that “*Collective action* is central to solving environmental problems”. Finally, laws that make *recycling* mandatory (24.3%), importance of *science and technology* for the solution of environmental problems (23.9%), usage of private land (22.9%) and protection of *wild animals* (21.2%) were the statements that students disagreed upon.

In summary, this section addressed the students’ views on environmental uses and service. There were 19 items in the environmental use part of the questionnaire that students answer on a 5-point Likert-type scale. Thus, the total lowest score could be 19 and the total highest score could 95 with an average of 57. According to the results, the mean score of the students were 71.59 with the 7.59 standard deviation indicating that students are aware of the importance of interaction between humans and the environment.

4.5.4 Environmental Concern

The concern dimension consisting of 9 items focused on participants' sensitivity toward environmental. The environmental concern items asked respondents to share their level of concern about current issues related to the environment. These items were adapted from the ones used by NEEFT and Roper (2005) for the study titled "Environmental Literacy in America". Table 11 presents respondents' concern on environmental issues.

Table 11. Percentage of respondent concern on environmental issues

Items	Very concerned	Somewhat concerned	A little concerned	Not at all concerned	Unsure
Air pollution.	39,7	40,3	8,1	4,2	3,2
Noise pollution.	29,8	37,0	14,9	8,6	5,0
Water Pollution	55,1	24,0	7,8	4,2	3,8
Industrial pollution.	31,5	24,5	17,2	10,5	10,9
Hazardous wastes.	30,6	28,8	15,1	10,4	9,4
Poor drinking-water quality.	48,2	21,5	10,4	8,9	6,0
Indoor air pollution.	42,5	26,5	12,9	6,1	6,1
Ozone Depletion.	45,3	23,1	10,6	8,4	8,0
Global warming.	63,3	15,7	6,0	5,5	5,1
Sample Average	42,88	26,82	11,44	7,42	6,39

The results demonstrated when the ‘very concerned’ and ‘somewhat concerned’ responses were summed up then it appears that almost all of the environmental issues were of significant concern to respondents with the percentage over 56. The item most frequently receiving a concerned response was *air pollution* with 80.0% of respondents which is followed by *water pollution* (79.1%) and *global warming* (79.0%). Furthermore, other items that students were concerned about were *poor drinking water quality* (69.7%), *indoor air pollution* (69.0%), *ozone depletion* (68.4%), *hazardous wastes* (59.4%) and *industrial pollution* (56.0%).

In addition, the “a little concerned” and “not at all concerned” percentages of the responses were also summed up. All of the responses were above 10% however the item that received the highest percentage was *industrial pollution* with 27.7% that is followed by *hazardous wastes* (25.5%). Other item that received more than 20% was *noise pollution* (23.5%). The rest of all items were received less than 20% of not concerned responses were *poor drinking water quality* (19.3%), *indoor air pollution* and *ozone depletion* with 19%. Similarly, *air pollution* (12.3%), noise pollution (12.0%) and global warming (11.5%) were the ones that students are not concerned.

Almost all of the responses that students are unsure about was less than 10% with an exception that is *industrial pollution* (10.9%). Other items that students were unsure about with less than that were *hazardous wastes* (9.4%), *ozone depletion* (8.0%), *indoor air pollution* (6.1%), *poor drinking water quality* (6.0%), *global warming* (5.1%) and *noise pollution* (5.0%). The issues that students least unsure about were water pollution (3.8%) and air pollution (3.2%).

To sum up, this section addressed the students’ level of concern about current issues related to the environment. There were 9 items in the environmental concern part of the questionnaire that students answer on a 5-point Likert-type scale. Thus, the total lowest score could be 9 and the total highest score could 45 with an average of 27. According to the results, the mean score of the students were 35.77 with the 6.65 standard deviation indicating that students are concerned about environmental issues.

4.6 Relationships among Knowledge, Attitudes, Uses and Concern

Relationships among the components of the ELQ (knowledge, attitudes, uses, and concerns) have been analyzed by means of zero order correlations. The assumptions tested before the analyses were comprised of normality, linearity and homoscedasticity. None of the assumptions were violated. The table 12 below shows correlations among knowledge, attitudes, uses, and concerns.

Table 12. Zero-order correlations between students' environmental knowledge, attitudes, uses and concern

	Knowledge	Attitude	Use	Concern
Knowledge	1.000	.125**	.147**	.195**
Attitude	.125**	1.000	.557**	.253**
Use	.147**	.557**	1.000	.287**
Concern	.195**	.253**	.287**	1.000

** Correlation is significant at the 0.01 level

As presented in the table 12 there is positive, significant but small correlation between *knowledge and attitude* ($r = .13, p < .01$). The coefficient of determination ($r^2 = .017$) shows that knowledge of the students helps to explain 2 % of their variance in their attitude towards environmental issues. Also positive, significant and small correlation was found between *knowledge and use* ($r = .15, p < .01$). The coefficient of determination ($r^2 = .038$) shows that knowledge of the students helps to explain 4 % of the variance in their views on environmental uses and service. Moreover there is positive, significant but small correlation between *knowledge and concern* ($r = .20, p < .01$). The coefficient of determination ($r^2 = .025$) shows that knowledge of the students helps to explain 3 % of the variance of their concern about environmental problems.

Positive, middle strong (medium) and significant correlation was found between *attitude and use* ($r = .56, p < .01$). The coefficient of determination ($r^2 = .31$) shows that attitudes of the students help to explain 31 % of the variance in their views on environmental uses and service. This is the strongest correlation found among the components of the ELQ; meaning that the students with positive attitude towards environmental issues have positive views on environmental uses and service. In other words the more students have positive attitudes towards environmental issues the more they have positive views on environmental use and service.

In addition, positive, small and significant correlation was found between *attitude and concern* ($r = .25, p < .01$). The coefficient of determination ($r^2 = .064$) shows that attitudes of the students help to explain 6 % of the variance of their concern about environmental problems.

Moreover, positive, medium and significant correlation was found between *use and concern* ($r = .29, p < .01$). The coefficient of determination ($r^2 = .082$) shows that students' concern about environmental problems helps to explain 8 % of the variance of their views on environmental use and service. This means that students concerning about environmental problems have more positive views on environmental use and service.

Therefore, as a result of the correlation analysis, relationships found among the four components of environmental literacy included in the questionnaire can be considered as small except for the relationship between the variables attitude-use and use-concern.

4.7 Relationship between students' background characteristics and Environmental Literacy

Canonical correlation analysis was used to examine the relationship, if any, between the background characteristics of students and the set of environmental literacy variables in the questionnaire. Student characteristics that were examined included their self-assessment of their interest in environmental problems (perception of interest), their views on the importance of environmental problems (perception of importance), their self evaluation of their environmental knowledge (perception of knowledge), their involvement in outdoor activities (activities), their perception of their parents' interest in environmental problems (parents' interest) and their perception of their parents' involvement in environmental activities (parents' involvement). The results of the canonical correlation analysis presented in table 13 showing that the first canonical correlation was .39 (with 15 % overlapping variance; [Wilks Lambda(Λ)=.985 $p < .01$] indicating significant relationships between the two sets of variables.

Table 13. Canonical correlations and coefficients, variance, and redundancies of student characteristics and environmental literacy components

	First canonical variate	
	Correlation	Coefficient
Student Background Characteristics		
Environmental interest	-.792	-.524
Environmental importance	-.343	-.269
Self assessment of environmental knowledge	-.739	-.472
Outdoor activities	-.027	.071
Parents' interest in environmental issues	-.446	-.179
Parents' involvement in environmental activities	-.426	-.154
Percent of Variance	.279	
Redundancy	.043	

Table 13 (cont'd)

Environmental Literacy Components		
Knowledge	-.396	-.214
Attitude	-.417	-.027
Use	-.942	-.416
Concern	-.877	-.727
	Percent of Variance	.378
	Redundancy	.059
Canonical Correlation		.394

As table 13 shows, using a cut-off correlation of 0.30 (Tabachnick & Fidell, 1996), students' perception of interest, perception of importance, perception of knowledge, parents' interest in environmental issues, parents' involvement in environmental activities and environmental importance were highly correlated with the first canonical variate. The first canonical variate is negatively related to all variables of set one. Likewise, all environmental literacy components measured by the questionnaire were found to be negatively correlated with the first canonical variate.

The first pair of canonical variate indicates that students' perception of interest, perception of importance, perception of knowledge, parents' interest in environmental issues, and parents' involvement in environmental activities were associated with knowledge, attitude, use and concern. In other words students who are interested in environmental issues, who give importance to environmental problems, who thinks they have good knowledge about environmental issues, whose parents' are interested in environmental issues and whose parents involve in environmental activities have better knowledge about environmental issues, more positive attitude towards environmental issues, more positive view on environmental uses and service and concern environmental problems. As the first canonical correlation is significant the other canonical correlations were ignored and not interpreted.

The reported percent of variance values in table 13 indicate that the first canonical variate pair accounts for 28 % of the variance of students' characteristic variables and 38 % of the variance from the environmental literacy components of the questionnaire.

The redundancy values in table 13 reveal that proportion of variance of "student background characteristics" explained by canonical variate of "environmental literacy components" is .04. This means that canonical variate of "environmental literacy components" explains 4 % of the variance in "student background characteristics". On the other hand proportion of variance of "environmental literacy components" explained by canonical variate of "student background characteristics" is .06. This means that canonical variate of "student background characteristics" explains 6% of the variance in "environmental literacy components".

4.8 Effect of Gender on Environmental Literacy

The effect of gender on the environmental literacy of the students has been analyzed by means of Multivariate Analysis of Variance (MANOVA). Before the analysis, assumptions about normality, linearity, multicollinearity, singularity and homogeneity of variance-covariance matrices were tested. No assumption was violated however; in order to provide multivariate normality some extreme outliers were omitted.

Assumptions for MANOVA

1. Sample Size

In MANOVA sample size is important to get away with violations of some of the other assumptions such as normality and linearity. In order to calculate MANOVA there must be more cases in each cell than we have dependent variables. In this study number of case is four and in each cell there are many more than required number of cases. So this assumption was not ignored.

2. Normality and Outliers

MANOVA requires both univariate and multivariate normality. There are different ways to assess univariate normality such as obtaining skewness and kurtosis values, calculating kolmogrov simirnov or checking graphs etc. In this study Q-Q plots were examined to assess normality. Each variable was examined individually and Q-Q plots showed us that all the variables disturbed normally. So univariate normality was tested. Since each variable assessed individually in terms of univariate normality we can assume that multivariate normality can be achieved. Moreover, in order to define both multivariate outliers and assess multivariate normality Mahalanobis distances was calculated. So maximum mahalanobis distances value was compared with critical value and variables whose mahalanobis value is higher than the critic value were defined as extreme outlier and omitted.

3. Linearity

Linearity assumption refers to the presence of a straight-line relationship between each pair of variables. In this study linearity was tested with scatter plots separately in terms of males and females for dependent variables. Scatter plots showed us that this assumption was not violated.

4. Multicollinearity and singularity

Manova requires moderately correlation among dependent variables. This is called multicollinearity assumption. Correlations were checked in order to assess multicollinearity no correlation higher than .80 was found. So this assumption was not violated.

5. Homogeneity of variance-covariance matrices.

Test of this assumption is generated in MANOVA output. Box M test of Equality of Covariance matrices test was used to assess this assumption.

Result of this test showed us that Homogeneity of variance-covariance matrices assumption was not violated [$F_{(10-3339704)} = 2.263$ $p > .01$].

MANOVA results shows that there is significant difference between the mean scores of students on dependent variables according to their gender [Wilks Lambda (Λ)=.985 $F(4, 843)= 3.191$, $p < .05$] (Table 14). This means that male and female students' mean scores differentiate significantly at least in one of the dependent variables. Below is the table which shows means, standart deviations and one-way Anova results for dependent variables

Table 14. Mean environmental literacy components by gender

Variable	Gender	n	X	S	df	F	P
Knowledge	Male	402	4.29	1.96	1-846	.402	.526
	Female	446	4.37	1.79			
Attitude	Male	402	36.13	4.56	1-846	9.173	.003
	Female	446	37.04	4.19			
Use	Male	402	71.03	7.63	1-846	5.429	.020
	Female	446	72.16	7.55			
Concern	Male	402	35.21	6.98	1-846	6.079	.014
	Female	446	36.33	6.23			

According to the table 14, students' attitude scores [$F(1-846)= 9.173$, $p < .05$], use scores [$F(1-846)= 5.429$, $p < .05$] and concern scores [$F(1-846)= 6.079$, $p < .05$] differentiate significantly depending on their gender. On the other hand there is no significant difference between the knowledge scores of female and male students [$F(1-846) = .402$, $p > .05$].

The table 14 shows that female students' mean scores on attitude, use and concern subscales are higher than the male students' have. This means that female students have more positive attitudes towards environmental issues and more positive views on environmental use than male students' have. Moreover the results indicate that female students concern about environmental problems more than male students' do.

4.9 Summary of Results

In the first section, the results of students' self assessment on their environmental perception and knowledge are given. The results indicated that 54% of the respondents evaluated themselves as having 'a fair amount of' concern about environmental problems and 62% of the students view environment as one of the 'most important' problems that humans face with currently. Only 4% stated that they practically had no concern about environmental problems and also they do not view environment as a problem. Moreover, 61% of students evaluated their level of environmental knowledge as 'a fair amount'. Only 1% stated that they practically had no knowledge.

In the second section, students are asked about their engagement in outdoor activities. The activity that students engage in frequently was hunting (80%) and it is followed by camping (60%). Moreover, bird watching (38%) and fishing (32%) were among the highest rated activities that students engage in frequently. However, 47% of the respondents stated that they 'never' engaged in walking.

The third section was about students' area of living. The results indicated that, 67% of the students spent most of their childhood in a small town up to then. Only 12% of the students responded that they spent most of their childhood in rural area or farm.

The fourth section gave the results of students' parents' perceptions about environmental problems and behavior towards environmental protection. While 53% of the students indicated that their parents concerned 'a fair amount' about

environmental problems, 51% of respondents stated that their parents were somewhat active in promoting environmentally friendly behavior. Only 2% of the students responded as 'don't know' for their parents' perceptions about environmental problems and only 4% of the respondents stated that their parents were not active at all in promoting environmentally friendly behavior.

In the fifth section, frequency distributions for students' level of environmental knowledge, attitude, use and concern were given for each item including subtitles. The first subtitle was about students' level of environmental knowledge. According to the results, 68% of the students have inadequate level of knowledge about environment based on the NEETF and Roper Starch grading scale. However, more than half of respondents correctly answered the questions concerning trees as *renewable resources* (64%), *definition of biodiversity* (58 %); batteries as *household hazardous waste* (59.5 %); and *human activities* of habitat as the major reason for animal extinction (53.5 %). On the other hand, the knowledge item most often answered incorrectly concerned the major *source of carbon monoxide* (74.7%) and the common *cause of pollution of streams, rivers and oceans* (55.1%). Furthermore, the largest number of 'don't know' responses concerned the common method for storing *nuclear waste* throughout the world (49.1%).

Moreover, the results of the environmental attitude subtitle indicated that students have positive attitude toward environment. The highest percentage of agree response among the environmental attitude statements was "*Plants and animals* have as much right as humans to exist" (84.1%). Other statements that students are agreed upon were about *ecological catastrophe* (74.8%), *natural resources* (70.6%) and *disastrous consequences* (62.4%). On the contrary, the statement that students disagreed with highest percentage was "The so-called '*ecological crisis*' facing humankind has been greatly exaggerated" (28.8%). Also, the students were undecided on the same statement (35.2 %).

Similarly, another statement that students disagreed and undecided about was “The *balance of nature* is strong enough to cope with the impacts of modern industrial nations” with 23.9% and 43.1% respectively. In addition, 32.3% of the students undecided if “We are approaching the *limit of the number of people* the earth can support” or not.

When students’ views on environmental uses and service were addressed in the fifth section, results showed that students are aware of the importance of interaction between humans and the environment. The highest three statements that students were agreed upon were about *special areas for endangered species* (88%), *awareness of environmental problems for everyone* (85.1%), *importance of plants and animals in the environment* (83.8%). However, the statement that students disagreed upon mostly was “*Poisonous snakes and insects* that pose a threat to people should be killed” (56.5%). In addition, the highest percentage of the statements that students were undecided about was *cultural changes* for the solution of environmental problems (31.7%) as well as *lifestyle changes* for the solution of environmental problems (30.1 %).

As the final component of the environmental literacy in the fifth section, environmental concern of the students was seemed to be high. 9 out of 10 items about environmental concern was received a concern response over 56%. The item most frequently receiving a concerned response was *air pollution* with 80.0% of respondents which is followed by *water pollution* (79.1%) and *global warming* (79.0%). As in line with the concerned responses, the not concerned responses were not more than 20%. The item that received the highest percentage of not concerned response was *industrial pollution* (27.7%). Besides, almost all of the responses that students are unsure about was less than 10% with an exception that is *industrial pollution* (10.9%).

In the sixth section, relationships among the components of the ELQ (knowledge, attitudes, uses, and concerns) have been analyzed by means of zero order correlations. Relationships found among the four components of environmental literacy included in the questionnaire can be considered as small except for the relationship between the variables attitude-use and use-concern.

The strongest correlation found between attitude and use variables among the components of the ELQ indicating that the students with positive attitude towards environmental issues have positive views on environmental uses and service or vice versa. Besides, there was a significant correlation between use and concern variables that means students concerning about environmental problems have more positive views on environmental use and service.

The seventh section included the results of the relationship between students' background characteristics and Environmental Literacy. Canonical correlation analysis was used to examine the relationship, if any, between the background characteristics of students and the set of environmental literacy variables in the questionnaire. The results showed that students' perception of interest, perception of importance, perception of knowledge, parents' interest in environmental issues, and parents' involvement in environmental activities were associated with knowledge, attitude, use and concern. That means students who are interested in environmental issues, who give importance to environmental problems, who thinks they have good knowledge about environmental issues, whose parents' are interested in environmental issues and whose parents involve in environmental activities have better knowledge about environmental issues, more positive attitude towards environmental issues, more positive view on environmental uses and service and concern environmental problems.

In the last section, the effect of gender on the environmental literacy of the students has been analyzed by means of Multivariate Analysis of Variance (MANOVA). The results displayed that students' attitude scores, use scores and concern scores differentiate significantly depending on their gender.

Even though female students' mean scores on attitude, use and concern subscales were higher than the male students', there was no significant difference between the knowledge scores of female and male students.

In other words, female students have more positive attitudes towards environmental issues, more positive views on environmental use and more concern about environmental problems than male students' have but same level of knowledge on environmental issues.

CHAPTER 5

DISCUSSION

The present study was intended to investigate primary school students' level of environmental literacy including knowledge, attitude, use and concern components. The purpose of this chapter is to present the description and interpretation of the data which was collected from 848 6th, 7th and 8th grades students in Bodrum, Turkey during April- May 2007. The accessible population for the study was calculated to be 7%; the number students completed questionnaires (848) divided by the total number of students enrolled in the public schools at the time (12096). The questionnaire used in this study was Environmental Literacy Questionnaire (ELQ) which was designed to measure four components of environmental literacy; knowledge, attitudes, uses and concerns about the environment. The major outcomes along with the data analyses were discussed here in order by the four research questions described in chapter one.

5.1 Discussion

The responses of students on the ELQ showed that, self-evaluation of environmental knowledge item was answered by most of the students (61%) indicating that they have 'a fair amount' of knowledge about environment. However, respondents did not indicate a strong confidence in the extent of their environmental knowledge, with 14% of respondents indicating that they have 'a lot' of knowledge about environment. When they are asked a series of environmental knowledge questions, the results indicated that only 42% of the students have adequate level of knowledge about environment. So, it appears that they were fairly realistic about their level of environmental knowledge.

The studies done on environmental education shows that people have little knowledge about the environment (Dechano 2006). The environmental knowledge surveys by age or region are not consistent (Coyle 2005). A study done by Gendall et al. (1995) amongst 22 countries on the public understanding of scientific and environmental facts found that U.S. and German respondents have the lowest score followed by Great Britain, New Zealand and Norway (Coyle, 2005). According to the NEETF/Roper studies, people's level of education was found to be the most significant single factor in the level of environmental knowledge (Coyle, 2005).

However, Chu et al. (2007) found that that young children lack knowledge concerning several aspects about the environment, such as the interrelationship among creatures and between plants and animals, energy sources of plants and humans or animals, food chains, and the roles of unattractive animals. Also, young children are not well informed about environmental issues, such as endangered animals, wild animals, and other topical environmental issues affecting society. However, they are relatively familiar with issues of environmental pollution such as air pollution and water pollution. Also, DeChano (2006) found that, the students are not well prepared in their basic knowledge about the environment. While Swiss students achieved the highest scores, Chile students attained the lowest scores on the knowledge base section of the survey. On the other hand, students demonstrated a positive attitude toward the environment. Besides, results of the other studies revealed that students did not possess the knowledge necessary to be *environmentally literate* (Culen & Mony, 2003; Shepardson, 2005).

Furthermore, Chu et al. (2007) found that environmental literacy levels of students is correlated with their area of residence. Although most of the students of the current study spent their childhood in Bodrum which is a small town with natural beauties and resources, it does not seem that they are aware of the issues concerning environment as students in metropolitan areas.

Indeed, more than 50% of respondents correctly answered the questions concerning trees as *renewable resources* (64%) (item no.8); *definition of biodiversity* (58 %) (item no.4); batteries as *household hazardous waste* (59.5 %) (item no.12); and *human activities* (53.5%) (item no.13) of habitat as the major reason for animal extinction (53.5 %). Similarly, Kaplowitz and Levine (2005) found that the highest percentages of the correct responses received from the participants in their study were about household *hazardous wastes* (82.8%) and *biodiversity* (86.4%).

Besides, the knowledge item most often answered incorrectly concerned the major *source of carbon monoxide* (74.7%) (item no.5). The unexpected incorrect response was concerned the common *cause of pollution of streams, rivers and oceans* (55.1%) (item no.7). Since Bodrum is on the Aegean coast of Turkey students are expected to know about the marine issues. Additionally, another knowledge item answered incorrectly was the *electricity generation* (item no.6) in Turkey with 36% of the students thinking that most electricity in Turkey is produced by hydro electric power plants. Similarly, the items that students responded incorrectly with the lowest scores concerned electricity generation (55.8%) in the study of Kaplowitz and Levine (2005). Moreover, 32.1% of the students thought that most of the *garbage in Turkey* (item no.10) ends up in recycling centers instead of solid waste storage areas which may be seem as the results of recycling projects done in Bodrum.

Although there were not many ‘don’t know’ responses on environmental knowledge items with high percentages the largest number of ‘don’t know’ responses concerned the common method for storing *nuclear waste* (item no.14) throughout the world (49.1%). As Littlelyke (2004) found, older students displayed more understanding on the global concepts than the younger ones. Therefore, the ‘don’t know’ response of the students about the nuclear waste might be the reason of their age. This assumption is supported by the study of Barney et al. (2005) indicating that the highest scores for the knowledge dimensions were associated with the college-age students as opposed to the elementary school students who had the lowest scores.

In addition, even though the new science curriculum mentions about the nuclear wastes at the seventh grade, at the time of the study, the integration of EE concepts were just at the beginning stage so students were not faced with the concepts about nuclear wastes commonly.

The results of the environmental attitude items showed that students have positive attitudes toward environment. Also, since the highest percentage of agree response (84.1%) among the environmental attitude statements was “*Plants and animals* have as much right as humans to exist” students seem to have eco-centric worldview that is they are environment oriented. In other words, human-being does not seem as the dominator of the natural environment which in turn supports the quality of the nature and students’ environmentally friendly behavior.

Additionally, 74.8% of the students agreed that “If things continue on their present course, we will soon experience a major *ecological catastrophe*”. Moreover, 70.6% of the students were agreed on the item stating that, “The earth has plenty of *natural resources* if we just learn how to develop them”. This is an important indicator of positive attitudes of students toward their environment because they live in a town that is full of natural resources. So, their agreement on the development of natural resources is a good sign for the sustainable use of natural resources in this region. Similarly, the participants in the study of Pipinos and Fokiali (2007) displayed positive attitude toward the conservation of the natural and cultural environment of their area.

In addition, the statements on environmental attitude items that students disagreed and undecided about were about “The so-called ‘*ecological crisis*’ facing humankind has been greatly exaggerated” and “The *balance of nature* is strong enough to cope with the impacts of modern industrial nations” (28.8%, 35.2 % and 23.9%, 43.1% respectively). Tikka, Kuitunen and Tynys (2000) found that students coming from the metropolitan area in southern Finland had the most positive attitudes toward environment comparison to the students coming from farming families.

Since the students live in Bodrum, they have not faced with big environmental problems yet, they do not seem to be aware of the existing problems around the world. However, their perception on the importance of environmental problems revealed that 62% of the students view environment as one of the ‘most important’ problems that humans face with currently. Students’ environmental ideas and attitudes are influenced by media (films and books about nature) (Eagles & Demare, 1999) so the high percentage of students’ responses for the environmental problems may be as a result of the news and discussion made on the environmental problems through media.

When students’ views on environmental uses and service were addressed, the results indicated that students agreed on more than half of the items (11 out of 19) with over 60% evidencing pro-environmental awareness, values, cultural change, individual responsibility, life style changes, collective actions, technology, and protective laws. The highest three statements that students were agreed upon were about *special areas for endangered species* (88%), *awareness of environmental problems for everyone* (85.1%), *importance of plants and animals in the environment* (83.8%). Furthermore, they were aware of the importance of responsibility of the people (79.6%) and their own (75.2%) for the solution of environmental problems which is also a good indicator for the development of environmental literacy. On the other hand, even though the students see *technological changes* (73.7%), *changes in people’s values* (59.9%) and *lifestyle changes* (55.6%) as important items for environmental problems they were also disagreed and undecided about the effects of *cultural changes* (13.8% and 31.7% respectively) for the solution of environmental problems. Indeed, as a culturally rich region for thousands of years, it is expected for students that live in Bodrum to be aware of the impacts of cultural changes on the environment. However, since they are the millennium students they are mostly faced with the impacts of technology on their lives.

Moreover, the results of the environmental concern items showed that students are highly concerned about the environment. All but one item received concerned response with over 56% which is in correlation with the self assessment of the students on their level of environmental concern in which 54 % of the respondents evaluated themselves as having ‘a fair amount of’ concerned about environmental problems. The highest rated items received a concerned response were *air pollution* (80.0%); *water pollution* (79.1%), *global warming* (79.0%) and *poor drinking water quality* (69.7%).

Studies done on EE indicated that students have concern but not enough understanding about the environment (Salmon 2000). For instance, in the study of Littledyke (2004) most of the students were found to have limitations in their understanding of the environmental issues but they were highly interested and concerned about environmental issues. Also, few of them were aware of the impact of science on society or the environment. Although students easily worry about the environmental problems, they do not have enough knowledge and action strategies to help nature. Environmental scientists and experts, by using complex terminology, assume that the public easily understand the concepts and their effects on lives, health, and activities of the people (Coyle, 2005). The main prerequisites to appropriate action are knowledge and sensitivity to a problem. In other words, a student should have knowledge and know what to do about the problem (Moseley, 2000).

Besides, a contradiction between knowledge about and concern for the environment is; while a person can exhibit high levels of concern about the environment with a low level of knowledge about it, one can also have low levels of concern about the environment but high levels of knowledge about it (Morrone et al., 2001). To institute policies in an effective way balancing the struggle between the humanity and the environment, we should have an understanding of the causes that make individuals concern toward the environment (Weaver, 2002).

Students' concern and positive environmental attitudes increases when they are faced with environmental concepts through their science courses (Yılmaz et al., 2004). Some studies found that construction of ideas about ecology and environmental concern of individuals are related with animals (Myers et al., 2004). For instance, Barney et al. (2005) found that environmentally friendly behavior of the students toward dolphins was related to their knowledge and attitudes.

Based on the area they are living that is a small town the students in this study are not mostly faced with the problems that people face in metropolitan areas which is evident in their responses that they are not concerned about *industrial* (27.7%) and *noise pollution* (23.5%). Perhaps as in the study of Palmberg and Kuru (2000), they see the problems as something not concerning them. In addition, the issues those students mostly unsure about were *hazardous wastes* (9.4%) and *ozone depletion* (8.0%) which can be also as a result of poor science curriculum that neglects to mention about environmental problems at the time of the study.

When the relationships among the four components of environmental literacy included in the questionnaire were investigated, it was found to be small except for the relationship between the variables attitude-use and use-concern. The results indicated that the students with positive attitude towards environmental issues have positive views on environmental uses and service or vice versa. It is really important for the students that live in Bodrum having positive attitudes toward environment and positive views on environmental uses in order to protect the natural beauty of their environment as well as using the natural resources in a sustainable way. Sustainability was seen as a central component to help children to engage in critical reflection on a wide range of environmental issues and be able to take action to improve the world in which they live (McNaughton, 2004). As stated by the author "it should aim to equip learners with the knowledge, skills and values necessary for becoming 'global citizens'" (p.140). Besides, the significant correlation between use and concern variables showed that students concerning about environmental problems have more positive views on environmental use and service.

Students' high level of concerns about environmental problems and positive views on environmental use is increasing the hopes for a better future.

Additionally, there is little information on the assessment of students' acquired environmental knowledge and attitudes (Lee & Williams, 2001). Although many studies indicate that there is relationship between knowledge and attitudes (Disinger, 1986; Weaver, 2002; Dimopoulos & Pantis, 2003) toward environment there are also many studies that place doubt on the relationship between environmental knowledge and attitude (Dechano, 2006). In order to improve public's attitudes toward nature, we should be able to understand the relationship between the attitudes of people toward nature and what factors determine these attitudes (Tikka et al., 2000). In addition to knowledge, feelings and values of the students influence their attitude toward nature (Tikka et al., 2000). In the study of Disinger (1986) it was found that students were aware of the environmental problems but they gave correct answers to the only half of the questions that measured their knowledge of environment since the attitudes are also dependent on personal feelings and values (Tikka et al., 2000). Personal values and knowledge which makes students understand the relationship between humans and nature is the key factors for students to increase willingness to act through environmental problems (Palmberg & Kuru, 2000). However, many of the values formed are driven by the teachers not by the students (Knapp, 2000). So, teachers should be given enough importance for the development of students' environmental literacy.

Furthermore, examination of the relationship, if any, between the background characteristics of students and the set of environmental literacy variables in the questionnaire showed that students who are interested in environmental issues, who give importance to environmental problems, who thinks they have good knowledge about environmental issues, whose parents' are interested in environmental issues and whose parents involve in environmental activities have better knowledge about environmental issues, more positive attitude towards environmental issues, more positive view on environmental uses and service and concern environmental problems.

In addition, the results of the analysis of students' view on their parents' perceptions about environmental problems and behavior towards environmental protection indicated that 53% of the students responded that their parents concerned 'a fair amount' about environmental problems. 51% of respondents stated that their parents were somewhat active in promoting environmentally friendly behavior. Parents as one of the main contributors to enhance students' environmental knowledge, attitudes, uses and concerns about the environment only 2% of the students responded as 'don't know' for their parents' perceptions about environmental problems and only 4% of the respondents stated that their parents were not active at all in promoting environmentally friendly behavior. It was found that talking about the environment at home is correlated with ecologist and moralistic attitudes toward the environment (Eagles & Demare, 1999). Also the study of Culen and Mony (2003) found that *parents* were one of the most frequent choices made by children when asked to select how they had heard about environmental issues. Since parents influence the students' moderate levels of environmental literacy they should be educated on the environmental issues in different ways.

When students are asked about their engagement in outdoor activities which is a sign of their interest within the environment, the results indicated that students frequently engaged in hunting (80%) and camping (60%). Moreover, bird watching (38%) and fishing (32%) were among the highest rated activities that students engage in frequently. The results of NEETF/Roper surveys indicated that geographic region influences environmental knowledge and participation of individuals in environmental activities (Coyle, 2005). Bodrum with a variety of animal species both in the forests and in the sea is a valuable resource and place for relaxation for the local residents. That is why students seem to engage in camping and bird watching frequently. However, high percentages of the responses in hunting and fishing may result in the extinction of these species.

When children directly experience environmental concepts, their familiarity and understanding of the terms increase (Barraza & Cuaron 2004). Palmnerg & Kuru (2000) found that experiences in nature developed pupils' self-confidence and feelings of safety, which in turn increased their willingness to participate in future outdoor activities. Besides, the experienced pupils seemed to have a strong and clearly definable empathetic relationship to nature and they exhibited better social behavior and higher moral judgments and also they expressed their feelings towards other people and organisms. Similarly, Tikka et al. in 2000 found that students who come from farming families are the most active because outdoor activities are a natural part of their lifestyle. Also, when students are provided with more opportunities on environmental experiences then they can choose environment-based professions.

Finally, the results displayed that female students were found to have positive attitudes towards environmental issues, more positive views on environmental use and more concern about environmental problems than male students' have but have same level of knowledge on environmental issues. This is a common result for many studies that is as a result of the cultural forces and evolutionary history "females are more likely than males to associate themselves with "caregiver" roles" while males associate themselves with "breadwinner" role (Weaver, 2002). That is why women are more concerned about the environmental issues than men. Thus, since females seem more concerned on and interested in the environment, environmental education could encourage and foster more females to become scientists (Coyle, 2005).

Although there are contradictions for the effect of gender on students' knowledge, attitude, use and concern, gender was found to affect pro-environmental attitudes in the study of Weaver (2002) across the United States, Great Britain, West Germany, Russia, and Japan with some variation in significance and direction of influence. Furthermore, significant differences were found between females and males in attitudes, knowledge and concern on the environment in many other studies (Eagles & Demare, 1999; Tikka et al., 2000; Jenkins & Pell, 2006; Pipinos & Fokiali, 2007).

On the contrary, even though females are more concerned on the nature they show less knowledge than males (Robinson & Crowther, 2001; Tikka et al., 2000; Tuncer et al., 2005).

5.2 Limitations of the study

Since this study was conducted for 848 primary school students (6th, 7th and 8th grades) during a single semester at four public schools, it may not reflect the level of environmental literacy of students in the population at large. On the other hand, relatively little is known about the knowledge, attitudes, uses and concerns of primary students about environment. Therefore, this study is intended to provide a starting point for further investigation of students' environmental literacy levels.

5.3 Recommendations for Future Research

Since this study investigated the primary school students' level of environmental literacy levels in Bodrum, future study should investigate the different school grades students' and different target groups' level of environmental literacy for more generalization of the population and also for the increased awareness of the society on the issues related to the environment and sustainable development. Moreover, sample size could be increased and interviews can be conducted in addition to the questionnaire in order to gain more insight about students' environmental literacy levels and ideas about the environment. Additionally, future research could be conducted involving different populations and places with a variety of characteristics around Turkey for comparison of the regions so that different needs of the students could be determined for an effective EE and action strategies could be developed for sustainable development of Turkey.

5.4 Implications of the study

Environmental education would support the younger generations to lessen the environmental mistakes of their elders since people who are educated on the environment are more likely to be a part of environmental activities (Coyle, 2005). So, there should be more research on students' level of environmental literacy for efficient curriculum development and instruction.

This study has shown that although students displayed positive attitudes, high concerns and positive views for the use of environment they were not seem to have enough knowledge about the environment. Although they had low levels of knowledge, both females and males had almost the same levels of knowledge which is a good indication of fair education for both females and males. In order to support them to increase their levels of knowledge on environment, different teaching materials and activities should be provided for teachers and students so that they can be more knowledgeable about the environment. The findings of science and technology should be a part of education in order to create an awareness and understanding of environmental issues (UNESCO, 1978).

Besides, since in Turkey the environmental education is just integrated in the science curriculum more deeply, the curriculum design should be helpful for better development of EE. Since there are different cultural regions in Turkey, the different school curriculum based on the needs and understanding of students about EE should be investigated. Besides, EE programs in schools and institutions should be linked with each other so that students can have the opportunity to participate in outdoor activities held by the institutions or act collectively to resolve environmental problems. In the study students were frequently engaged in most of the outdoor activities but walking. Thus, being a great place with its natural beauties, students can be directed through activities on the environment such as field trips so that they can enjoy walking while investigating the nature.

Also, teachers can contribute to the design of such activities and to the shape of the curriculum. For instance, they should enroll in environmental activities in collaboration with their local district administration and community. Also, pre-service and in-service training of teachers should have the top priority to incorporate the full measure of environmental education (Knapp, 2000). To investigate the attitudes, self-efficacy, perceived barriers and intentions of teachers on EE will make the educators more aware about environmental issues so that Turkey will have more environmentally literate citizens.

Additionally, there should be partnerships with non-formal institutions and other community sources. More studies are needed involving different target groups such as local residents, tourists, agencies and various authorities in order to make more generalizations for the touristic places. Although there seem to be more important environmental problems to be concerned, protection of cultural and historical heritages are also important problems to be questioned (UNESCO, 1978). New approaches and solutions are required for the solutions of existing and upcoming environmental problems so that local places such as Bodrum can be developed in a sustainable way without disturbing the cultural and natural beauties. For example, a kind of alternative tourism known as ecotourism can be started for the conservation of environmentally and culturally sensitive areas and also for the development of local people in social and economic aspects (Pipinos & Fokiali, 2007). Thus, different strategies can be helpful for the awareness of the local people and tourists about the environment.

“Many of our leading environmental problems today and into the future will be the result of the accumulated actions of individuals” (Coyle, 2005). The best way for students to be more environmentally literate is to address local issues in the classroom and to enroll in environmental activities in their area that are concern to them. As citizens, students will be the main solvers of environmental problems so from a young age, they should show active and responsible environmental behavior (Chu et al., 2007).

5.5 Conclusion

In 1977, the definitions of the nature, objectives and pedagogical principles of environmental education and guidelines for action nationally and internationally were defined (UNESCO-UNEP, 1987) at the Intergovernmental Conference on Environmental Education which is commonly known as Tbilisi Conference. Since then, efforts have been made for the content of and methods to improve environmental education in a more precise way both in international and national levels (UNESCO-UNEP, 1987).

The objectives of EE are categorized into five topics that are awareness, knowledge, attitude, skills and participation. While awareness is described as “to help social groups and individuals acquire an awareness of and sensitivity to the total environment and its allied problems”, knowledge helps those to gain different kinds of experience in the environment and acquire the required knowledge about it and associate problems. According to the definitions, attitudes should help groups and individuals to have values and feelings of concern for environment and also motivation for active participation for the improvement and protection of it. Besides, skills are needed for social groups and individuals to identify and solve environmental problems. In addition, participation is described to have the opportunities for social groups and individuals to be actively involved in working toward the resolution of environmental problems (UNESCO-UNEP, 1987).

In order to achieve the objectives of EE, it is recommended to the create specialized units by the appropriate authorities to train leaders in the environmental fields; develop school curricula satisfying the needs of the environment at the local, regional and world levels; prepare books and scientific reference works necessary for the improved curricula; determine educational methods and media, including the audio-visual aids needed for the purpose of explaining and popularizing environmental curricula and programs (UNESCO, 1978).

Although we become more concerned for the quality of the environment and its relationship to human health, it is getting harder to do something constructive about the problems (Coyle, 2005). Indeed, people mostly tend to blame other things for the environmental problems instead of taking account the impacts of their own actions.

The knowledge and attitudes of potential learner groups concerning the environment are important for the training of teachers to help them gain a different perspective through teaching since they “emerge from a process of traditional, single-discipline education” (UNESCO-UNEP, 1987). The curricula, teaching methods and materials, institutional organization and teacher training are the essential basis for EE to be implemented in truly interdisciplinary ways (UNESCO-UNEP, 1987).

All of us, not only the environmental educators or teachers have a role in helping students to build the knowledge and skills needed for environmental problems (Salmon, 2000) The development of environmental skills of the students is dependent on their environmental behavior (Hoody, 1995). Although behavioral change can have huge impacts on the environment, Roper research shows that people as individuals do not think that they can make a difference on the environment as opposed to the responses of a company or public institution (Coyle, 2005). For changes in behavior, environmental knowledge works best when given information do not require in-depth understanding or skills such as saving water and electricity (Coyle, 2005). In order to change one’s behavior, environmental sensitivity, personal beliefs, decision making and problem-solving skills must be linked with environmental knowledge (Morrone et al., 2001).

Educational interventions should be designed in a way that encourages active participation and cooperation of students focusing on the style of students’ learning experience (Devine-Wright, 2004). Constructivist theory takes students’ pre-knowledge about the world into account so it aims to present the new knowledge in a way that fits the existing worldview of the students (DiEnno & Hilton, 2005).

Thus, it may help students to gain knowledge, attitudes and enhance decision-making skills about the environmental issues (DiEnno & Hilton, 2005).

“In the context of ecological crisis and environmental deterioration, teaching about environmental issues and the preservation of the world’s environment has become increasingly important across the globe” (Ko & Lee, 2003). Although the goals and objectives of EE cannot be defined without the economic, social and ecological aspects of a society, certain objectives of it are common to the all societies around the world (UNESCO-UNEP, 1987). Resolving serious environmental problems at the global level can be achieved by creating an awareness of the economic, political and ecological interdependence of the modern world so, for the analysis and solutions of environmental problems, a holistic approach should be developed within the contribution of all natural, social and human sciences and the arts (UNESCO, 1978).

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APPENDIX
ENVIRONMENTAL LITERACY QUESTIONNAIRE

EĞİTİM VE ARAŞTIRMA İÇİN ÇEVRE OKUR YAZARLIĞI
ANKETİ

Bu anketin amacı öğrencilerin çevre ile ilgili tutum, bilgi ve ilgilerini değerlendirmektir. Anketin tamamlanması yaklaşık 15-20 dakikanızı alacaktır. Bu çalışmaya katkılarınız **gönüllü** olmanıza bağlı olup, çalışmanın sonuçlandırılabilmesi açısından çok değerlidir.

Bu anketten elde edilecek verilerin değerlendirilmesi aşamasında, anketin son bölümünde yer alan kişisel bilgiler kesinlikle gizli tutulacaktır. İsim ve diğer özel bilgiler anketin kapsamında yanıt verilen sorularla kesinlikle bağlantılandırılmayacaktır. Özel bilgilerinizin gizli tutulması konusunda gereken titizliğin gösterileceği kesinlikle garanti edilmektedir.

Bu çalışma ile ya da sizin katkılarınız ile ilgili sorularınız için Gaye Tuncer'i 210 4065 no'lu telefondan arayabilirsiniz.

Eğer bu çalışmaya gönüllü olarak katkıda bulunmayı kabul ediyorsanız lütfen sonraki bölümlerde yer alan soruları yanıtlamaya geçiniz ve lütfen her soru için bir seçenek işaretleyiniz.

Yardımlarınız ve katkılarınız için teşekkür ederiz.

ÇEVRE

1. Çevre sorunları ile ne kadar ilgilisiniz?

- çok fazla
- yeteri kadar
- biraz
- pek az
- hiç

2. Aşağıdakilerden hangisi sizin görüşünüze en yakındır?

Çevre günümüzde insanların karşı karşıya olduğu en önemli 2 ya da 3 problemden biridir.

Çevre önemli bir problemdir, ama daha önemli başka problemler de vardır.

Çevre önemli bir problem değildir.

Çevre bir problem değildir.

3. Çevre konuları ve problemleri ile ilgili, genel olarak, ne kadar bilginiz olduğunu düşünüyorsunuz?

- çok
- yeteri kadar
- biraz
- hiçbirşey
- fikrim yok

4. Çok çeşitli bitki ve hayvan türleri vardır ve bunlar çok farklı ortamlarda yaşamaktadır. Bu düşünceyi tanımlamak için kullanılan sözcük hangisidir?

- Çeşitlilik
- Biyolojik çeşitlilik
- Sosyo-ekonomik
- Evrin
- Bilmiyorum

5. Türkiye’de karbon monoksit hava kirliliği yaratan önemli bir kirleticidir. Aşağıdakilerden hangisi en önemli karbon monoksit kaynağıdır?

- Fabrikalar ve işyerleri
- İnsanların nefes alıp vermesi
- Motorlu araçlar
- Ağaçlar
- Bilmiyorum

6. Türkiye’de elektrik üretimi büyük ölçüde nasıl gerçekleştirilmektedir?
Petrol, kömür ve odun yakılarak
Nükleer santraller ile
Güneş enerjisi ile
Hidro elektrik santraller ile
Bilmiyorum
7. Türkiye’deki akarsu ve deniz kirliliğinin en temel nedeni nedir?
Arıtılmamış evsel, sanayi ve tarımsal atıksular
Bahçe ve caddelerden akan sular
Kumsal ve plajlardan atılan çöpler
Şehir çöplerinin boşaltılması
Bilmiyorum
8. Aşağıdakilerden hangisi yenilenebilir bir kaynaktır?
Petrol
Demir Madeni
Ağaçlar
Kömür
Bilmiyorum
9. Ozon, atmosferin üst katmanlarında koruyucu bir tabaka oluşturur. Ozon bizi aşağıdakilerden hangisinden korur?
Asit yağmurları
Küresel ısınma
Sıcaklıktaki ani değişimler
Zararlı, kansere neden olan güneş ışığı
Bilmiyorum
10. Türkiye’de çöplerin büyük bir kısmı nereye atılır?
Denizler
Yakma tesisleri
Geri dönüşüm merkezleri
Çöp depolama alanları
Bilmiyorum
11. Türkiye’de çevreyi korumaya yönelik kararlar alan resmi kurumun adı nedir?
Çevre ve Orman Bakanlığı
TEMA
Tabiatı Koruma Vakfı
Türkiye Çevre Eğitim Vakfı
Bilmiyorum

12. Aşağıdaki evsel atıklardan hangisi zararlı atık olarak adlandırılabilir?

- Plastik ambalajlar
- Cam
- Piller
- Yemek artıkları
- Bilmiyorum

13. Hayvan türlerinin nesillerinin tükenmesinin en yaygın sebebi nedir?

- Pestisitler hayvanların ölmesine yol açmaktadır.
- Yaşam alanları insanlar tarafından yok edilmektedir.
- Avcılık çok artmıştır.
- İklim değişiklikleri hayvanları etkilemektedir.
- Bilmiyorum.

14. Bilim adamları nükleer atıkların depolanması ile ilgili çalışmalarında henüz sonuca ulaşamamışlardır. Şu anda dünyada yaygın olan nükleer atık depolama yöntemi nedir?

- Nükleer yakıt olarak kullanılmaktadır
- Başka ülkelere satılmaktadır
- Çöp depolama alanlarında depo edilmektedir
- Depolanmakta ve kontrol altında tutulmaktadır
- Bilmiyorum

15. Aşağıdaki tümceler insan ve çevre ilişkisini yansıtmaktadır. Lütfen düşüncelerinizi her tümce için verilen seçeneklerden birini işaretleyerek belirtiniz.

		kesinlikle katılmıyorum	katılmıyorum	kararsızım	katılıyorum	kesinlikle katılıyorum
a	Dünyanın insan yaşamını destekleme kapasitesini doldurmak üzereyiz.					
b	İnsanların doğaya müdahale etmesi genellikle felaketle sonuçlanır.					
c	Dünyada herkese yetecek miktarda doğal kaynak vardır, sorun bu kaynaklardan nasıl yararlanacağımızı öğrenmektir.					
d	Bitki ve hayvanlar da insanlar kadar varolmayaşama hakkına sahiptir.					
e	Doğanın dengesi, modern endüstrileşmiş toplumların etkileri ile rekabet edebilecek					

	güçtedir.					
f	Bizi diğer canlılardan üstün kılan özel yeteneklerimize rağmen, hala doğa yasaları ile mücadele ediyoruz.					
g	İnsanların karşıkışıya kaldıkları 'Ekolojik kriz' olarak adlandırılan olaylar fazlasıyla abartılmaktadır.					
h	İnsan olmak doğanın geri kalan bölümüne hükmetmektir.					
i	İnsanlar doğayı kontrol edebilmek için doğayı anlama gerektiğini sonunda öğrenecekler					
j	Eğer herşey bugünkü gibi devam ederse, yakında büyük bir ekolojik facia ile karşılaşacağız.					

16. Lütfen aşağıda verilen her tümce için verilen seçeneklerden birini işaretleyiniz.

		kesinlikle katılmıyorum	katılmıyorum	kararsızım	katılıyorum	kesinlikle katılıyorum
a	Soyu tükenmekte olan türler için özel alanlar ayrılmalıdır.					
b	Su kalitesi ile ilgili yasalar daha yaptırımcı olmalıdır.					
c	İnsanların et ihtiyaçlarının karşılandığı vahşi hayvanlar korunması gereken en önemli türlerdir.					
d	Zehirli yılanlar ve böcekler insanlar için tehdit oluşturdukları için öldürülmelidirler.					
e	Toprak sahiplerine sulak alanlarını tarımsal ve endüstriyel amaçlar için kullanmalarına izin vermelidir.					
f	Herkesin çevre sorunlarının farkında olması çok					

	önemlidir.					
g	Şahıslar sahip oldukları arazileri istedikleri şekilde kullanmakta serbest olmalıdır.					
h	Çevre sorunlarının çözümlenmesinde kişisel sorumluluklarım olduğunu düşünüyorum.					
i	Hükümet, vahşi hayatın korunması amacı ile özel mülkiyet alanlarının kullanımını denetlemelidir.					
j	İnsanlar çevreye verdikleri hertürlü zarardan sorumlu tutulmalıdır.					
k	Bitki ve hayvanların tümü çevrede önemli bir role sahiptir.					
l	Teknolojik değişimlerin çevre için yararları olduğu kadar zararları da vardır.					
m	Hükümet geri dönüşümün zorunlu olması yönünde yasalar hazırlamalı ve uygulamalıdır.					
n	Hava kirliliği ile ilgili yasalar yeteri kadar serttir.					
o	Çevre problemlerinin çözümünde bilim ve teknoloji çok önemlidir.					
p	Çevre problemlerinin çözümünde kültürel farklılıklar çok önemlidir.					
r	İnsanların değer yargılarının değişmesi çevre problemlerinin çözümlenmesinde rol oynayacaktır.					
s	Toplu eylemler çevre problemlerinin çözümünde önemli bir yer tutar.					
t	Yaşam alışkanlıklarındaki değişimler (tüketim gibi) çevre problemlerinin çözümlenmesinde önemli rol oynayacaktır.					

17. Aşağıda verilen çevre problemleri ile, genel olarak, ne kadar ilgilisiniz? Lütfen her madde için verilen seçeneklerden birini işaretleyiniz

		ilgisiz	çok az ilgili	kararsızım	biraz ilgili	ok ilgili
a.	Duman kirliliği.					
b.	Ses kirliliği.					
c.	Otomobil emisyonları.					
d.	Endüstriyel kirlilik.					
e.	Zararlı atıklar.					
f.	Kalitesiz içme suyu.					
g.	Kapalı alanlarda oluşan hava kirliliği.					
h.	Ozon tabakasının delinmesi					
i.	Küresel ısınma.					

KİŞİSEL BİLGİLER

Yukarıdaki ankete verdiğiniz yanıtları daha kapsamlı değerlendirebilmek için size bir kaç kişisel soru sormak istiyoruz. Bu bölümde vereceğiniz yanıtların gizli tutulacağını lütfen unutmayınız.

18. Cinsiyetiniz nedir?

Erkek

Kadın

19. Hangi yılda doğdunuz? 19__

20.Şu anda kaçınıcı sınıftasınız?

6. sınıf

7.sınıf

8.sınıf

9.sınıf

21. Aşağıdaki aktiviteleri bir yıl içinde hangi sıklıkta yaparsınız?

	sıklıkla	bazen	ara sıra	hiçbir zaman
a. Kamp				
b. Açık havada yürüyüş				
c. Kuş gözleme				
d. Balık tutma				
e. Avcılık				

22. Şimdiye dek yaşadığınız bölge aşağıdakilerden hangisi ile tanımlanabilir?

Kırsal alan, çiftlik

Küçük kasaba (nüfusu 25 000 ile 100 000 kişi arasında)

Büyük şehir (nüfusu 100 000 kişiden fazla)

23. Anne ve babanızın çevre problemlerine ilgisi konusunda ne düşünüyorsunuz?

çok

yeteri kadar

çok değil

hiç

kararsızım

24. Anne ve babanız çevre korumacı davranışlar konusunda ne kadar aktiftir?

çok aktif

biraz aktif

aktif değil

kararsızım

25. Anne ve babanızın eğitim seviyesi hangi düzeydedir?

Anneniz	Babanız
İlkokul	İlkokul
Ortaokul	Ortaokul
Lise	Lise
Meslek Lisesi	Meslek Lisesi
Üniversite	Üniversite
Yüksek Lisans	Yüksek Lisans
Doktora	Doktora

Katkılarınız için teşekkür ederiz!

Bizimle paylaşmak istediğimiz bir düşünceniz varsa, lütfen aşağıdaki boşluğu kullanınız.