

EFFECT OF DESIGNED ENVIRONMENTAL EDUCATION LECTURES ON
ENVIRONMENTAL ATTITUDES OF PRIMARY SCHOOL STUDENTS

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ABSTRACT

EFFECT OF DESIGNED ENVIRONMENTAL EDUCATION LECTURES ON ENVIRONMENTAL ATTITUDES OF PRIMARY SCHOOL STUDENTS

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This study aims to measure the effect of designed environmental education lectures that is based on general environmental problems on primary school students' attitudes toward environment. The participants of this study obtained from a governmental school in Yüzüncü Yıl districts of Ankara and consists of 51 (18 fourth grade and 33 fifth grade) students. In the study that is held in 2006-2007 education year students implemented to environmental education lectures for one month. The lectures included the "sustainable development" and "ecological footprint" concept, as well as the general environmental problems, their reasons and recycling as solution for reducing environmental problems, and student-centered teaching methods such as discussion, role playing, cooperative learning and questioning were used during the lectures in addition to the traditional teaching method. The data concerning the effect of the lectures was obtained by the environmental attitude questionnaire implemented to the students before and after the treatment as pre-test and post-test. Independent sample t-test and paired sample t-test were conducted for data analysis and the result of the study indicated that environmental education lectures increased the environmental attitudes of the students.

Keywords: Environmental Education, Environmental Attitude, Education for Sustainable Development, Sustainable Development, Ecological Footprint

ÖZ

DİZAYN EDİLEN ÇEVRE EĞİTİMİ DERSİNİN İLKÖĞRETİM ÖĞRENCİLERİNİN ÇEVRESEL TUTUMALARINA OLAN ETKİSİ

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Bu çalışma genel çevre problemleri temel alınarak hazırlanan çevre eğitimi derslerinin ilköğretim öğrencilerinin çevreye yönelik tutumlarına olan etkisini ölçmeyi hedeflemektedir. Deneysel çalışma yöntemi ile yapılan bu araştırmanın örneklemini Ankara'nın Yüzüncü Yıl semtindeki bir devlet okulundan elde edilmiştir ve toplam 51 (18 dördüncü sınıf ve 32 beşinci sınıf) öğrenciden oluşmaktadır. 2006-2007 eğitim yılı içinde gerçekleştirilen bu çalışmada öğrencilere bir ay süren çevre eğitimi dersleri uygulanmıştır. Genel çevre problemleri ve sebepleri konularının yanı sıra sürdürülebilir kalkınma, ekolojik ayak izi ve geri dönüşüm kavramlarını da içeren bu derslerde geleneksel anlatıma ek olarak öğrenci merkezli öğretim yöntemleri kullanılmıştır. Tasarlanan çevre eğitimi derslerinin ilköğretim öğrencilerinin çevreye yönelik tutumlarına olan etkisi çalışmanın öncesinde ve sonrasında ön-test ve son-test olarak uygulanan çevresel tutum anketleri sonuçlarının karşılaştırılması yolu ile ölçülmüştür ve “ilişkili örneklem için t-testi” ve “ilişkisiz örneklem için t-testi” analiz yöntemleri kullanılmıştır. Sonuç olarak, çevre eğitimi derslerinin öğrencilerin çevresel tutumlarını pozitif yönde etkisi olduğu bulunmuştur.

Anahtar Kelimeler: Çevre Eğitimi, Çevresel Tutum, Sürdürülebilir Kalkınma için Eğitim, Sürdürülebilir Kalkınma, Ekolojik Ayak İzi

To My Parents
Neval and Ali Ferit YILDIRIM

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CHAPTER 1

INTRODUCTION

Beginning from 1950's human being, equipped with the technology and knowledge, started to consume natural resources in an unplanned and improvident way (Atasoy, 2006). In 1980's it was understood that this stage of over-consumption of resources has a major threat to human life (K. Jenkins & B. Jenkins 2005). The threat caused by the environmental problems such as, population growth, air pollution, water pollution, deforestation, urbanization, directed the people to look for solutions to achieve sustainable use of the natural resources. Fien and Tilburry (2002) reported that "the term "sustainable development" gained prevalence in 1980 as a solution to the threat developed by environmental problems, by means of the World Conservation Strategy, and then enhanced by the report titled "Our Common Future" in 1987 (p.2). The arguments in the report grounded another conference about environment and development and the conference "The Earth Summit" was hold in Rio de Janeiro in 1992. The major action program that includes the suggestions for the nations to achieve sustainable development, called Agenda 21, was comprised in this conference (Palmer, 1998), which was followed by Johannesburg Summit in 2002.

Environmental education (EE) was suggested as one of the most effective ways to respond environmental threats. As was stated during Tbilisi International Conference on Environmental Education (1977), the growing recognition of the consequences and implications of environmental problems must be coupled with an increasing awareness of solidarity among nations. Improved management of the environment to serve humanity should aim at reducing existing disparities and at bringing about international relations based on equity, in the perspective of a new international order. EE has been defined as having an evident role to play if the issues are to be provided with the knowledge, skills and attitudes which can modify the existing situation for the better. Moreover, EE that deals with the increase in knowledge about earth's condition and awareness of the people concerning their responsibilities toward environment to prevent the environmental destruction is

required in order to ensure a sustainable future (Smati, 2004; McKeown, 2002). As provided one of the major solutions for the threats against environmental problems, EE attempts have also begun to contain the concept of sustainable development. Education for Sustainable Development (ESD), on the other hand, has roots in nature protection education and environmental education (Bolscho & Hauenschild, 2006). Over recent years, ever since the Our Common Future Report in 1987, 'sustainable development' has been a key concept in debate concerning the environment. It has become a strong element in the area of environmental education (Bonnett, 2006). As stated by Moore (2005), ESD is essential for students to appreciate, understand and think critically about complex environmental problems in connection with social and economic aspects. It is inevitable that the education and sustainability is connected with each other, however the dissimilarity between the education and ESD is inscrutable (McKeown, 2002). Education for sustainable development, which is a concept with social, economic and environmental dimensions, searches for equivalence of people and the economic well-being regarding the culture and the natural sources of the earth (Combes, 2007). The need for ESD has revealed in the Stockholm Conference in 1972. ESD informs the human about the current lifestyles and to find ways for living in a more sustainable world (IUCN, 2002).

How students learn to think about sustainability will influence their actions as local and global citizens and will make them aware of the sources of environmental problems that threaten the human life. Therefore, since EE and ESD coincides by several means and since its being a strong element in the area of environmental education, the research realized for this thesis attempts to apply one of the indicators of sustainable development, namely ecological footprint, as a means of helping to improve primary school students' environmental attitudes. Therefore, following sections covers basic explanations about sustainable development and its basic indicators.

Since sustainable development is a progressive concept it is hard to define its meaning (McKeown, 2002). According to the World Conservation Strategy, it is defined as "Present development of available resources without compromising the ability of future generations to meet their needs" (Palmer, 1998). In the "Our Common Future" as one of the unique documents about the need for a sustainable future, the concept of sustainable development was defined as "Development that

meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987, p 43). And, in the Earth Summit, it was emphasized that human is the centre of the sustainable development concept and they are the holder of a right to have healthy and productive life. Moreover, according to the Johannesburg Summit (2002), sustainable development calls for improving the quality of life for all of the world’s people without increasing the use of our natural resources beyond the earth’s carrying capacity and it includes the dimensions related with the environment, society and economy and culture each of which are comprises significant topics such as biodiversity, social needs, production, etc. (UNDP & Ministry of Environment, 2002).

The ecological footprint (EF) is one of the major indicators of sustainable development and according to the report prepared by the Commission on Sustainable Development (CSD, 2001), other indicators of sustainable development are, education, atmosphere, land, oceans, seas and coasts. It can be said that education level, living conditions and consumption of natural resources designates the ecological footprint of the people, which basically have an impact on environment and sustainability. EF, which is improved by Mathis Wackernagel and William Rees during late‘80s (Wackernagel *et al.*, 1996), is used for measuring natural consumption related with the effect on the biosphere’s reproductive capacity (World Wildlife Fund [WWF], 2002). In other words, it enables people to realize the effect of their lifestyle on the natural resources of earth (Haque *et al.*, 2005). And, EF analysis attempts to estimate the needs of a known population for consumption of the natural sources and assimilation of wastes in the aspect of equivalent renewable land area (Wackernagel *et al.*, 1996, p.9). Thus, sustainable consumption level of a society or a person can be calculated by means of the EF of that society or person. If the footprint of the population is larger than the bio capacity it is said that the consumption is unsustainable (Redefining Progress, 2005). According to the estimates between the years 1961-2001, the EF of Turkey is 16, 25 while the biological capacity is 9.08 (Redefining Progress, 2001), meaning that the consumption in Turkey is unsustainable (www.ecologicalfootprint.org, 13.09.06). EF concept has been used by several researchers as a tool for an effective ESD. Ryu and Brody (2006), for example, investigated the effect of using ecological footprint

analysis (EFA) in an ESD course at an interdisciplinary graduate level on 50 graduate students from Texas A&M University and found that the course has a significant effect on sustainable behavior of the participants.

Consumption, which constitutes the major part of EF, is another indicator of sustainable development. As the report of Commission on Sustainable Development (CSD, 2001) states, material consumption, transportation and energy use sub-themes are the indicators related with the consumption. The term “consumption” is used to refer to the consumption of products and services by households (Organization for Economic Co-Operation and Development [OECD], 2002) and its categories include food, housing, transportation, consumer goods, services and wastes (Ryu, *et al.*, 2006). Therefore it directly affects EF of a society or a person and the terms “consumption pattern” and “life styles” have frequently been used in ESD in a way to help students to be sensitive about sustainable consumption patterns and thus sustainable use of natural resources. As was indicated by UNEP & UNESCO (2001), students should be enhanced to think about their consumption pattern that is related with how they live, work, and study; have fun with their friends and how their lifestyle linked to the rest of the world.

The attitudes and behaviors of the young people concerning the sustainable consumption and their expectations about the future in addition to their ideas related with changing their lifestyle and habits in order to improve sustainable consumption was investigated by means of the study realized by UNEP & UNESCO (2001). The study was realized in six countries; Australia, Norway, Mexico, Thailand, Canada and Italy. The result showed that the young were not aware of their consumption patterns and life styles on the environment. Furthermore, the study related with the Korean children’s environmental literacy levels and the variables effecting it (Chu *et al.*, 2007) indicated an inadequate knowledge of the children related with the various aspects of the environment (e.g. energy sources of plants and humans or animals, food chains, the roles of unattractive animals, etc.) as well as lack of information about some of the environmental issues (endangered animals, wild animals, and other topical environmental issues affecting society) while they were know about the topics mentioned in the curriculum (e.g. air pollution, water pollution, etc.).

A Turkish practice about the university students’ sensitivity about their environment realized in Manisa (Çetinkaya & Nehir, 2005), on the other hand,

indicated that, more than half of the students were stated that they were sensitive for the subjects related with the environment while more than 80% of them mentioned that they did not attend any environmental activity provided by any environmental organization. In a different study held in Ankara (Tuncer, Sungur, Tekkaya & Ertepinar, 2005) concerning the effect of school type (private and public) and gender on the attitudes of the young people toward environment revealed that private school students designates more positive attitudes than the public school students as well as the girls who have more environmental awareness and more positive attitudes to the environment. In another study Tuncer *et al.* (2005) discussed the attitudes of young people concerning the change in the consumption patterns and sustainability in Ankara. Results of the study addressed a requirement for more effective environmental education for enhancing the young people to be more sensitive about environmental issues and sustainable development.

However, in Turkey, environmental education and education for sustainability have not given the importance it deserves. For example, only a limited knowledge about environmental pollution has been given in the 4th grade science books, while the impact of human behavior on environment is presented shortly in the 5th grade science books (Ministry of Education, 2006). According to the study done by Hotinli (2004), environmental education in primary level in Turkey has some problems and the major ones are; insufficient “in service” training programs for the teachers and inadequate resources for the students. As a result of another research, realized in Turkey, related to evaluation of the effect of an environment based lecture on the environmental knowledge of the candidate teachers (Şahin, Cerrah & Saka, 2004) in Trabzon , it was found that the lecture had a significant effect on the participants’ environmental knowledge. In 2004 The European Commission and MIO-ECSDE stated that supplying the demand of sustainable development could be by study of education with the effective institutions or social cohesion and welfare (European Commission and MIO-ECSDE, 2004). Yet, only for ten years environmental education activities has started to hold in Turkey by means of NGOs and some of the international active programs (Hotinli, 2004).

There are several methods suggested for EE and ESD. According to McNaughton (2004), for example, the use of educational drama in the primary level for EE and ESD lectures ends up with very satisfactory results. Furthermore, Şahin *et*

al. (2004) investigated the effect of students-centered method on the environmental education lecture by comparing it with the teacher-centered method and revealed that, student-centered method including an active participation of the students is more effective. Brody and Ryu (2006), on the other hand, investigated the effect of graduate course concerning sustainable development on the facilitating learning, transforming perception and actions of the participants by using the ecological footprint analysis and as a result the significant effect of the course on the sustainable behavior of the participants was found.

As a result of above mentioned research and development about EE and ESD, one can infer that, EE and ESD are essential to struggle with environmental problems and to achieve a sustainable future. Although there are several studies concerning the applications of EE and ESD in many countries, there are still several points to research on; the research needs to be strengthened by means of applications from different countries based on the fact that effectiveness of EE and ESD depends on social, economical and environmental factors like living habits, people's priorities, culture, religion, economical status, geographical conditions, etc. Therefore, realizing such a study on the effect of an EE course, designed to contain indicators of sustainable development, in Turkey, a developing country in the stage of industrialization with very young population, promises to fulfill the gap in the related literature.

1.1 The Main Problem

The purpose of this study is to detect the effect of designed environmental education lectures on primary school students' attitudes toward environment.

1.1.1 The Sub-Problems

1. Is there a significant difference between the pre-test mean scores of 4th grade and 5th grade students?
2. Is there a significant effect of environmental education lectures on students' attitudes toward environment?

1.1.2 Null Hypotheses

Null Hypothesis 1

There is no significant difference between the pre-test mean scores of 4th grade and 5th grade students.

Null Hypothesis 2

There is no significant effect of environmental education lectures on students' attitudes toward environment.

1.2 Definition of Important Terms

This section includes some of the important definitions that are related with the study.

Sustainable development: Meeting the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainable development indicators: They facilitate to evaluate standards toward the sustainable development and supply an earlier warning in order to avoid economical, social and environmental damage.

Ecological Footprint: Cumulative artificial indicator that is used for measuring natural consumption related with the effect on the biosphere's reproductive capacity.

1.3 Significance of the Study

Environmental education enhances the environmental literacy of the people living in that country (Chu *et al.*, 2007). It is also one of the means to help students to be aware of their impact on the environmental destruction. Thus, environmental education provided in schools has an important role through raising environmentally sensitive generations and having a sustainable future (Loughland *et al.*, 2003). However, in Turkey, although social, economical and environmental conditions require doing so, environmental education has not taken the importance it deserves. Therefore, this study aims to help to fulfill this gap in Turkey and to propose a case as containing a design and application procedure for environmental education and education for sustainability. Thus, the study comprises design and implementation of a course, based primarily on the introduction of the major environmental problems and their relations between life styles and ecological footprint concepts and an

application of the course to an elementary school level to develop positive environmental attitudes.

CHAPTER 2

REVIEW OF THE LITERATURE

This chapter includes a review of the literature related to historical and recent developments about environmental education and education for sustainability based on theoretical and implicational aspects. According to the content and the scope of the study, the literature review is composed of three sections as history and development of environmental problems, impacts on the life on earth and sustainable use of natural resources, historical and recent developments in research for environmental education and education for sustainability in the world and applications in environmental education and education for sustainability in several countries including Turkey with a specific emphasis on the life styles, ecological footprint and environmental destruction concepts and application of the different teaching methods.

2.1 Environmental Problems: Reasons, Results and Impacts on Human Life

Primitive societies improved their actions with respect to the reproductive capacity of the nature by thinking as they were the part of it which leads to live in harmony with the nature (Karakoç, 2004, p.67). However, especially after the industrial revolution, the human beings have begun to overuse the natural resources and made them dirty unconsciously without thinking the future (Özdilek, 2004, p.75). Nowadays, it is not hard to realize that lifestyles of the human are not sustainable (McKeown *et al.*, 2002) and the idea that the human actions are one of the major cause of environmental destruction is delivered (Tankha *et al.*, 2005). Thus, environmental problems aroused by means of the qualitative and quantitative increase in the dirtiness on the environment that lead to environmental destruction (Ökmen, 2004, p.331). Some of the environmental issues emerging and that may be accepted as examples for unsustainable consumption of the natural resources are exhausted natural resources and damaged environments as mentioned by Jenkins *et al.* (2005). Unplanned development attempts in developing countries, including Turkey, caused numerous environmental pollutions incidents (Swedish Trade Council, 2000); some of the major ones are;

- Solid waste, air and water pollution problems in the urban environment
- Forest and biodiversity losses due to unsustainable management of the natural sources, including water, air, soil.
- Marine and coastal water pollution
- Losses of cultural and natural heritage

According to the Adamson (1973), air pollution started with the invention of the fire. It surrounds the people living in a town that contains too many motor vehicles, smoke emerging from wood or coal fires, fumes of unrestrained industrial service, odor of un-wrap dump or uncontrolled sewage (Gowdy and McDaniel, 2004, p.107). Also Creswell et al. (2002) mentioned the reasons of air pollution as fumes emitted by the cars' exhaust, gasses coming out because of the burning of fossil fuels in power stations in order to obtain electricity that is required for cooking food, watching television and having easier and more comfortable lives and gasses existing from the homes for heating. And the gasses, especially the carbon dioxide, arose as a result of the human actions and their lifestyles lead to greenhouse effect. As stated by Logan (2006), significant increase in the greenhouse gasses (carbon dioxide, water vapor, nitrous oxide, tiny amount of methane) observed since the beginning of the industrial terms because of the human activities. These gasses block the ground's capability to get cool by trapping thermal radiation released by the surface of the earth and cause greenhouse effect (Arar, 2007). Significant change observed in the amount of carbon dioxide since the industrial revolution, and this increase enhanced greenhouse effect which leads to global warming of the earth's surface (Houghton, 2004, p.23). And, as a result of the warming of the earth many future changes arise as Hill (2004) states;

- Melting of the glaciers around the world
- Increase in the sea level that could force people to leave their homes in low-lying countries, make the drinking water salty by infiltrating it and hence destroy coastal ecosystems, as well as the species living there.

- Spreading of the diseases such as malaria that is spread by mosquito which kills millions of people in warm climates.
- Decrease in the coral reefs which create great biodiversity in marines.

In addition to the global warming, air pollution cause health problems on the humans (e.g. poisoning, cancer, irritation of eye and respiratory system, lung, hearth and asthma diseases) and vertebrate animals (e.g. eye, teeth, bone damage and impairment of the respiratory system), damage on plants' leaf tissue and fruit, decrease in their reproductive processes, and reduction of oxygen, erosion, and water and soil pollution by means of the acid rains (Botkin & Keller, 1995, p.450).

Hodges, (1973) mentioned the major sources of the water pollution as domestic (waste water comes from homes), industrial, agricultural (sediments, fertilizers and farm animal wastes) and shipping waste waters (human sewage and other wastes such as oil). Thus, human activities, especially living habits of people such as how much detergent they use in their house or how often they have shower, in addition to the industrial wastes result in water pollution. For example, in 1983, petroleum production was started in Caspian Sea that caused the increase of the sedimentary rocks in the sea because of the ignorance of the nature and environment protection, discharging of the wastes through the sea and the rivers that meet the sea, increase in sea level and solid wastes (Altıntaş, 2004, p.205). Black Sea is another example that faces with the pollution due to the industrial wastes of the countries having shore, agricultural activities, transportation on the sea and sewer (Altıntaş, 2004, p.205). Water pollution cause danger in aquatic life killing millions of fish every year due to the municipal and industrial wastes and threaten human health (Hodges, 1973, p.6,7). Furthermore, discharge of a sewage to a stream ground some changes on the downstream that the sewage is send out leading to reduction of the dissolved oxygen that will affect the number and kind of the organisms, while this effect is more significant in a lake since infiltration of light is important for photosynthetic reaction that affects the amount of oxygen (Peirce *et al.*, 1998, p.39, 40,44, 46).

Soil pollution arises by the change in the chemical structure of the soil due to the acid rains composed of gasses from factories and fossil fuel combustion (Özer, 1988, p.34). Moreover, fertilizers for agriculture, pesticides for harmful insects and plants, agricultural wastes, mineral oils, fuel and petrol due to the industrial activities and domestic wastes lead to soil pollution (Çepel, 1997, p.29). Another reason of soil pollution is discharging garbage to the wrong areas that may cause air and water pollution by mixture of garbage leak waters with the underground water or fire in the garbage dumps because of the methane gasses explosion one of which example is observed in 1996 in Ümraniye, İstanbul (Özdilek, 2004, p.91) Soil pollution also cause increase in heavy metal and change in PH value of soil in addition to provide source for pathogens (Erten, 2004).

The wastes that became unusable as a result of the social and economical activities of the humans and do not contain liquid to be fluid (e.g. household wastes, paper, cartoon, plastic, wood, glass and metal), called solid wastes also cause pollution (Başal, 2005, p.14). Solid wastes that are different from hazardous and radioactive matters are generally called as municipal solid waste that composed of solid materials disposed by society and solid wastes could cause diseases on humans via the rats or flies by carrying disease vectors coming from an open dump (Pierce *et al.*, 1998, p.157). In order to prevent pollution caused by the solid waste, the amount of generated waste should be decreased and “environmentally preferable products” should be used in addition to the reusing and recycling products such as glass, paper, aluminum and plastics (Hill, 2004, p.257, 263)

Biodiversity losses could exist because of the habitat losses or destruction, change in ecosystem, invasion of exotic species on the endemic animal and plant populations, overuse of natural sources (hunting the animals or picking up the plants) and dirtiness all of which were caused by the human (Mazı, 2004, p.173,174). And, human behaviors such as hunting, firing for ground-cleaning and introducing domestic animals leads to extinction of some species (Reuter *et al.*, 2003, p.147). Furthermore, building dams for hydroelectric power stations in order to produce electricity for human’s needs

cause the some species to lose their habitats and at last become endangered species (National Geographic, Lose Paradise).

Deforestation increases because of the limited reforestation despite the over cutting trees for sale of wood and fires in the forest, in addition to conversion of the forests into agricultural fields in order to extend the regions for agriculture (Kurt, 2004, p.562). Trees take in carbon dioxide, leaving oxygen that is required for living and also, its roots soak up rainwater that will reduce flooding risk in heavy rains (Hill, 2004, p. 2, 3). Cutting trees and destroying the forests results eroding of the land, increase the risk of global warming since absorbed carbon dioxide will be less with fewer trees and decrease the biological diversity because of extinction of plants and species of wildlife (Food and Agriculture Organization of the United Nations, 1993, p.9)

Air for breathing, food for eating, water for drinking and matters for forming civilizations are the sources that the humans required to stay alive on the earth, however, these resources should be used sustainable so that the earth could meet the needs of the human population (Distefano & Vesilind, 2006, p.12). On the contrary, since the revolution of industry the activities done by human, especially the consumption of raw material in impressive amounts damaged sources of the earth and caused pollution (Adamson, 1973, p.2). And now the humans live over the limits for carrying capacity of the earth and the term “Sustainable Development” put into the agenda because of exceeding this limit in order to lessen the effect of industrialization on environment (Yıldırım & Göktürk, 2004, p.450). In 1972, Stockholm Conference is held that presented the fist international identification of the issues related with the environment as well as maintaining the term sustainable development to provide adequate solution between the terms environment and development. And, in 1987 World Commission on Environment and Development defined the term “Sustainable Development” as meeting the needs of the present without compromising the abilities of future generations to meet their own needs in the report called “Our common Future”. This term was continued to develop and handled in another conference in 1992, The Earth Summit maintained in Rio de Janerio. The goal of this conference was determining the solutions for reducing

environmental problems of the world such as climate change, air pollution, deforestation and biodiversity loss (Hill, 2004, p.19) that arose Agenda 21 which includes strategies for the nations to attain sustainable development (Palmer, 1998).

By means of the indicators of sustainable development (Table 2.1) which are mentioned by Commission on Sustainable Development (CSD, 2001) early warning for resisting the economic, social and environmental damage can be provided.

Table 2.1 Indicators of Sustainable Development

Theme	Sub-Theme	Indicator
Atmosphere	Climate Change	Emissions of Greenhouse Gases
	Ozone Layer Depletion	Consumption of Ozone Depleting Substances
	Air Quality	Ambient Concentration of Air Pollutants in Urban Areas
Land	Agriculture	Arable and Permanent Crop Land Area
		Use of Fertilizers
		Use of Agricultural Pesticides
	Forests	Forest Area as a Percent of Land Area
		Wood Harvesting Intensity
	Desertification	Land Affected by Desertification
Urbanization	Area of Urban Formal and Informal Settlements	
Oceans, Seas and Coasts	Coastal Zone	Algae Concentration in Coastal Waters
		Percent of Total Population Living in Coastal Areas
	Fisheries	Annual Catch by Major Species
Fresh Water	Water Quantity	Annual Withdrawal of Ground and Surface Water as a Percent of Total Available Water
	Water Quality	BOD in Water Bodies
		Concentration of Faecal Coliform in Freshwater
Biodiversity	Ecosystem	Area of Selected Key Ecosystems
		Protected Area as a Percent of Total Area
	Species	Abundance of Selected Key Species

Source: Commission on Sustainable Development, 2001

As indicated in the table above, the indicators of sustainable development such as the increase in the amount of greenhouse gasses, concentration of air pollutants, wood harvesting intensity, population living in coastal areas and catch of the major species by the fisheries; use of fertilizer and pesticides; fresh water quality and biodiversity are affected by the lifestyles of the humans, their ecological footprint and consumption patterns. Thus, ecological footprint and consumption of people is indicator of sustainable development. Also, Herva et al. (2007) mentioned that ecological footprint that concerns lifestyles of individuals, regions and the world has been commonly used as indicator of sustainability. Ecological footprint is a tool that is used for measuring the load inflicted by a specific population on nature and it denotes the land area required for sustaining recent source consumption levels and discharged wastes by that population (Weckernagel & Rees, 1996, p.5). In other words, it allows people to recognize the effect of their living style including consumption patterns and ecological footprint on the natural sources (Haque *et al.*, 2005). Studies comparing the ecological footprints of a population and biocapacity of the earth can show us the facts about the sustainability; if the human impact is larger than the biocapacity, sustainability of the environment fails. According to the study revealed by Reidfining Progress (2001), the ecological footprint estimates between 1961 and 2001 indicates that the ecological footprint of Turkey is calculated as 16,25 while its biocapacity (biological production in an area) is 9.08. It is obvious that the consumption in Turkey is not sustainable since the ecological footprint is bigger than the biological production. The humanity will face with natural disasters unless the environmental sensitivity of people change in the favor of environment and one of the means to stop these disasters is to back off the present and future ideas and behaviors of people (Erten, 2006). Environmental sensitivity as individual and society have important role in reaching regional sustainable development (Sibille *et al.*, 2007) and this can be provided by means of the environmental education. It was stated that starting to enhance children to act sensitive toward the environment in young ages improves their environmental conscious and sense of responsibility

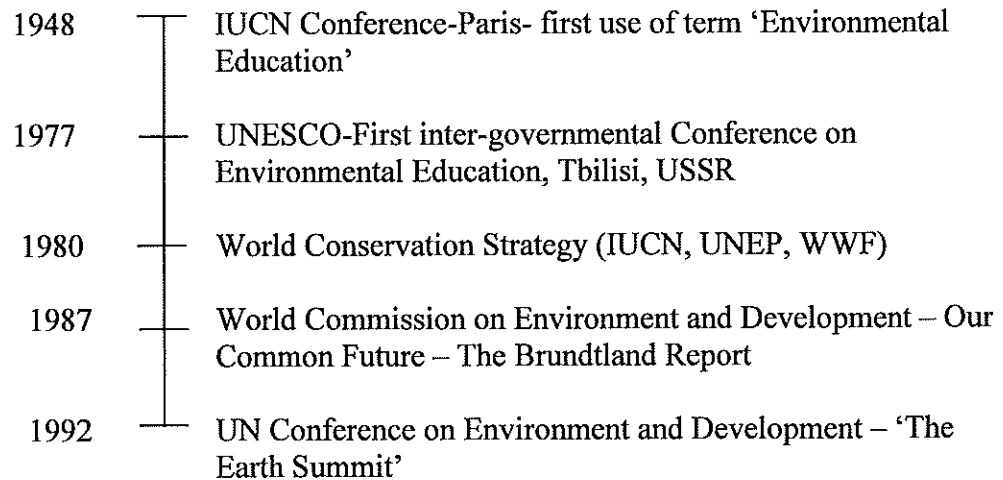
(Başal, 2005), and environmental education is a linkage between the school and community with the environment they required (Hacking *et al.*, 2007).

2.2 Environmental Education and Education for Sustainable Development: The History and Research

2.2.1 Environmental Education (EE)

Environmental Education aims to improve environmental literacy, (Shin *et al.*, 2007) which is a concept that can be improved by enhancing people to determine and find solutions about the problems where the environment, technology and science combined, since the environmental subjects concern the political, economic and socio-cultural subjects (Willison, 2004). EE needs insertion of methodologies to connect it with the education concerning human rights, health, women's issues and public education beyond others and its major purpose is to enhance the earth protection by creating sustainable behaviors (Padilla, 2001). The schools have the major duty to achieve the aim of environmental education that targets all the people living on the earth in order to improve the behaviors and the attitudes related with the environmental sensitivity and protection (Şimşekli, 2001). Loughland *et al.* (2003), however, stated that environmental education should mainly focus on the understanding of children instead of assuming what they know or believe. As Şahin *et al.* (2004) reported, UNEP & UNESCO (1987) states that the change or destruction in the environment by various interventions will affect the living conditions of the living organisms in the same manner since the humanity is the production of the environment it belongs, (p.114). For this reason, the sensitiveness about the environmental issues and the applications related to this subject raised importance during the 21st century which leads to the idea about necessity of educating individuals conscious to the environment in order to supply them healthier and more reliable environment. (Şahin *et al.*, 2004).

The term Environmental Education is firstly used at the IUCN Conference and then continued its development by other conferences some of which are listed in Figure 1 (Palmer, J., 1998).



Source: Palmer, J., 1998

Figure 2.1 Environmental Education: key events on a development timeline

The Tbilisi Conference, which is 'the first Intergovernmental Conference on Environmental Education' (UNESCO, 1977), created the turning point of the environmental education in terms of integrating it into human education. (Ünal *et al.*, 1999). The Report of this Conference leads three goals of environmental education which are;

- (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 behaviors of individuals, groups and society as a whole towards the Environment.
- (UNESCO, 1977)

In 1987, World Commission on Environment and Development prepared the 'Bruntland Report' that is also known as 'Our Common Future'. This report is one of the influential texts related with the environment in the 20th century that displays the increase in the global awareness of the second half of the century about the huge environmental problems the earth face and expanding change toward the environmental action (Bruntland Report, 1987).

In 1992, UN Conference on Environment and Development is held in Rio de Janeiro called The Earth Summit. After this conference the committees created Agenda 21 which is a major action program composed of 40 chapters that offer the

way of achieving sustainable development for the nations (Palmer, 1998). Chapter 36 of Agenda 21, 'Promoting Education, Public Awareness and Training', that states the importance of education for sustainable development:

Education, including formal education, public awareness and training should be recognized as a process by which human beings and societies can reach their fullest potential. Education is critical for promoting sustainable development and improving the capacity of people to address environment and development issues (Agenda 21, Chapter 36, p.3)

Johannesburg Summit mainly aims to assess the consequences of the plan stated in the Earth Summit in 1992 and turn it into action. "The Summit presents an opportunity to build on the knowledge gained over the past decade, and provides a new impetus for commitments of resources and specific action towards global sustainability." (Johannesburg Summit, 2002)

There are several studies related with the environmental education in various regions. For example, according to the Smati's research (2004), nowadays in Tunisia huge amount of effort is spent in order to increase the awareness of the humans and hence take care of the environment. And the primary school in this area involves the clubs for directing the students to attend the activities related with the biodiversity and keeping environment as well as being a compulsory subject of environmental education in primary and high school.

Another study is held by Perikleous (2004) which focused on the current situation of environmental education in Cyprus stated that the current ideals caused crisis that are at the human level such as wars, unemployment and environmental level such as environmental distraction; water, soil and air pollution; extinction species in the time we live and environmental education could find solutions for these crisis and it could generate social and educational change which may assist the people to manage their lives and provide success for the future. A survey is implemented to the 436 teachers from the town and village schools in the Nicosia region in order to realize the situation of environmental education in Cyprus, 1999-2000 years. In the questionnaire, the way of teachers' environmental education implementation, its structure, the negative effect on environmental education in terms of educational settings and the suggestions of teachers is asked. The results of the study in which not much change occurred since that time indicated that the

teachers think they have an impact on the implementation of EE and their suggestions included some of the priorities while rearranging environmental education which are related with discipline, insufficient time, curriculum, bureaucracy and lack of participation.

Hotinli (2004) argued the environmental education in primary and secondary schools of Turkey at formal level in which some problems related with the environmental education of primary and secondary school is mentioned. These problems that reduce the quality of environmental problems mainly focused on four themes;

- “In service” training programs for the teachers are not sufficient enough to improve the practice for the implementing the methods and achieve all of the teachers.
- The importance given for the environmental education is not as much as the importance provided for the Mathematics or Turkish lessons because of the value given to these lessons for the central examination system.
- “Social Activity Clubs” are not compulsory in the curriculum although some of the NGO’s tries to create activities at the Ministry of Education level in order to make the environmental clubs compulsory in schools.
- The resources concerning environmental education (e.g. books for students and teachers, posters, audiovisual equipments, etc.) are not adequate.

(Hotinli, G., 2004)

Chatzifotiou (2005) investigated the environmental education condition in primary schools of Greek by selecting the participants who are the teachers of primary schools in three regions of Greece. The semi-structured interview was used the results of which is led to the different categories. The author stated three aspect of argument by looking at the data that are education about the environment which involves climate, water, plants, animals, etc.; education in the environment that concerns the idea that the children think the environment as a source to make investigations; education for the environment that deals with the improving the positive attitudes and behaviors to the environment. It is argued in this study that environmental education of Greek is lead by National Curriculum the activities out of curriculum have an significant impact on the awareness of the primary school teachers in positive way.

Tuncer *et al.* (2005) revealed a study about the young people's attitudes regarding sustainability and changing the consumption patterns. A questionnaire is used in order to evaluate the attitudes of students selected from ten schools in Ankara, as a result it is recognized that environmental education should be more effective to enrich the young peoples' sensitivity about environmental issues and sustainable development.

Bryda (2006) revealed another study concerning the perception of pre-school children on the environmental problems in Poland which aimed to investigate the environmental knowledge and the attitudes of the pre-school children and their parents regarding environment. The questionnaire is implemented to the participant comprised of 686 parents and 674 pre-school children (six-year-olds) from 30 pre-schools. The results illustrated that the basic environment themes were common to the children and they recognized unsuitable behaviors for the environment additionally, the environmental protection principles that is implemented practically were worse for the environmental themes that are more detailed. It was seen that attitudes of the children toward environment is effected by the region they live and the most of the parents illustrated proper attitudes to the environment, however they sometimes did not want to change their behaviors or habits for protecting the environment.

Said *et al.* (2007) conducted a study in order to estimate the environmental comprehension, consciousness and knowledge levels a study was done on the basis of empirical, exploratory and descriptive designs, which also includes the secondary school students to exercises related with the sustainable consumption. A survey is implemented to the 306 students chosen randomly from four secondary schools in Johor, Malesia and the results indicated that the participants were aware of the environmental issues and more or less concerning it. Also, it is found that the environmental education increased the awareness of the participants while not having impact on their behavior.

Ravindranath (2007) performed a study for examining the importance of the EE in teacher education as well as the difficulties while attaining the sustainable development goals provided by the UN Decade of Education for Sustainable Development (UNDESD). And, it is found that the teacher education has a

significant effect on the strategies and practices related with the sustainable development by improving the human who are environmentally literate.

To sum up literature indicated the requirement of the environmental education in order to increase the awareness of the people. Furthermore, it is revealed that the schools, as well as the teachers' environmental literacy, has an important role in changing the attitudes of people toward environment and become more sensitive. On the other hand, some of the studies stated that there are several problems to integrate environmental education the school curriculum.

2.2.2 Education for Sustainable Development (ESD)

The aim of education for sustainable development is to denote the complicated and dynamic connection about the social sciences and natural sciences (Willison, 2004). The Stockholm Conference in 1972 has raised the need for education for sustainability which has developed by the Intergovernmental Conference on Environmental Education in Tbilisi, 1977. (Ferreira, A., Lopes, M. & Morais, J.). As stated by Tilburry *et al.* (2002) the sustainable development concept became widespread by means of the World Conservation Strategy, in 1980 and this concept is evolved with the report prepared by World Commission on Environment and Development, in 1987, called 'Our Common Future' (Tilburry *et al.*, 2002, p.2). By this report, sustainable development became the major concept to direct the people about realizing the environmental subjects and what to do about them (Bonnett, 2006). The term sustainable development continued to growing via the discussions and negotiations of the communities between the years 1987-Brundtland Report- and 1992-The Earth Summit (Hopkins *et al.*, 2002, p.14). The Earth Summit is the outcome of the Rio de Jenerio Conference in 1992 that is happened due to the contradictions revealing from Bruntland Report (Palmer, 1998). Agenda 21 that is the product of The earth Summit was one of the first worldwide document that underline the integration of sustainability into higher education, after which the requirement for educational programs at university level related with basis of sustainability is mentioned by various world summits and national declarations in different regions (Ryu & Brody , 2006).

There are several studies concerning the education for sustainable development (ESD). For example, Herremans and Robin (2002) undertook a study by using three dimensions of sustainability which are economic, social and

environmental dimensions, sustainability triad, to teach sustainability in the classroom. A case study related with the national park is used to decide the relationship between the dimensions of the sustainability; whether it is converging or contradicting. The analyzes of the conditions regarding the sustainability triad facilitates the reason of unsustainability and tries to find solution about environment, in addition to the assisting to identify the causes of convergence or contradiction between the dimensions.

Devine and Fleming (2004) investigated the beliefs of children about global warming and energy resources in terms of psychological viewpoint and converging positional influences on the subjective ideas as well as self-efficacy. The adult and young members of an educational organization called Woodcraft Folk are included in the study in addition to the young who are not the member of this organization. The results of the study in which comparative research design is used showed that the children's beliefs about environmental problems are affected by the cooperative learning environments in a positive manner. And the children from members of the organization indicated higher level of awareness and they recognized self-efficacy relating the global warming comparing to the children who are non-members of the organization. Furthermore, the results illustrated surprising dissimilarity between the perceived self-efficacy level of children and adults who are member of the organization.

Bolscho and Hauenschild (2006) examined the history of the Germany and found that there is parallelism relating the debate of people and concern of teaching in schools about environmental improvements due to the cores of the education for sustainable development which are environmental education and education of nature protection. The results of the environmental developments claim that teaching in schools does not hang back the social and environmental problems in nowadays essentially.

Herva *et al.* (2007) stated that The Ecological Footprint (EF) is a concept that is one of the indicator of environmental sustainability implemented to the lifestyles of people, regions, nations or even the world. And they held a study that aims to improve a tool that can be useful for assessing the impact on the environment and in addition to the environmental behavior of various tailoring processes in which the

results stated the suitability of a recent method for the implication of Ecological Footprint to an activity.

Brody and Ryu (2006) carried out an evidence-based research in order to examine whether the sustainable development course at the interdisciplinary graduate level make the learning of the participants and transforming their perceptions and behaviors easier. Ecological footprint analysis is used during the course in order to realize the effect of ESD on the regular consumption patterns of the participants. The study involves the participation of 22 graduate students who are at the doctoral and master level in addition to the 28 control group students that is conducted untreated control group design. The results of the study indicated that the course has a significant effect on the sustainable behavior that is calculated by means of the ecological footprint.

To sum up the literature concerning conferences about sustainable development underlined the need of education for sustainable development in order to achieve a sustainable future. And the studies revealed at different ages stated that the methods used in the study effect the environmental perspective of the people. It is found that cooperative learning effects elementary school students' beliefs related with the environmental issues in positive manner. Also it is revealed that a sustainable development course at the interdisciplinary graduate level had a significant effect on sustainable behavior of the graduate students.

2.3 Applications in Environmental Education and Education for Sustainability

Leeming and Porter (1997) investigated the effect of “Caretaker Classroom Program”, which includes different activities to enhance participation of the students having different background, age and interests on the environmental attitude of the students that composed of 35 classes from 11 schools. By means of comparing pre-test and post-test scores of the classes, it was found that the students who were implemented activities concerning environmental issues showed more positive attitudes than the students who were not applied any activities.

Payne (1981) investigated the effect of two outdoor environmental education programs, which are “Sunship Earth” and traditional study of plants, animals, water and soil program (P.A.W.S.), on 266 sixth grade students from a residential outdoor school of Washington country, Oregon. The participants are administrated different

programs implemented attitude inventory and knowledge test as pre-test and post-test, and the results stated that each program had a significant effect on environmental attitudes of the students, however, attitude change of the students applied different programs was not significant.

Tikka *et al.* (2000) studied the effect of having different educational establishment on the attitude of the students toward environment and nature. A survey is implemented to 464 students who have finished comprehensive schools and characterized various educational establishment, from Finland and it was revealed that the attitudes toward the environment differed between the students from various educational establishment.

Fien *et al.* (2000) investigated the effect of environmental education program on students learning, as well as the influence of these students that arise by discussing their learning with their parents and other community members. Six environmental education programs that include different issues, such as air quality, water, land and energy use, were implemented to the students by different teaching methods including student-centered methods (i.e., case studies, role playing and discussion). 284 students in 5-12 grades from 4 private and 5 state government schools involved the program and surveys and interviews applied to the students and their parents in order to realize its effect. The results showed that students were able to share their learning and environmental attitudes with their parents, and also positive changes observed in their attitudes including household practices.

UNEP and UNESCO (2001) revealed a study which includes the implementation of a survey to the participants from 6 countries; Australia, Norway, Mexico, Thailand, Canada and Italy and the results indicated that most of the people do not aware of the effect of their consumption patterns (e.g. the cloths of food they purchase) on the environmental pollution.

Şimşekli (2001) performed a study that concerns the effect of the teachers and school administrators' contribution on the activities within the "Applied Environmental Training" project regarding the environmental awareness of the students. Four pre-schools and 10 primary schools from Bursa, Turkey is selected as the sample and all the activities done in the schools is evaluated by looking at the activity reports during the inspections. The results indicated that the environmental literacy of the teachers were not sufficient that creates one of the difficulties having

negative impact on the environmental education and it is stated that the number and variety of the activities related with the environment should be increased and extended to the whole educational year for improving their environmental conscious.

In a study held by Morgil *et al.* 30 students from Beypazarı, Ankara were desired to make a project concerning environment and present it in 2001-2002 education year. A pre-test and post-test was implemented to the students in order to recognize the effect of the projects that are prepared by active labour of the students on their environmental knowledge. And it was found that the Project based learning lead to increase of the environmental knowledge of the students.

McMillan (2003) investigated the effect of an undergraduate environmental studies class on Dalhousie University students' environmental values by means of questionnaires, interviews, and observations and found that environmental values of the students increased during the course year.

Erten (2003) conducted a study in 2002- 2003 fall semester in order to evaluate the effect of one-week lectures concerning "Garbage Reduction" on attitude, behaviors and knowledge of 230 5th grade students from a school that is involved in a improvement environmental conscious program, from Ankara and one of the result of the study indicated that the negative attitudes of the students toward environment became positive after the treatment.

Şahin *et al.* (2004) searched for recognizing the environmental education lecture that is based on the teaching methods where the participants are active on the teacher candidates. The participants of the study is selected from Karadeniz Technical University and composed of 23 students from the biology department and 29 students from class teacher department. The environmental education lectures that took 14 weeks included the topics related with the air, water, soil, radioactive, noise and light pollution. These lectures implemented to the biology department students by means of student-centered method while the same topics implemented to the class teacher department students by the teacher-centered method by the same teacher. The results indicated that the lectures with the student-centered teaching methods is more effective than the other one and it is suggested that these lecture should be though by providing the active participation of the students in the university.

McNaughton (2004) investigated the impact of educational drama lectures on the primary school students (10-11 years old) about education for sustainable

development. The study in which a small-scale qualitative research is used includes several lectures mainly concerning the environmental issues which are implemented in two phases. Two classes selected from different schools considering the ages and the stage of the children were involved to the study and in the first phase two sets of lectures related with the sustainability citizenship themes and local and global themes were thought, which were repeated by another teacher with her class as a second phase. The lectures implemented to the students by using the drama method and it was aimed to improve their awareness, knowledge and action skills as well as enhancing positive attitudes toward environment. And the results indicated that drama provides easier learning in education for sustainability and it was revealed that various areas of learning could be used during education for sustainable development as well as drama.

Xiao-dong *et al.* (2004) studied the comprehension of the students from Chinese green schools about the greenhouse effect. Interview is made with the 14-years-old students that are divided into 5 groups and included 3 pupils in each group in order to realize their ideas about the solutions for pollution due to the factories and raising number of the cars. It is observed that the students were confused while solving the themes from real life and they illustrated negative vision for the future of the planet and human life.

Çetinkaya *et al.* (2005) investigated the attitudes of the university students about the environmental problems in Manisa, in 2005. Questionnaire is implemented to the 410 participants and it is found that 65 percent of the students were stated that their sensitiveness about environmental topics while approximately 85 percent of them mentioned that they did not attend any environmental activity provided by any environmental organization.

Tuncer *et al.* (2005) conducted a study related with the effect of school type (private and public) and gender on the environmental attitudes of the young people, in Ankara. The questionnaire was implemented to 1497 students consists of 6th, 7th, 8th and 10th graders. The results indicated that the environmental attitudes of the private school students is more positive than the public school students and also it was seen that the girls have more positive environmental awareness and more positive attitudes toward environment.

The environmental attitudes of the elementary school students was investigated by Alp et al. (2006) and the effect of class level and gender on the environmental attitude is searched, in Ankara. The 1140 participants (6th and 8th grade students) that are selected from 18 schools implemented a test and the results revealed that the students have positive attitudes although their knowledge is insufficient. Furthermore, it was found that gender does not have an effect on the environmental knowledge, however, girls tend to have more positive attitude and also the 6th grade students showed more positive attitude toward environment.

Kaplan and Liu (2006) made a research in Pennsylvania, USA that concerns the advantages of integration of adults into a monogenerational environmental education program for the young in terms of their environmental attitudes and knowledge. The study involves children youth and older adults in order to observe the benefits of their interaction as the results indicated the increase in the environmental awareness and knowledge of the youth such as caring for the environment and improving the knowledge about environmental issues such as plants, animals, etc.

Another study revealed by Tuncer and Erdoğan (2006), investigated the assessment of the undergraduate course concerning the improvement of sustainable live of the students. 85 students that attend the course were evaluated in terms of need, formative and summative assessment and the results indicated that the course had an important role on the responsibilities and awareness of the students about environmental problems and sustainability.

Maskan et al. (2006) searched for the evaluating the ideas of the teacher candidates on the reasons of environmental problems and environmental education and how to cope with these problems. The students from Dicle University involved in the study and implemented a questionnaire; as a result, 67% of the students mentioned that they did not attend any environmental education course before the university. Also, it is stated that most of the universities does not give much importance for the environmental education.

Uzun and Sağlam (2006) conducted a study for introducing "Environmental Attitude Scale" that is developed by them. The scale, which is implemented to the 969 9th grade and 10th grade students, was analyzed by means of the factor analysis

and as a result, it is decided that "Environmental Attitude Scale" was composed of two sections as "behavior" and "attitude".

Chu *et al.* (2007) held a study concerning the environmental literacy of the Korean children's as well as the variables having impact on it. An instrument called Environment Literacy Instrument for Korean Children (ELIKC) measuring knowledge, attitude, behavior and skills is implemented to the 969 students from various areas (large cities, rural and medium-sized areas). The results indicated that their knowledge is not adequate for the environmental issues such as energy sources of plants and humans or animals, food chains, the roles of unattractive animals, however, they knew the subjects thought in the curriculum such as air pollution, water pollution, etc. Moreover, it was determined that gender, parents' school background and environmental information sources that the students get impacts their environmental literacy.

Oluk and Özalp (2007) revealed the effect of constructivist methods on teaching global environmental problems on 7th grade students. In the study that experimental research design was used problem based learning method was applied to the experimental group students and traditional teaching methods were implemented to the control group students. The data collected by means of pre-test, post-test and interviews showed that project based learning method was much more effective than the traditional methods.

In summary, the literature concerning education for sustainable development pointed out several studies for different age groups including the application of a lecture, project or questionnaire. And, these studies revealed that teachers' environmental literacy has a significant role on the education and the activities concerning environment should be provided during the educational year. Also, the importance of using students-centered methods, especially the drama in the lectures that provides the active participation of the learners is denoted. In other studies that investigates the effect of school type and the effect of gender on environmental knowledge and attitude it is examined that private school students' environmental attitude is more positive than the public school students and girls tend to have more positive environmental attitude. Furthermore, in the researches that consider the attendance of the participants for the environmental activities or courses revealed that most of the participants did not attend any environmental activity provided by any

environmental organization and also they did not attend any environmental education course before the university.

CHAPTER 3

METHOD

This chapter comprised of four sections as to introduce the methodology used in the study. The sequence of the sections of this part is the same as the steps followed during the realization of the study. The first section is about participants of the study and the introduction of the study area. Second section is about adaptation of the instruments and explanation of their content. Third part is about the core part of the study; it includes the details about lecture design procedure and explains decision making process for methods of teaching. And the last part is about the procedure and tends to explain the steps followed for applying the designed lectures.

3.1 Participants of the Study

The target sample for this study was chosen among the public schools in Çankaya district in Ankara. The school was located in the “Yüzüncü Yıl” area, where economic state of the people may be defined as average, and it includes two cycles which are morning and afternoon. The total number of students in the morning cycle which includes students from 1st grade to 5th grade is 370. The school has a small garden that has a little grass area and there are no trees and flowers. Also, school has some social clubs such as, library, folk music and environment.

The participants of the study, in which single subject research design was used, were composed of total of 51 (19 females and 32 males) students who are selected as class by cluster random sampling (Fraenkel & Wallen, 2006) among two 4th and two 5th grade classes in the school. The number of students according to the grade and gender has been presented in the Table 3.1 below. The average age of the students was 10 and their cumulative grade ranges between 4 and 5.

Table 3.1 Some demographic characteristics of the participants (n = 51)

		N	%
Gender	Female	19	37
	Male	32	63
Grade	4 th Grade	18	35
	5 th Grade	33	65
	Total	51	

3.2 Variables

There are two types of variables in this study; independent variables and dependent variables.

3.2.1 Independent Variables

Independent variable of this study is environmental education lectures.

3.2.2 Dependent Variables

The dependent variables are used for measuring the effect of an independent variable. The dependent variable of this study is the environmental attitude of the elementary school students that is measured by means of the environmental attitude questionnaire as pre-test and post-test.

3.3 Lecture Design

Lecture contents were determined depending on the basic global environmental issues and sustainable development (SD) indicators as described by international and national agencies (CSD, 2001 & Ministry of Environment and Forest), experiences of the other researchers (Fien et al., 2000; Şimşekli, 2001; Cerrah et al., 2004; Erten, 2003; McNaughton, 2004) and by considering the objectives defined by the Turkish Republic Ministry of Education (MEB, 2006) for the new curriculum for primary schools in Turkey.

The decided content of the lectures and the relevant references are presented in the Table 3.2 below.

Table 3.2 Content of the lectures

Lecture No	Global Issue	Matching SD indicator (UNEP,2001)*	Relevant subject in the new Turkish curriculum (MEB, 2006)	Subject
<i>1st Week: First day, first lecture</i>	Urbanization Deforestation Loss of Biological diversity Environmental problems Impact of human on increasing environmental problems	Land Biodiversity Oceans, seas and coasts Atmosphere	Air pollution Water pollution Soil pollution Reasons of environmental pollution Unplanned urbanization	General environmental problems and reasons
<i>2nd Week: Dams and electricity use</i>	Sustainable development	Strategic implementation of SD	Excessive paper consumption Fire in forests	“Sustainable Development” as a solution for environmental problems
<i>3rd Week: How big is your foot?</i>	Consumption patterns	Material consumption Energy use Transportation	Transportation consumption of plastics and detergents at home	How big is our ecological footprint?
<i>4th Week: Let's recycle!</i>	Solid wastes	Waste generation and management	Wastes Batteries	Let's produce solutions for reducing environmental problems: Recycling

According to the Table 3.2, the global issues mentioned were concerning the general environmental problems (Urbanization, deforestation, loss of biological diversity and impact of human on these problems), sustainable development, consumption patterns and solid wastes. The indicators related with these issues that are stated by UNEP (2001) are land, biodiversity, oceans, seas and coasts, atmosphere, strategic implementation of SD, material consumption, energy usage, transportation, waste generation and management. Indicators help for earlier realization of the damage in economic, social and environmental aspects to protect them (CSD, 2001). On the other hand, in Turkey, environmental education is placed in the science curriculum of elementary schools and includes basic general environmental problems. The environmental issues in the Turkish curriculum that concerns the sustainable indicators and global issues mentioned in the table above are air, soil, water pollution; reasons of environmental pollutions such as unplanned urbanization, consuming too much paper, firing the forests, plastic and detergent consumption at homes, the way of transportation, the wastes generated by people and batteries as a dangerous wastes. On the basis of the curriculum the researcher improved the general environmental problems and prepared the lectures considering the sustainable development indicators that address the global environmental issues.

3.4 Instrument Used in the Study

A 32 item environmental attitude questionnaire was used for the study. The aim for using this questionnaire was to test the effect of 4 weeks environmental education program on the students' environmental attitudes. The questionnaire was comprised of the attitude items used by National Environmental Education and Training Foundation (NEETF & Roper, 2005) for assessing environmental literacy and those used by Tuncer *et al.* (2005) for assessing environmental attitudes of the primary school students in Turkey. The questionnaire was rearranged based on three major points as; the content of the designed lecture (Table 3.2), grade level of the students and environmental conditions in Turkey.

Table 3.3 presents the subjects of the lectures and the related items in the attitude dimension of the questionnaire.

Table 3.3 The lectures subjects versus the items in the attitude dimension

Lecture	Subjects	Item/s in the attitude dimension
1	General environmental problems and reasons	Turkey does not expose to environmental pollution. When humans interfere with nature it often produces disastrous consequences. Plants and animals have as much right as humans to exist. Several animal and plant species exposed to extinction in Turkey Environmental pollution has negative affects on the human life I feel personally responsible for helping to solve environmental problems. Wild animals that provide meat for people are the most important species to protect. All plants and animals have an important role in environment Poisonous snakes and insects that pose a threat to people should be killed.
2	“Sustainable Development” as a solution for environmental problems	The earth has plenty of natural resources; however the main point is to learn how to make use of them. Sustainable use of water and electricity is important for sustainability of natural resources.
3	How big is our ecological footprint?	We are approaching the limit of the number of people the earth can support. Fast food consumption is hazardous for health of both the people and the environment Everyone have a negative impact on the environment; however it changes according to the consumption patterns Spending too much time in shopping centers affects the use of natural sources and consumption negatively.
4	Let’s produce solutions for reducing environmental problems	Special areas should be provided for the endangered species. It is important that everyone should be aware of the environmental problems. Collective action (i.e. movements) is central to solving environmental problems.

The questionnaire is composed of two sections as; participants’ profile and environmental attitudes. The first part, on the other hand, was comprised of two sub sections as demographic information and environmental background. Fourteen questions were asked in the participants’ profile section. Demographic information subsection included 9 questions related to gender, age, grade and average grade of students’, and education level and working status of their parents; environmental background section included 5 questions related to students’, and parents’ interest in environmental problems, students’ intention for outdoor activities, their perception about importance of environmental subjects and knowledge concerning environmental subjects. Environmental attitudes section, on the other hand, was comprised of 18 items of 4 point Likert type. The cronbach’s alpha calculated in the

pilot study of the questionnaire concerning attitude dimension was .85, which is within the limit stated by Hair (1998), meaning that section of the applied questionnaire is reliable. The detailed description of the questionnaire is presented in Table 3.4, below.

Table 3.4 Environmental attitude questionnaire

Section 1: Participants' Profile	
Section 1.1: Demographic information	
Item #	
1	Name of the school
2	Grade (4; 5)
3	Gender (girl; boy)
4	Date of birth
5	Average grade
6	Education level of students' mother
7	Education level of students' father
8	Working status of students' mother
9	Working status of students' father
Section 1.2: Environmental Background	
10	How much does your parents interested in environmental problems?
11	How much do you interested in environmental problems?
12	Which one of the following activities have you done before? (camping; walking; riding bicycle; bird watching; running; hunting; planting tree; fishing)
13	Which one of the followings is the most familiar with your ideas? a. Environmental problems are one of the most important 2 or 3 problems that human face b. Environmental problems are important, however there exists more important problems c. Environmental problems are not important d. There exist no environmental problems
14	How much do you think you know about the environmental problems? (Much, Enough, A little, Don't know)
Section 2: Environmental Attitude	
Target: To assess feelings and values related to environment as well as the responsibility toward environment and intention to be a part of responsible environmental behavior.	
1	Turkey does not expose to environmental pollution.
2	Earth's capacity for supporting life is almost terminated.
3	Interference of humans generally produces disastrous consequences.

Table 3.4 (continued)

4	The earth has plenty of natural resources; however, the main point is to learn how to make use of them.
5	Special areas should be provided for the endangered species.
6	Plants and animals have as much right as humans to exist.
7	Several animal and plant species exposed to extinction in Turkey.
8	Animals that provide meet for the human are the most important species to be protected.
9	Poisonous snakes and insects should be killed because of threatening the human life.
10	It is important that everyone should be aware of the environmental problems.
11	I feel personally responsible for helping to solve environmental problems.
12	All plants and animals have an important role in environment.
13	Social activities have an important role in finding solutions for environmental problems.
14	Sustainable use of water and electricity is important for sustainability of natural resources.
15	Preferring to spend too much time in shopping centers as a lifestyle affects the usage of natural sources and consumption in negative way.
16	Everyone have a negative impact on the environment; however it changes according to the consumption patterns.
17	Fast food Consumption is hazardous for both the health of us and the environment.
18	Environmental pollution affects the human life in negative manner.

3.5 The Lectures; Treatment Procedure

The lectures started at the first week of March' 2007 after the application of pre-test. It took 4 weeks to complete the designed schedule. Every lecture took 40 minutes and one lecture was given each week. The schedule and the content of the lectures are summarized in the Table 3.5 below.

Table 3.5 Schedule and content of the lectures

Lecture	Subject	Target	Methods	Application	Objectives
<i>1st Week: First day, first lecture</i>	General environmental problems and their reasons. (Urbanization, deforestation, loss of biological diversity, environmental problems, impact of human on increasing environmental problems)	To acquire awareness and sensitivity to the total environment	Role playing, Cooperative Learning, Discussion	Students were assigned to try to feel like an animal living in a forest and asked the problems they probably face in their home. Students discussed their problems with each other as the animal they had chosen. <i>Assignment:</i> Students were assigned to observe activities of their parents and themselves for one week and list the ones that effect the environment.	To list environmental problems by giving examples from daily life. To define the role of human beings for increasing environmental problems. To describe effects of the environmental problems on the animals' and humans' life. To determine the effect of deforestation on the animals' life and biodiversity
<i>2nd Week: Dams and electricity use</i>	"Sustainable Development" as a solution for environmental problems	To help students to understand how daily life can be adopted to help to protect environmental sources.	Questioning, Discussion	The possible answers for the following questions were discussed with the students: causes and results of environmental problems individuals' role to lessen the impact. Sustainable development has been introduced and questioned as a concept for solution to decrease individuals' impact on the environment. Students watched a short movie related with the impacts of dam construction on the animal and human lives. <i>Assignment:</i> Students were assigned to investigate what to do to enhance sustainable use of sources.	To comprehend the terms "water pollution, soil pollution and air pollution". To explain the causes for the existing "water pollution, soil pollution and air pollution". To list the negative effects of the pollution on human life and environment. To realize the negative impacts of a dam on the habitat. To discuss "sustainable development" concept and its relation with our living habits.

Table 3.5 (continued)

<p><i>3rd Week: How big is your foot?</i></p>	<p>How big is our ecological footprint?</p>	<p>To ensure understanding of the students that they are part of the natural circle. To help students to understand the effect of consumption patterns on the environment and the term "Ecological Footprint".</p>	<p>Questioning, Case study, Discovery</p>	<p>One of the students was asked to tell about his regular day and all students discussed the possible impacts of his life style on the environment. Two of the students were asked to find out or make up lifestyles of the two different people from different parts of Turkey. All students discussed the effects of their life styles and consumption patterns on the environment. A handout was given to the students and they are required to answer the questions related with their own life styles and consumption patterns. <i>Assignment:</i> Students were assigned to observe the waste produced in their houses during 1 week and compare the amount of organic waste with that can be reused or recycled.</p>	<p>To discuss the term "consumption". To list the effect of the different consumption patterns on environment (The way of travel, using renewable energy sources, eating fast food, sustainable use of water and energy at home and school) To help students to understand the meaning of ecological footprint concept and its relation with the consumption patterns and environmental impact.</p>
<p><i>4th Week: Let's recycle!</i></p>	<p>Let's produce solutions for reducing environmental problems: Recycling</p>	<p>To discuss how to help to reduce environmental problems and to comprehend the term recycling as one of the solutions.</p>	<p>Questioning, Demonstration, Discussion</p>	<p>The poster that includes some pictures related with the environment was hanged on the board (Appendix C). Students were asked to find out the items that are harmful to the environment and cause pollution. Recycling was discussed as one of the solutions. Some materials possible to be recycled (e.g. plastic bottle, glass jar, newspaper) were brought to the classroom and students were assigned to categorize them</p>	<p>To help students realize that they are a part of a solution for environmental problems To discuss solutions for reducing the environmental problems, such as recycling. To define the benefits of using recyclable matters To differentiate the wastes that can be recycled</p>

As was presented in the table above, various teaching methods were used during the treatment procedure depending on the subject, such as role playing, cooperative learning and demonstration. In addition to these methods, visual-aids (e.g., poster and short movie) used frequently and at the end of each lecture discussion sessions were held. During the first lecture, for example, role playing was used in order to realize the impact of human on the animals living in a forest (Table 3.5). Discussion topics included students' opinions about types of environmental problems, our role to help to decrease environmental problems, sustainable development, our living habits and consumption patterns. Moreover, several assignments were given to the students. For example they were asked to observe the quality and quantity of the solid waste produced in their home for a period of a week and to distinguish between organic wastes and the ones possible to be recycled. All these concepts, on the other hand, were explained at the end of the two weeks, by "ecological footprint" concept; subtitled that, human impact on the environment depends on various factors, including life styles and consumption patterns, and this can be measured by ecological footprint and decreasing our footprint will help very much to achieve a sustainable future.

3.6 Procedure

The study was conducted in the fall semester of the 2006-2007 school year. Participants' environmental attitude was measured before the treatment by the instrument described in the former section and identified as the pre-test. The treatment was composed of 4 lectures and was given in 4 weeks. After all of the lectures were completed, the post-test was applied to all participants in order to measure the impact of the treatment.

The implementation procedure has been explained in detail in the following sections.

3.6.1 1st Week: First day, first lecture

The subject of the first week was "General environmental problems and their reasons". The purpose of this lesson was to help the students to realize the environmental problems and their impact on our lives and the role of human as causing environmental problems. The teaching methods used during this lecture were role playing, cooperative learning and discussion. Role playing method is preferred to

describe and identify the general environmental problems, depending on the fact that, while having roles, the teacher and the students actively participated the lecture and that improves the creativity and comprehension about the world with the people living in it (McNaughton, 2004). During role playing procedure, students were asked to imagine that they were any object in the forest (e.g. plant, animal, lake). They were allowed, for five minutes, to act as the thing they have chosen and meet and talk with each other by imitating it, in order to make them feel exactly that they are the member of the forest. Most of the students preferred to be an animal and enjoyed acting as the animal with shouting its noise. Then, they were asked to list the problems they face while living in the forest. The answers of the students were limited with the environmental pollution occurred due to garbage in the forest as a result of especially picnics and cutting and firing too many trees. Moreover, the 4th grade students mentioned that too many animals have been killed by human beings; one of the students who played a crocodile, for example, complained about human who killed his family in order to produce shoes from their skins. On the other hand, the students in 5th grade class talked about air pollution. As a result of this discussion 6 major environmental problems were set out with the students as: environmental pollution in general, air pollution, soil pollution, water pollution, solid wastes, deforestation and extinction of animals and plants. After setting up of a list of environmental problems, the class was divided into six groups to discuss the possible reasons for the six different environmental problems. Finally the students were asked to share their ideas with the whole class. The resulting ideas of the students about the reasons of the 6 major environmental problems are presented in Table 3.6

Table 3.6 Students' ideas: reasons for major environmental problems

Environmental problem	Students' ideas: the reason(s)
Environmental pollution in general	Throwing garbage to the lakes and forests. Firing the forests.
Air pollution	cigarette smoking factory emissions car exhausts deodorants.
Soil pollution	chemicals mixing with soil. throwing garbage and wastes to environment.
Water pollution	throwing garbage to lakes or to other water sources. wastewaters of factories discharging into the lakes or seas.
Solid wastes	throwing solid wastes to environment.
Deforestation and extinction of animals and plants.	Illegal/unconscious hunting. Illegal/unconscious cutting and firing of the trees

3.6.2 2nd Week: Dams and electricity use

The subject for the second week was "Sustainable Development" and the purpose of this lecture was to improve the knowledge of the students about the terms related with the environmental problems and to emphasize sustainable development as a solution for the environmental problems. Questioning and discussion methods were used during this lecture in addition to the use of a visual material; a short movie on the impacts of a dam construction. The movie was used in order to explain the loss of biological diversity in rural districts due to the increasing urbanization and the construction of dams and help students to make a relation between their life styles and environmental damage. At the beginning of the lecture, the students were asked to define reasons for environmental pollution. The answer of most of the students for this question was "*human*". All of them knew that the people pollute the environment by discharging wastes everywhere; however, they could not think that our living habits, such as consuming too much electricity and/or water, effect the environment. Especially 4th grade students could not make a relationship between a dam and the electricity use. When they were asked, most of the students told that they forgot to turn of the lamp while going out of the room or turn of the TV by remote control tool. After this discussion, the students watched the movie related with the impacts of constructing a dam on the animals' and people' lives. The movie was attracted the

students very much and during the movie they felt upset for the animals that had to leave their habitat and lose their families. Especially the question “Which one do you prefer; to sit in your home with air conditioner or to save the life of the servos that live close to the dam area ?” asked in the movie made the students to examine their lifestyles. After watching the movie most of the students promised that they will not forget to turn of the lamp and warn their parents about using electricity more consciously. A discussion session was held afterwards, related to the meaning of the concept of sustainable development. None of the students had an idea about the concept. Then, the meaning was explained and the students were assigned to list what to do in order to have a more sustainable life and to observe their family for a week and list the activities that may cause environmental problems.

3.6.3 3rd Week: How big is your foot?

The subject that had thought in the third week was “ecological footprint”. The purpose of the lecture was to make the students familiar with the term “consumption patterns” and to teach the effect of consumption patterns on the environment. Questioning, discovery and case study methods were used in order to get the students’ attention. After summarizing the previous lecture, students were asked to share their observations related to their assignments with the class. The answers given by the students, to the question “Do you or your family have any impacts on polluting the environment?” showed that they can hardly realize the effect of their daily life on the environment. Most of the students told that no activity of their family causes environmental problems, except from consuming too much electricity or leading to air pollution by means of cigarette smoking. Accordingly one of the students was asked to tell his one regular day to the friends and others are required to find any relationship between the activity and the related environmental impact. This study helped the students to realize the effect of their daily life activities on the environment. One of the students, for example, told that his father takes him to school every day with their own car. When he was asked about the impact of this activity on the environment, he defined that this cause air pollution as a result of the gases that comes from the exhaust of the car. And it was discussed afterwards that the use of school bus may be a sustainable solution alternative for this situation. After this discussion, two students were given a card that includes lifestyles of two different people (Elif and Berkay) that were made up by the teacher (Appendix A) and they

were asked to read the story of them one by one and discuss whether the life styles of these two have impacts on the environment. The story was about daily lives of Berkay and Elif that, “Berkay lives in İstanbul, pizza and chocolate are his favorites, he prefers car instead of bus to go to school and plays computer game every night; while Elif lives in a village and goes to school by walking, she eats home made foods and has no computer and games, etc.” By comparing these two life styles, students decided that Berkay’s style of living has many impacts on the environment. They suggested Berkay not to play with computer too much, eat healthy foods instead of junk food and use public transportation as much as possible. After repeating the meaning of the sustainable life styles and sustainable development, students discussed what to do in order to have a sustainable future. Only one of the students in the 4th grade told that we should be careful about our consumption patterns. On the other hand, as a result of the questions they were asked like, “Do you leave the tap open while brushing your teeth?”, “Do you turn of the lamp before going out the room?”, “If you could not finish the meal in your plate, do you throw it?”, students made a list about the things to do have a sustainable future.

As a summary, students were told that their living styles have an impact on the environment but its severity changes one to another. After asking the question “How could this impact be measured?” the term “ecological footprint” was mentioned and students were asked if they want to tell anything about the term. Since the students did not answer, they were directed by asking another question that, “*Do you think ecological footprint depends on the size of the foot?*” All of the students agreed with this idea and decided to find the one having the biggest foot in the classroom. Moreover they decided that the people with the big foot kill the insects and crush the grass more than the people with the small foot. After they were explained that the size of the foot does not reveal the ecological footprint but it is related with the consumption pattern. At the end of the lecture, handout (given in Appendix B) was distributed including questions related with the consumption patterns of the students. In addition, students were assigned to observe the waste in their houses during a week and compare the organic wastes with the recyclable ones.

3.6.4 4th Week: Let's recycle!

The subject for the last week was “Let's produce sustainable solutions to help reduce environmental problems: Recycling”. And the purpose of this lecture was to discuss about individual responsibilities to reduce the environmental impact and comprehend recycling as a one of the sustainable solutions. During this lecture, questioning, demonstration and discussion methods were used in addition to a poster (Appendix C) used for summarizing the whole lectures. The poster hanged on the board that includes the pictures related with the environment and regular human activities. And the students were asked to find the ones that are harmful to the environment and cause environmental problems. By this way all the lectures were renewed and then the students were asked what could be done in order to help to reduce these problems. The answers of the students were that they should not discharge the wastes into the environment, use the electricity and water consciously. Afterwards, using recyclable materials were emphasized and the students were asked if they take are conscious to use them. Since they have already familiar with this idea, because of the used paper boxes in their classrooms, most of the students knew about recycle but they confessed that they were not sensitive about it. Furthermore, the students were told about the benefits of recycling as it provides using the materials again and helps to use fewer sources. It is necessary to point out at this point that, although there were recycling pins in their classrooms, the students were not really aware of what and why were they doing this. Thus the importance of recycling were mentioned in detail in terms of its benefits of protection of natural resources, saving energy and reduction in the amount of waste and several recyclable materials (e.g. plastic bottle, glass jar, newspaper) and organic wastes were brought to the classroom in order to make students to realize that they should not be thrown in a waste bin together. All the wastes were placed in the classroom floor and students were assigned to categorize them in terms of paper, glass, plastic and organic. Then three students were assigned to hold three different boxes named as plastic, glass and paper. And all the students in the classroom participated the activity and tried to put the wastes into the correct box.

3.7 Statistical Techniques Utilized in the Study

Descriptive and inferential statistics were used in this study in order to analyze the collected data concerning demographic information, environmental perspective and environmental attitudes of the participants.

3.7.1 Descriptive Statistics

The mean, standard deviation, skewness and kurtosis values of the variables are calculated as descriptive statistics.

3.7.2 Inferential Statistics

Paired Sample t-Test and Independent Sample t-Test was conducted in order to recognize the effect of environmental education course on the environmental attitude of the elementary school students.

3.8. Assumptions and Limitations

Assumptions and limitations of the study that are considered by the researcher are mentioned below.

3.8.1 Assumptions

1. The implementation of the questionnaire and the lectures were under standard conditions for all the groups.
2. The responses of the participants for the items in the instrument were accurate.

3.8.2 Limitations

1. The designed environmental education lectures has taught by the researcher.
2. This study is limited to duration of the lectures.
3. This study is limited to design of the study.
4. Validity of the study is limited to the honesty of the students in their responses for the instrument.
5. Validity of the study is limited to the reliability of the instrument used in the study.

CHAPTER 4

RESULTS

Results of this study have been presented in three subheadings as; demographic information related with students and their parents, their perceptions on environment and students environmental attitudes. Results of descriptive and inferential statistical analyses constituted the basic tool for presenting the results. The mean and frequency distributions were used to explain the participants' demographic profile, their perceptions on environment and to evaluate the change in their environmental attitudes upon the application of the designed course.

4.1 Student's profile

Profile of the students of this study has been evaluated by means of the results of descriptive statistics concerning the questions asked in the 1st part of the questionnaire. Students' profile has been evaluated in two parts as demographic characteristics and environmental background. There are 9 questions related to students' profile in the questionnaire and are related to grade, gender, age and cumulative grade in addition to the educational level and working status of their parents. Such information is foreseen to be important as supportive variables for evaluating their attitudes toward environment.

Students' demographic characteristics: Grade, gender, age and average grade

Table 4.1 presents the data about grade and gender of the students whose average age were 10 and average grade were 4.7.

Table 4.1 Students' demographic characteristics

	Students	
	#	%
Grade		
4 th grade	18	35
5 th grade	33	64
Total	51	100
Gender		
Boys	32	63
Girls	19	37

Students' environmental background

According to the table 4.2, 36.7% of the students declared that they were interested in the environmental problems in a great deal while 49.0 percent of the students stated that they were interested in environmental problems in fair amount.

Tendency of the students for the outdoor activities in pre-test were 22% camping; 80% walking; 88% riding bicycle; 22% bird watching; 76% running; 6% hunting; 59% planting tree and 32% fishing.

Table 4.2 Students' environmental background

Concern about environmental problems	Students (%)
A great deal	36.7
Fair amount	49.0
Somewhat	12.2
Not at all	-
Undecided	2.0
Tendency for outdoor activities	
camping	22
walking	80
riding bicycle	88
bird watching	22
running	76
hunting	6
planting tree	59
fishing	31
Perception about importance of environmental subjects.	
One of the 2 or 3 important problems	70.6
More important problems exists	27.5
Not important	0
Not exists	2
Perception about knowledge concerning environmental subjects.	
Much	23.5
Enough	52.9
A little	17.6
Don't know	5.9

The Table 4.2 represents that students' perception about the importance of environmental subjects was quite fair (70.6%). Also, for the question "How much do

you think you know about the environmental problems?" 23.5% of the students mentioned that they know much about the environmental problems.

4.2 Parents' profile: Education level and working status

The data related to parents' level of education and working status have been presented in the table and figures below. Results have been presented to offer an insight for the further evaluations for the possible differences that may be obtained for the students.

Table 4.3 Parents' education level and working status

Education level of parents		(%)
Mother	Primary	27.5
	Secondary	13.7
	High school	33.3
	University	25.5
	Other	-
Father	Primary	21.6
	Secondary	11.8
	High school	29.4
	University	31.4
	Other	2.0
Working status of parents		
Mother	Government	33.3
	Private	5.9
	Own	-
	Other	-
	Jobless	56.9
Father	Government	35.3
	Private	19.6
	Own	15.7
	Other	13.7
	Jobless	13.7

Table 4.3 and Figure 4.1 represent related data on the education level of students' parents. As it is displayed in figure, education level of mothers and fathers ranged from primary education to master degree. For instance, while 27.5% of the mothers and 21.6% of the fathers are graduated from primary education, 25.5% of mothers and 31.4% of fathers graduated from university.

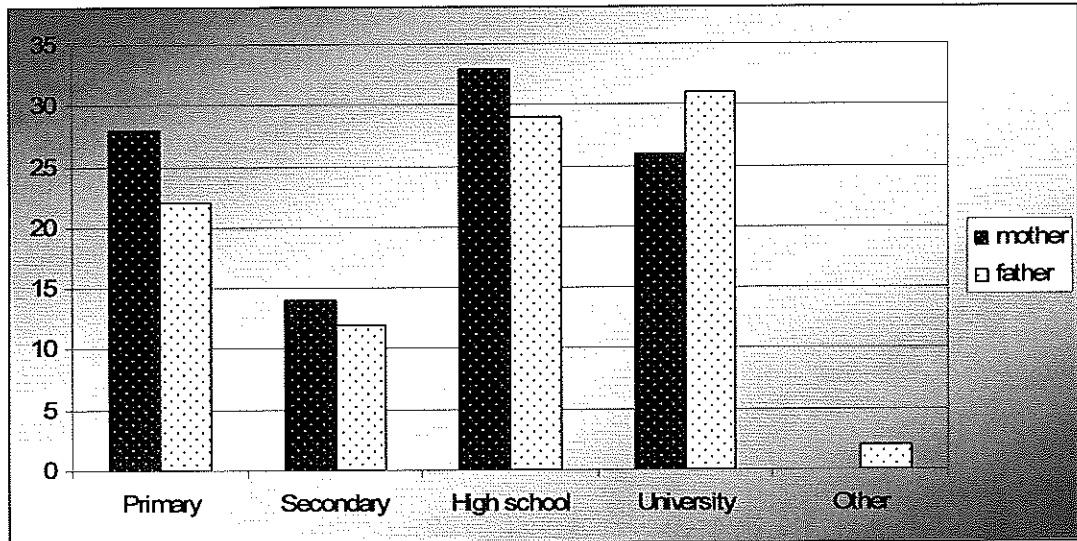


Figure 4.1 Parents' profile: Education level

The data related with the working status of the parents are given in Figure 4.2 and Table 4.3. As seen from the figure, 33.3% of the mothers and 35.3% of the fathers are working as civil servant; 5.9 percent of the mothers and 19.6 percent of the fathers' works in private sector and 2.0 percent of the mothers and 13.7 percent of the fathers are working in other kinds of job such as, cleaner or doorman.

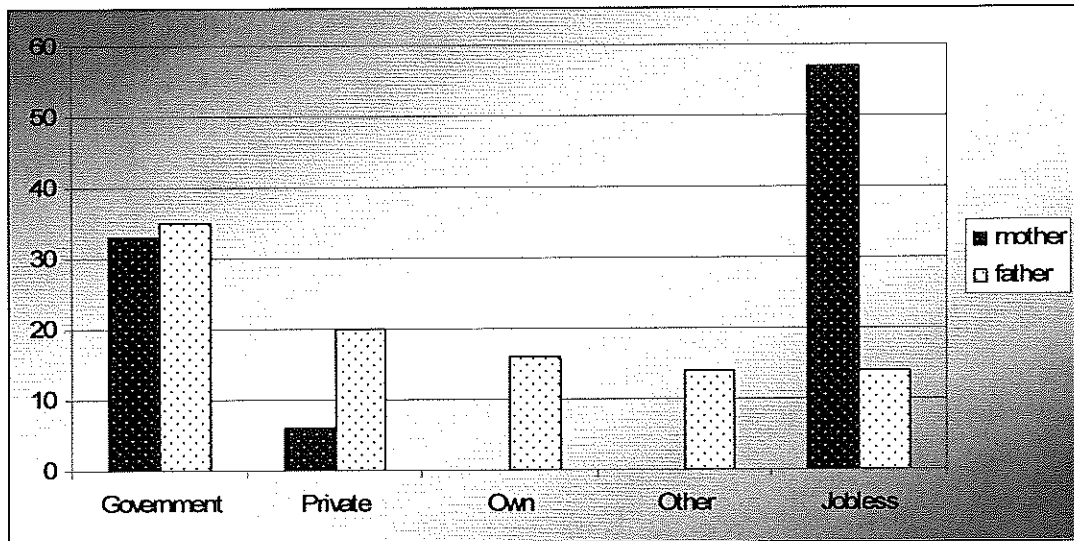


Figure 4.2 Parents' profile: Working status

Parents' Environmental Background

Parents' environmental background has been determined by means of a question that targeted to assess their interest toward environmental problems and the results have been presented in Table 4.4.

Table 4.4 Parents' Environmental Background

Interest of environmental problems	Parents (%)
A great deal	24.0
Fair amount	32.0
Somewhat	26.0
Not at all	2.0
Undecided	16.0

As mentioned in the table above 24.0 percent of students' parents were interested in environmental problems in a great deal and 32% of them were fair amount interested in environmental problems.

4.3 Pre-test mean scores of 4th grade and 5th grade students

This section exposes the pre-test mean scores between the 4th grade and 5th grade students that is evaluated by independent sample t-test. The dependent variable was the attitude scores of the students toward environment and the independent variable was the environmental education lecture.

4.3.1 Assumptions of Independent Sample t-test

For normality assumption, univariate normalities were checked that includes the histograms, skewness and kurtosis values.

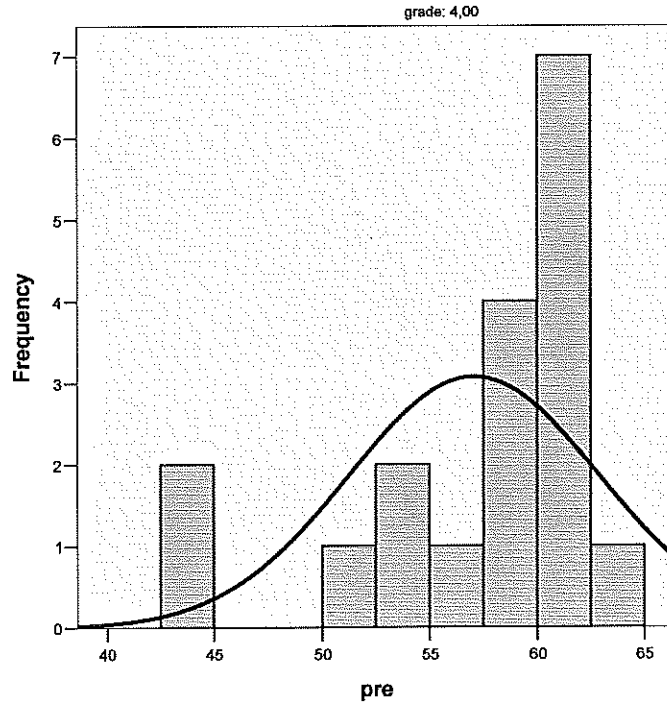


Figure 4.3: Histogram for pre-test scores of 4th grade students

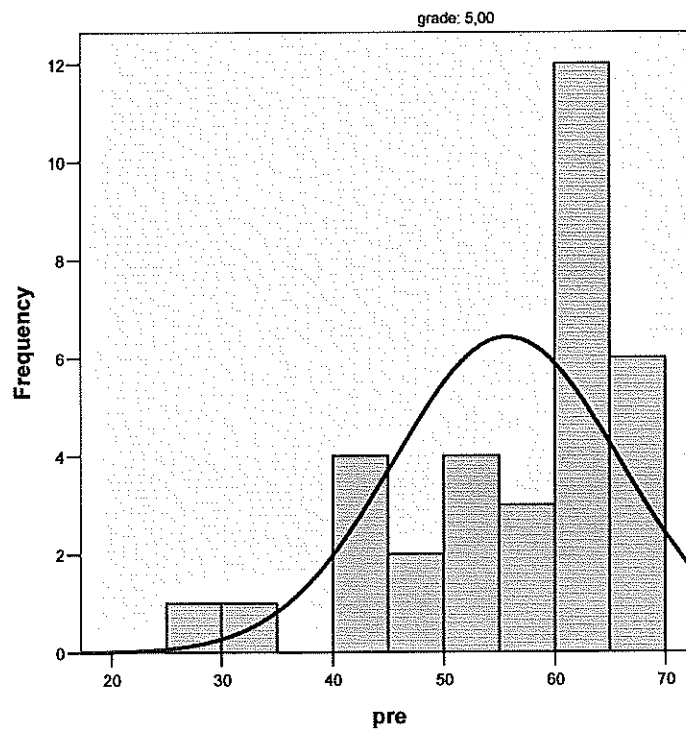


Figure 4.4: Histogram for pre-test scores of 5th grade students

Histograms for the students were not seemed to be normally distributed (Figure 4.3 and Figure 4.4) and also the skewness and kurtosis values were not in the range of -1 and +1 (Table 4.5), meaning that normality assumption was not met. However, since the sample of this study (n = 18 for 4th grade and n = 33 for 5th grade students) is larger than 15 the normality assumption may be violated and it is thought that the test will yield accurate results (Green *et al.*, 2000, p.150)

Table 4.5 Skewness and kurtosis values of students

		Skewness	Kurtosis
Environmental	4 th Grade	-1.54	1.73
Attitude	5 th Grade	-1.11	0.62

Levene's test for equality of variances is used to test whether the variances of pre-test scores of 4th grade students and 5th grade students were equal or not. And the p-value for equality of variances for pre-test scores of these students was found 0.01. Since the p values was smaller than alpha (0.05) it can be said the variances of these groups are not equal.

Also, it was assumed that the observation within each treatment was independent

4.3.2 Independent Sample t-test Analysis

In order to compare the difference between the pre-test scores over the 4th grade and 5th grade students independent sample t-test was conducted. The result of this tests were indicated in Table 4.6

Table 4.6 Comparison of pre-test scores of 4th grade and 5th grade students

		Levene's Test for equality of variances Sig.	Mean Diff.	t-test for equality of means p
Environmental Attitude	Pre-test	0.01	1.36	0.55

4.3.3 Null Hypothesis 1

There is no significant difference between pre-test scores of 4th grade students and 5th grade students.

An independent sample t-test was conducted to evaluate the hypothesis that pre-test scores of 4th grade students and 5th grade students are equal. The results

indicated that (Table 4.11), there is no significant difference between the pre-test scores of two groups ($p = 0.55 > \alpha = 0.05$).

4.4 Environmental Attitudes of the Students

The significant difference between the environmental attitudes of 4th grade and 5th grade students were evaluated as a preliminary study and no significant difference was found (Table 4.6). Since the environmental attitudes of the two groups found to be equal they thought as one sample and results of the study analyzed by looking at the pre-test and post-test mean scores of these students. The descriptive statistics concerning the participants' scores on the environmental attitude dimension is evaluated in both pre-test and post-test results (Table 4.7, Table 4.8. and Table 4.9). The questions in this dimension includes 18 questions each of which contains "Agree", "Undecided", "Disagree" and "I don't know" options. The results were presented in percent frequencies for each item and evaluated for determining the environmental attitude of all students at the beginning and at the end of the study by means of the results obtained from pre and post tests. The answers of 1st, 8th and 9th questions are inverted during the evaluation of the results since they are negative sentences.

Table 4.7 Environmental attitudes of the students in pre-test and post-test

	Min.	Max.	Sample Mean	Std. Dev.
Pre-test	27	68	56.18	8.88
Post-test	26	60	60.31	9.15

As was presented in Table 4.7 the students' pre-test mean scores were 56.18. And, results showed that their post-test mean score (60.31) was higher than their pre-test scores. The increase in the pre-test and post-test mean scores of the students states that environmental education lecture increased the environmental attitude of the students.

Table 4.8 Percentage of Students' Agreement with Environmental Attitude Statements: Pre-test results.

Item	% frequency					I don't know (%)
	Agree	Undecided	Disagree			
1	-	13.7	72.5			13.7
2	5.9	31.4	13.7			41.2
3	47.1	13.7	11.8			17.6
4	52.9	13.7	5.9			19.6
5	52.9	11.8	9.8			17.6
6	68.6	7.8	11.8			5.9
7	62.7	9.8	5.9			15.7
8	9.8	31.4	21.6			37.3
9	3.9	21.6	49.0			25.5
10	74.5	3.9	5.9			9.8
11	52.9	23.5	5.9			11.8
12	78.4	9.8	3.9			5.9
13	35.3	39.2	7.8			15.7
14	64.7	17.6	7.8			5.9
15	35.3	25.5	15.7			15.7
16	47.1	23.5	17.6			9.8
17	56.9	21.6	11.8			7.8
18	78.4	5.9	7.8			5.9

Table 4.9 Percentage of Students' Agreement with Environmental Attitude Statements: Post-test results.

Item	% frequency					I don't know (%)
	Agree	Undecided	Disagree			
1	7.8	3.9	86.3			2.0
2	25.5	37.3	15.7			21.6
3	49.0	29.4	15.7			5.9
4	68.6	11.8	11.8			7.8
5	72.5	13.7	7.8			5.9
6	84.3	2.0	5.9			7.8
7	74.5	11.8	7.8			5.9
8	43.1	33.3	17.6			5.9
9	21.6	11.8	52.9			13.7
10	92.2	3.9	2.0			2.0
11	64.7	13.7	5.9			15.7
12	82.4	7.8	7.8			2.0
13	47.1	33.3	7.8			11.8
14	72.5	9.8	13.7			3.9
15	37.3	39.2	11.8			11.8
16	58.8	19.6	13.7			7.8
17	64.7	13.7	13.7			7.8
18	86.3	5.9	2.0			5.9

Students' responses to the items for pre and post tests are presented in Tables 4.8 and 4.9. As seen from the tables % frequencies have been increased for most of the items in the post test. However, for some of the questions an increase is observed in the percentage of "undecided" option. The reason for this increase may be the lack of emphasis or insufficient focus on those items in the related lectures.

4.5 Effect of the designed environmental education lectures on students' environmental attitudes

Paired-samples t-test was conducted in order to investigate the effect of designed environmental education lectures on the environmental attitudes of the students. The dependent variable was the attitude scores of the students toward environment and the independent variables were the environmental education lecture.

4.5.1 Assumptions of Paired Sample T-Test

Histograms, skewness and kurtosis values were checked for normality assumptions.

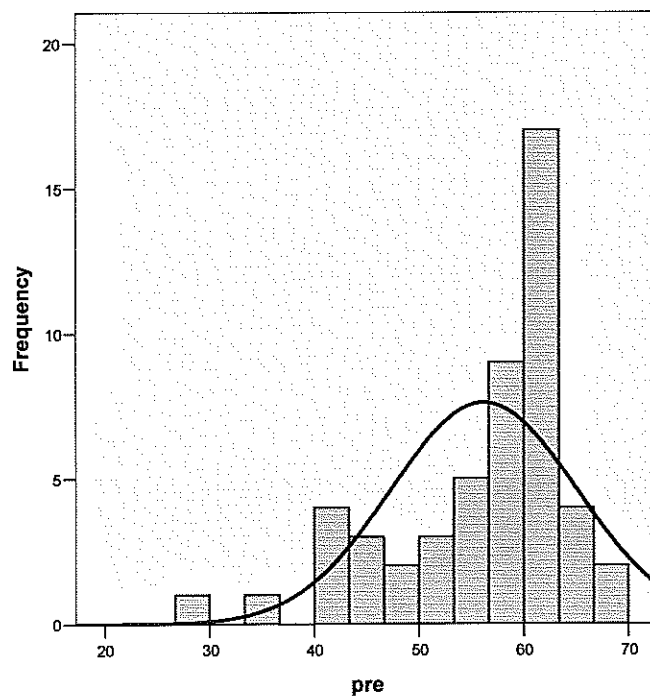


Figure 4.5: Histogram for pre-test scores of students

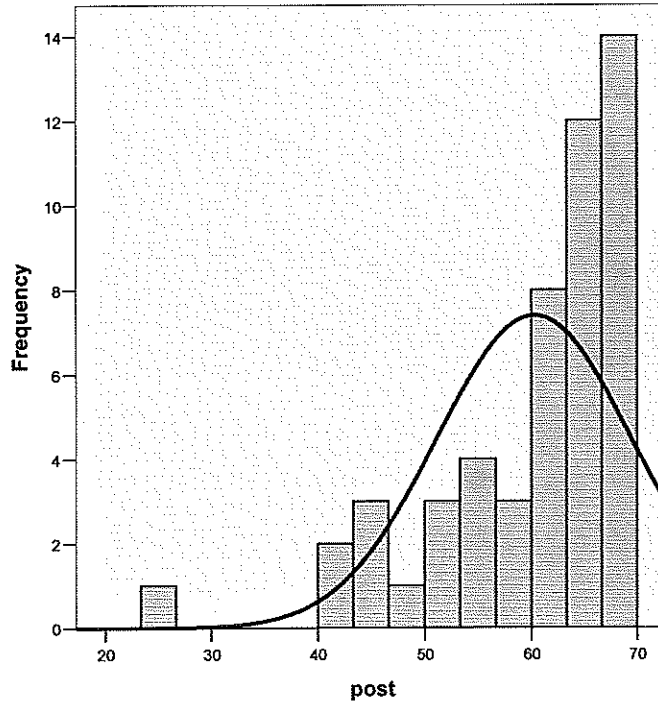


Figure 4.6: Histogram for post-test scores of students

The histograms in Figure 4.5 and Figure 4.6 and skewness and kurtosis values stated in Table 4.10 mentioned that the normality assumption for paired sample t-test was not met. However, having a large sample size ($n = 51$) that is more than 30 the normality assumption may be violated and it is thought that conducted test will yield relatively valid results (Green *et al.*, 2000, p.144)

Table 4.10 Skewness and kurtosis values of students

		Skewness	Kurtosis
Environmental Attitude	Pre-test	-1.293	1.418
	Post-test	-1.625	2.851

Also, it was assumed that the observation within each treatment was independent.

4.5.2 Paired Sample t-test Analysis

The dependent variable of this study was environmental attitude and in order to reveal the effect of environmental education lectures on the environmental attitudes of students, paired sample t-test was conducted. The result of paired sample t-test is indicated in Table 4.11.

Table 4.11 Comparison of pre-test and post-test scores within each group by paired sample t-test

	Mean	Std. Dev.	p
Environmental Attitude	4.13	8.03	0.001

4.5.3 Null Hypothesis 2

There is no significant difference within the pre-test and post-test mean scores of students.

Paired sample t-test was conducted in order to compare pre-test and post-test scores of students. The results (Table 4.11) indicated that there is a significant difference between pre-test and post-test scores of the students ($p = 0.001 < \alpha = 0.05$), meaning that null hypothesis is rejected. As a result, it can be said that environmental education lectures had a significant effect on the students' attitude toward environment.

4.6 Summary of Results

The results of this study can be summarized as follows;

- The inferential statistics used for evaluating whether the pre-test scores of 4th grade and 5th grade students is equal or not stated that there is no significant difference between the pre-test scores of the two groups.
- The inferential statistics that is conducted for recognizing the effect of environmental education lectures on students denoted that the environmental education lectures increased the attitudes of the students toward environment.

CHAPTER 5

DISCUSSION

This chapter has been composed of two parts as to represent the discussions concerning the lecture design and results of the application parts of the study.

5.1 Applications in EE and EfSD: Lecture Design

The major target of this study was to investigate the effect of environmental education lectures on primary school students' attitudes toward environment. As was explained in detail in Chapter 3, the lecture design included 4 sections. As mentioned in Table 3.6, the lectures include various student-centered teaching methods, in addition to the traditional teaching method. In the first lecture that contains general environmental problems and their reasons, cooperative learning, discussion and role playing methods were used. In the second lecture that concerns "sustainable development" concept, questioning and discussion methods were used as well as a short movie about effect of construction of dams on the animal and human lives. And, in the third lecture that aims to direct the students to think about the effect of their consumption patterns on environment including "ecological footprint" concept traditional learning, questioning, case study and discovery methods were used. In the last lecture the term recycling was thought as one of the solutions for reducing environmental problems by using questioning, demonstration and discussion methods.

As far as the researcher's observations during the lectures are concerned, it can be stated that, the first lecture which included attempts to make students comfortable to participate and thus mainly based on the role playing, improved the relationship between the student and the teacher and, during role playing the students assimilated the objects they choose in a forest and enjoyed very much. Furthermore, cooperative learning method helped to develop communication between the students and made them discuss the terms they learned during the lecture. Although classroom management was not that easy during role playing, all the students stated at the end that they liked the lecture very much.

One of the major observations for the second lecture was that, almost all the students tried to answer the questions asked by the teacher while making a summary about the past lecture. When the students realized that they will watch a movie, they felt very excited. Despite insufficient physical conditions in the classroom, the movie attracted the students very much that they felt very sad for the animals that had to leave their living area and families because of a dam construction. At the end of the lecture, the students told that they liked watching movie very much except the complaints of some of the students about not being able to see the movie very well.

The ecological footprint concept in the third lecture seemed as if it was not very attractive for the students at the beginning of the lecture. It was difficult for them to understand the term ecological footprint, may be because it was the first time they faced with it. The students mostly interested in the story of lifestyles of two different children and giving them advice to reduce their negative effects on the environment. After realizing the effect of their consumption patterns on the environment, the students tried to explain the term ecological footprint. Until it was explained by the researcher, most of the students believed that their ecological footprint depends on the size of their foot and they tried to decide about the one with the biggest foot size in the classroom. At the end of the lecture, most of the students stated that they were aware of understand being more sensitive about the environmental sources and again as they stated, they decided to talk about this with their parents.

In the last lecture most of the students mentioned that they were sad about finishing the lectures. A poster was used in this lecture in order to repeat all the lectures and the students were asked to tell about what they have learned during the lectures by the help of the poster. It was obvious that the students comprehend the behaviors having negative impacts on the environment, and when they were asked about their individual responsibilities, they mentioned several of them as to be conscious about cutting trees, hunting animals, smoking cigarette, traveling by car, throwing wastes to the environment, etc. In addition to these, they also mentioned recycling. Although the classrooms in the school have recycle bins, the students were not aware of the reason why they are doing this and what to do after the collection of those wastes. Moreover, they were not have adequate knowledge about not to throw every waste to the recycle bin. Assigning three students to be the recycled waste

containers (glass, paper, can) was fun and helped the students very much to realize difference between the wastes that can be recycled.

As a result of the observations, it can be easily stated that, the lectures attracted the students and directed them to think about environmental issues and feel as they are part of the environment. When the students were asked to list their feelings about the lectures, they stated that they enjoyed all the lectures; especially the first one that was based on role playing. Also, most of the students mentioned that they liked watching movie and some of the students told their feelings and ideas in more detailed. For example; one of the students mentioned that he did not understand the ecological footprint concept very well and added that he is going to make a search about it. Another student told that most of the people do not aware of the environmental problems and they should be informed by these kinds of lectures. The other one mentioned that he liked talking with the container while putting wastes into it.

Therefore, the researcher found these observations and students' evaluations very valuable as a supportive source for the results of statistical analysis indicated that the designed lecture has a significant effect on developing the students' environmental attitudes.

The literature about EE includes similar lecture design and application research. For instance, in 2000, Fien *et al.* implemented six different environmental education programs that takes various times (1 month to 1 year) on students at grade 5-12 which include several teaching methods (e.g. class discussion, oral presentation, written assignment, role plays, investigation and experiential learning) and topics concerning environmental issues such as air quality, local environmental problems, water issues and electricity (safety, uses, conservation). And, Erten (2003) executed a one-week schedule to the 5th grade students that is designed for increasing their awareness about "Garbage Reduction". The lectures included several topics related with garbage some of which are drawing about the environment in the next 30 years, field trip to the garbage destruction center in Ankara, discussion about this filed trip and recycling of the wastes, making paper from wastepaper as an example. In another study that is held in 2004, Şahin *et al.* compared the effect of environmental education lectures that are thought by students-centered methods and teacher-centered methods during 14 weeks (two hours each week). The content of the lectures composed of water, soil, air, radioactive, light and noise pollution and the student-centered methods

includes cooperative learning, role playing and presentation of the students. Furthermore, McNaughton (2004) implemented two sets of drama lessons concerning sustainability and citizenship to the primary school students (10-11 years old) that took 12 weeks. The first lesson was related with local issues (Rubbish and waste dumping illegally) while the second lesson was about global issues (Rainforest destruction and its effects on environment and communities living dependent on that forests).

The literature that is related with the application of environmental education and education for sustainable development indicated that the studies varies in terms of the topics implemented, the teaching methods used during the implementation and the duration of application. And, as it seen the designed lectures in this study is consistent with the general frame in terms of content and the application, rather than the duration of the implementation of the lectures.

5.2 Effect of Lectures on the Students' Environmental Attitude

The result of this study indicated that designed environmental education lectures had a significant effect on students' environmental attitudes. Paired sample t-test was conducted in order to test the hypothesis that concerns the difference between the pre-test and post-test mean scores of students. And, its result which was mentioned in Table 4.12 stated that there is a significant difference between the pre-test and post-test scores of the students.

Comparison of this result with other similar studies in the literature indicated several similarities. For example, Leeming and Porter (1997) examined that implementation of different activities concerning environmental issues affected the environmental attitudes of students in positive manner. Also, Payne (1981) revealed a study in a residential outdoor school to evaluate the effect of two outdoor environmental education programs on sixth grade students and found that the programs increase the environmental attitudes of the students. In another study, Fien *et al.* (2000) examined that environmental education programs affects students learning positively and increase the influence arise by discussion of the students about their learning with their parents that lead to positive changes in their attitudes including household practices. In another study, Erten (2003) found that lectures concerning garbage reduction changed the negative attitudes of the students toward

environment into positive. Furthermore, McNaughton (2004) used educational drama lectures on primary school students in order to improve their awareness, knowledge and action skills and attitudes toward environment and the results showed that drama lectures provided easier learning for students in education for sustainability.

Therefore, the results of this study is similar with the other researches that the environmental education lectures, programs or activities increased environmental attitudes of the participants at various age. On the other hand, there may be other variables that have an effect on environmental attitudes of the students as searched by other researcher. For instance, Chu *et al.* (2007) sated that school background of the parents affects the environmental literacy of the children in terms of environmental attitude, knowledge, behavior and skills. Also, Bryda (2006) stated that the region that people live has effect on environmental attitudes of children. Furthermore, it was revealed that gender affects the environmental attitudes of the students in the favor of girls (Tuncer *et al.* (2005); Alp (2005); Ertepinar *et al.* (2006); Chu *et al.*, (2007)). However, this study mainly focus on the effect of designed environmental education lectures on environmental attitudes of the primary school students rather than investigation of effect of other variables on environmental attitudes of the students. Therefore, the effect of other variables such as education level of parents, working status of parents, gender and grade can be investigated as further researches in order to contribute to improvement of the study.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

This chapter composed of two sections which are conclusion of the study and the recommendations for the further studies.

6.1 Conclusion

Most of the studies concerning environmental knowledge and attitudes of the students indicate that their knowledge concerning environmental issues and attitudes toward environment is insufficient (Erten, 2004). However, the literature indicates that there is not adequate number of studies that include implementation of any environmental education program, activity or lectures to improve the environmental attitude and knowledge of the students. Moreover, Tuncer *et al.* (2005) stated that environmental education curriculum in Turkey needs to be strengthen in elementary schools. Environmental education is an important tool to bring up individuals who possess a sense of environmental protection and it should start at the young ages in order to constitute this sense. And, this study aims to improve the environmental attitudes of the elementary school students by means of implementation of environmental education lectures.

The presented findings of this study stated a significant effect on the environmental attitudes of the students, by means of designed environmental education lectures that takes one month an increase is observed in the environmental attitudes of the students.

The lectures designed for this study mainly composed of student-centered teaching methods, in order to strengthen the understanding of the students. As mentioned by other researchers, implementing environmental education lectures that are composed of student-centered teaching methods influence their environmental attitudes more than the traditional teaching methods (Cerrah *et al.*, 2004; McNaughton, 2004; Oluk *et al.*, 2007). Also, the observations of this study imply that the lectures that require active participation of the students and includes visual aids provided easier and enjoyable learning for them. For instance, the first lecture in which the students act as an object in a forest by role playing was described as the

most enjoyable lecture by the students. All of the lectures in this study that are mentioned in Chapter 3 were designed in a way that the students comprehend the issues by thinking and constructing their knowledge, and the teacher act as a facilitator.

Furthermore, the lectures addressed ways about discussing the complex environmental problems with primary students and helping them to develop their perspective on how their lives contribute to the basic environmental problems.

To sum up, this study includes implementation of environmental education lectures and an environmental attitude questionnaire administrated as pre-test and post-test in order to evaluate the effect of the lectures on the students. And the results of the study stated that the lectures had a significant effect on environmental attitudes of the students that implemented the treatment. However, it may not be convenient to make a generalization by the results of this research, since it comprises a limited sample and since the period of implementation is not long enough. Therefore, the following recommendations were made for the future research.

6.2 Recommendations for further researches

The suggested topics for further studies are mentioned as follows:

- Another study similar to this one may be conducted in different types of schools (private and public schools), in different regions of Turkey, for the sake of generalizing the results and for being inspiration for curriculum designers, strategy makers, planners, etc.
- The period of the implementation may be made longer to strengthen the affect of the lectures
- A control group may be involved in the study to obtain more reliable results.
- Parents may be involved in the study in order to observe the attitudes of students in their homes.

- In addition to questionnaire, interview may also be used to detect the effect of the environmental lectures.
- Investigating the effect of other variables such as, gender, grade, education level and working status of the parents as further studies could contribute to the improvement of this study.

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APPENDICES

Appendix A: List of life styles of two different people

ELİF

- I live in Ödek village in Sivas.
- I study in Divriği boarding primary school since there is no school in our village.
- I visit my village at the weekends.
- We heat our home by stove and use wood and animal waste as fuel.
- Because of not havin grocery in our village, the villagers go to Divriği bazaar for shopping every Monday.
- In snowy days that the roads are blocked I could not go to my house.
- In summers, I always help my mother at home to milk cows and weave carpets.
- My mother produces most of the our breakfast (buttermilk, cheese, yoghurt, bread)
- I want to be a teacher in order to improve reading and writing skills of the students in my village.

BERKAY

- I live in Istanbul.
- I study in Bahçeşehir College.
- My mother brings me to school with her car everyday.
- I have a computer and a television in my room.
- I usually play computer games before sleeping.
- I usually sleep while watching television.
- I usually eat sausage, egg and salami in the berakfast and drink orange juice.
- I want to be a popular basketball player but my father wants me to be a doctor.
- Although I don't like, I visit dentist and doctor regualrly.
- My dentist told me that my teeth are very healthy but he always warn me not to consume fast food.
- My favourite foods are pizza and chocolate.
- I often buy new clothes.

Appendix B: Handout concerning consumption patterns of students

I. Aşağıdaki sorular için size uygun olan seçeneği işaretleyiniz.

1. Hayvansal ürünleri ne kadar sıklıkta yersiniz (et, tavuk, yumurta, balık, süt, peynir)?
 - a. Hiç yemem
 - b. Bazen yerim
 - c. Sıklıkla yerim
 - d. Neredeyse her gün yerim
2. Komşularınızla ve çevrenizdeki insanlarla kıyaslırsanız, ne kadar atık üretiyorsunuz?
 - a. Çok daha fazla
 - b. Aynı miktarda
 - c. Çok daha az
3. Evinizde kaç kişi yaşıyor?
 - a. 3 kişi veya daha az
 - b. 4 kişi
 - c. 5 kişi
 - d. 6 kişi
 - e. 7 kişi veya daha fazla
4. Ulaşım aracı olarak genellikle ne kullanırsınız?
 - a. Taxi
 - b. Kişisel araba
 - c. Dolmuş
 - d. Otobüs
 - e. Tren
5. Çok yakın mesafeler arasında ulaşımı nasıl sağlıyorsunuz?
 - a. Bisiklet
 - b. Yürüyerek
 - c. Araba
 - d. Dolmuş
 - e. Otobüs
6. Meyve ve Sebzeleri nereden alırsınız?
 - a. Pazar
 - b. Market
 - c. Manav
7. Günde yaklaşık olarak ne kadar naylon poşet harcıyorsunuz?
 - a. 1 tane
 - b. 2 tane
 - c. 3 tane veya daha fazla
8. Evinizin ısınması için hangi yakıt kullanılıyor?
 - a. Odun
 - b. Kömür
 - c. Doğal Gaz
 - d. Fuel oil
9. Ne kadar sıklıkta kendinize yeni kıyafet alırsınız?
 - a. Her beğendiğimi alırım
 - b. Arada sırada
 - c. 2-3 yılda bir alırım
 - d. Pek almam

II. Aşağıdaki sorular için parantez içindeki seçeneklerden size göre uygun olanı yuvarlak içine alınız.

1. Cam, plastik ve kağıt atıklar ile yemek artıklarını aynı çöp kutusuna atar mısınız? (Evet-Hayır)
2. Dişinizi fırçalarken musluğu açık bırakır mısınız? (Evet-Hayır)
3. Odadan çıkarken ışığı kapatır mısınız? (Evet-Hayır)
4. Kaleminiz ve defteriniz bitmediği halde yenisini alır mısınız? (Evet-Hayır)
5. Alüminyum kutudaki içecekleri mi yoksa cam şişedeki içecekleri mi tercih edersiniz? (Teneke-Cam)

Appendix C: The poster



Appendix D: Lesson Plan 1

Course: Science

Grade Level: 4-5

Topic: General environmental problems and their reasons

Topical Outline:

- Existing environmental problems
- The reasons for existence of the environmental problems
- The role of human on the environmental problems

Duration: 40 minutes

Objectives: At the end of this lesson, the students will be able to;

- List the environmental problems by giving examples from daily life.
- To comprehend the terms “Air pollution” and “Water pollution”.
- To define the role of human in the increase of the environmental problems.
- To explain the effect of human on the destroying the trees.
- To determine the effect of destruction of trees on the animals living there.
- To realize the impact of water pollution and air pollution on the living organisms.

Instructional Methods: Role playing, Cooperative Learning and Discussion method.

Procedure:

1. By means of cooperative learning, role playing and discussion methods, the students are directed to think about the general environmental problems, such as air pollution, water pollution, and destruction of the forests.
 - a. The students are wanted to imagine that they are an animal living in the forest by imitating the behaviors of the animal they choose. And they are directed to think about the problems they may face with while living in the forest.
 - b. The students are wanted to define the environmental problems that they may face in the forest in their imagination and divided into groups according to their ideas.
 - c. As a group, the students discuss and represent their ideas and then all the class involve to the discussion.
2. The teacher finishes the lesson by repeating the environmental problems that the students mentioned and then the students discuss the role of human beings on the constitution of these problems.

Assessment: The students are wanted to observe the behaviors of their families and themselves and write down the attitudes that have an impact on the environment.

Appendix E: Lesson Plan 2

Course: Science

Grade: 4-5th grade

Topic: Sustainable Development

Duration: 40 minutes

Purpose: The purpose of this lesson is to teach some of the terms related with the environmental problems by means of case study and to find solutions for these problems based on the sustainable development.

Objectives: At the end of this lesson, the students will be able to

- Realize the bad effects of the dams on the habitat.
- Comprehend the terms “water pollution and air pollution”.
- List the negative effects of the pollution on human life and environment.
- Comprehend the term “Sustainable Development”

Teaching Method: Questioning, Case Study

Procedure:

1. The teacher starts the lesson by showing a short film about the effect of construction of a dam on a river in Brasil on animals and human living there.
2. This case is linked with the sustainable development by means of questioning method.
3. The homework of the previous week, which is to observe the behavior of their parents and make a list, is discussed and the relationship between the behaviors and sustainable development is mentioned.

Assessment: Students were assigned to investigate what to do to enhance sustainable use of sources.

Appendix F: Lesson Plan 3

Course: Science

Grade: 4-5th grade

Topic: How big is our ecological footprint?

Duration: 40 minutes

Purpose: The purpose of this lesson is to make students aware of the effect of their consumption patterns on the environment and to explain the term “Ecological Footprint”.

Objectives: At the end of this lesson the students are assumed to;

- Comprehend the term “consumption”.
- List the effect of the different consumption patterns on environment
 - a. The way of travel
 - b. Using sustainable energy
 - c. Amount of water consumed in the houses
- Define the term “Ecological Footprint”

Teaching Methods: Questining, Case study and Discussion metod.

Procedure:

1. The students are wanted to think about the effect of their behaviors on environment. One of the students is asked to tell about his/her daily life habits and the other students are directed to discuss the effect of the behavior of their friends on the environment.
2. Two of the students are given two different cards, which includes list of regular life of two different people living in an urban and rural area, and wanted to tell the lifestyle of that people to their friends. And, all the students in the class discussed the effects of life styles of and consumption patterns of these people on the environment, by giving them advice to reduce their bad effect on environment.
3. These cases linked with the “ecological footprint” concept and the students wanted to think about its meaning.
4. After the definition of “ecological footprint”, a handout was given to the students and they are required to answer the questions related with their own life styles and consumption patterns.

Assessment: Students were assigned to observe the waste produced in their houses during 1 week and compare the amount of organic waste with that can be reused or recycled.

Appendix G: Lesson Plan 4

Course: Science

Grade: 4-5th grade

Topic: Let's produce solutions for reducing environmental problems: Recycling

Duration: 40 minutes

Purpose: The purpose of this lesson is to direct the students to think about reducing environmental problems and to comprehend the term recycling.

Objectives: At the end of this lesson the students are assumed to;

- List the general environmental problems
- Give examples about the solutions for environmental problems
- Define the benefits of using recyclable matters
- Differentiate and categorize the wastes that can be recycled

Teaching Methods: Questining, Group Work and Discussion methods.

Procedure:

1. All the lectures are summarized by means of a poster (Appendix C) that includes pictures concerning activities of human. The poster is hanged on the table and, the students desired to find out the items that are harmful to the environment and cause pollution. The students are asked to tell the bad effect of the pictures they selected on the environment.
2. The teacher suggests using recycling matters as a solution for reducing the environmental problems. After informing the students about this subject, a short activity is done to intensify the recycling matters:

The students are divided into three groups and given a name on the bases of recycling matters (e.g. paper, plastic, glass). The teacher brings a very big pocket that contains papers, glass bottles and plastic bottles to the class. Moreover, three different boxes that is mentioned as paper, glass and plastic are brought to the class. Then, the students are wanted to find the correct matter that matches with their groups name and put it to the correct box. The group that carries the most number of wastes to the correct box in 5 minutes wins the rise.

Assessment: The students are assigned to examine the waste box in their home and weight it. Then they are expected to separate the wastes in terms of their properties such as food wastes, glass, paper, plastic, drinking cubs and metal. After that, they are wanted to calculate the amount of the recycling materials in their waste box and compare them with the ones that can not be recycled.

Appendix H: Environmental Attitude Questionnaire

Sevgili Öğrenciler,

Bu anket sizin çevre problemleri konusu ile ilgili bilgi, davranış ve düşünce biçiminizi ölçmek amacı ile hazırlanmıştır. Bu sorulara vereceğiniz yanıtlar araştırma amacı ile kullanılacak ve gizli tutulacaktır. Yanıtlarınız Türkiye’de uygulanacak çevre eğitimi ders programlarının geliştirilmesine önemli katkılarda bulunacaktır. Sizlerin görüşleri bizim için çok önemlidir.

Yardımlarınız için teşekkür ederiz.

ODTÜ Eğitim Fakültesi, İlköğretim Bölümü

A. Kişisel Bilgiler

1. Okulunuzun adı:

2. Sınıfınız: 4 5

3. Cinsiyetiniz: kız erkek

4. Doğum tarihiniz:

5. Not ortalamanız:

6. Annenizin eğitim durumu: İlkokul Ortaokul Lise Üniversite

7. Babanızın eğitim durumu: İlkokul Ortaokul Lise Üniversite

8. Anneniz çalışıyor mu? : Evet Hayır

Yanıtınız “evet” ise çalıştığı kurum: devlet dairesi özel sektör kendi işyeri

9. Babanız çalışıyor mu? : Evet Hayır

Yanıtınız “evet” ise çalıştığı kurum: devlet dairesi özel sektör kendi işyeri

10. Anne ve babanız çevre problemleriyle ne kadar ilgili?

çok fazla yeteri kadar biraz hiç kararsızım

11. Çevre sorunlarıyla ne kadar ilgilisiniz?

çok fazla yeteri kadar biraz hiç kararsızım

12. Aşağıda açık havada yapılabilecek bazı aktiviteler göreceksiniz. Bunlardan daha önce yapmış

olduklarınızı işaretleyiniz. (Birden fazla seçenek işaretleyebilirsiniz.)

- kamp yürüyüş bisiklet sürme kuş gözlemi
koşu avcılık ağaç dikme balık tutma

13. Aşağıdakilerden hangisi sizin görüşünüze en yakındır?

- Çevre problemleri günümüzde insanların karşı karşıya olduğu en önemli 2 yada 3 problemden biridir.
- Çevre problemleri önemlidir, ama daha önemli başka problemler vardır.
- Çevre problemleri önemli değildir.
- Çevre problemleri yoktur.

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

- Çok
- Yeteri kadar
- Sadece biraz
- Bilmiyorum

B. Anket

I. Aşağıda çevre sorunlarına yönelik düşünceler göreceksiniz. Belirtilen ifadelere katıldığınızı ya da katılmadığınızı ilgili seçeneği işaretleyerek belirtiniz.

1 = Katılıyorum	2 = Kararsızım	3 = Katılmıyorum	4 = Bilmiyorum
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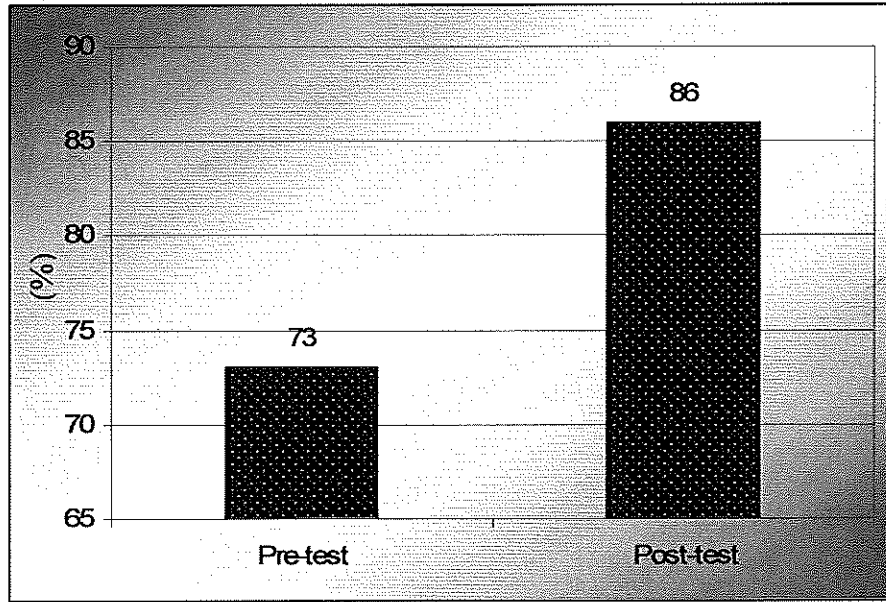
	Katılıyorum	Kararsızım	Katılmıyorum	Bilmiyorum
1. Türkiye'de çevre kirliliği sorunu yoktur.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
2. Dünyanın insan yaşamını destekleme kapasitesini doldurmak üzereyiz	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
3. Dünyada herkese yetecek miktarda doğal kaynak vardır, sorun bu kaynaklardan nasıl yararlanacağımızı öğrenmektir.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
4. Soyu tükenmekte olan türler için özel alanlar ayrılmalıdır.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
5. Ülkemizde nesli tükenmekte olan birçok bitki ve hayvan türü bulunmaktadır.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
6. İnsanların et ihtiyaçlarının karşılandığı hayvanlar korunması gereken en önemli türlerdir.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>

		Katılıyorum	Kararsızım	Katılmıyorum	Bilmiyorum
7.	Zehirli yılanlar ve böcekler insanlar için tehdit uyandırdığı için öldürülmelidir.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
8.	Çevre sorunlarının çözülmesinde kişisel sorumluluklarım olduğunu düşünüyorum.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
9.	Bütün bitki ve hayvanlar çevrede önemli bir role sahiptir.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
10.	Türkiye'de geri dönüşümün zorunlu olması yönünde yasalar hazırlanmalı ve uygulanmalıdır.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
11.	Toplumsal aktiviteler çevre problemlerinin çözümünde önemli bir yer tutar.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
12.	Su ve elektrik kullanırken tasarruflu davranmak, doğal kaynakların sürdürülebilir kullanımı açısından önemlidir.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
13.	Herkesin çevre kirliliğine etkisi vardır, ancak bu etki tüketim alışkanlıklarına göre değişir.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
14.	Alışveriş merkezlerinde uzun zaman geçirmek, tüketimi ve doğal kaynak kullanımını olumsuz yönde etkileyen bir yaşam tarzıdır.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
15.	"Fast Food" (Hamburger, vb.) tüketimi hem bizim hem de çevrenin sağlığı açısından zararlıdır.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
16.	Çevre kirliliği insan sağlığını olumsuz yönde etkiler	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
17.	Türkiye doğal kaynaklar açısından zengin bir ülkedir, bu yüzden doğal kaynakların tükenmesi söz konusu değildir.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
18.	Çevre kirliliği insan yaşamını negative yönde etkiler.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>

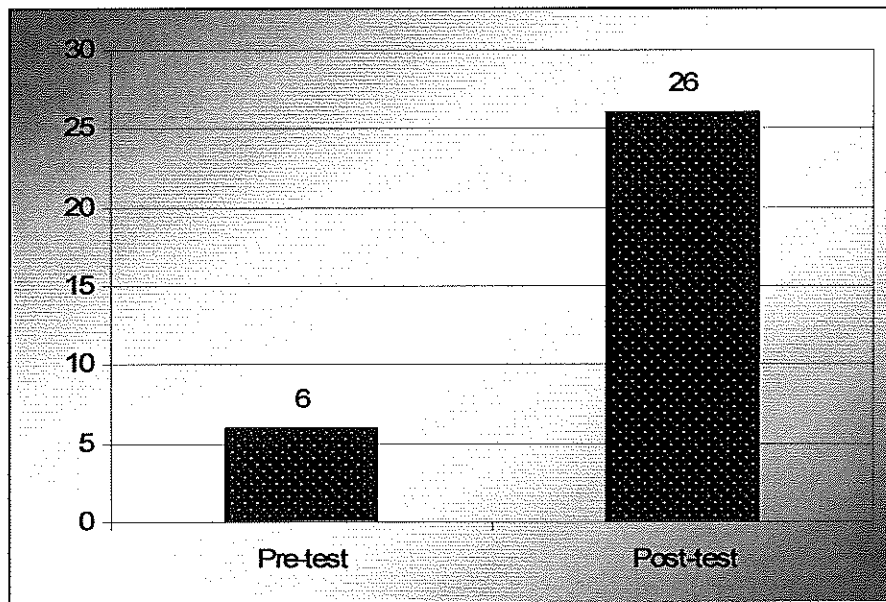
☺ Katkılarınız için teşekkür ederiz!

Appendix I: Percentages of the students that show more positive attitudes toward environment in environmental attitude questionnaire used as pre-test and post-test

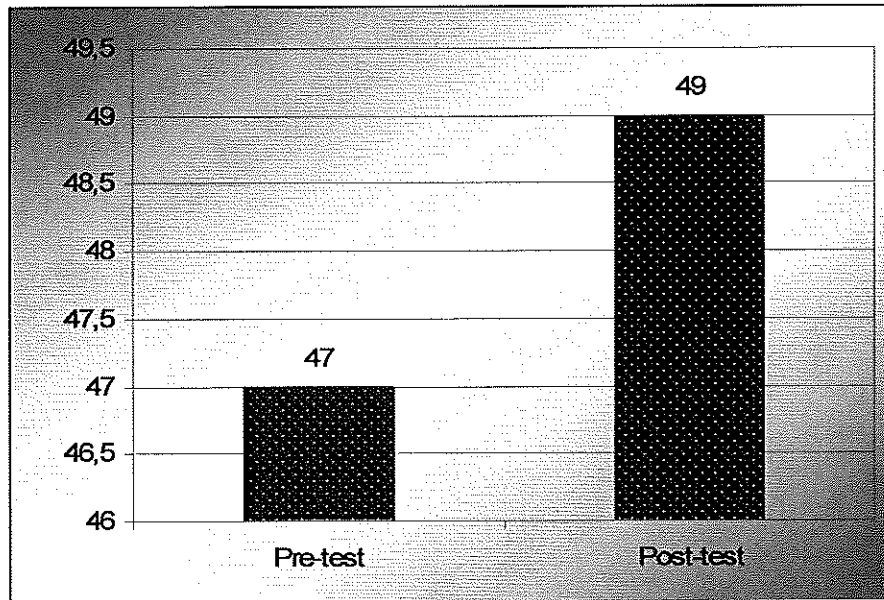
1. Turkey does not expose to environmental pollution:



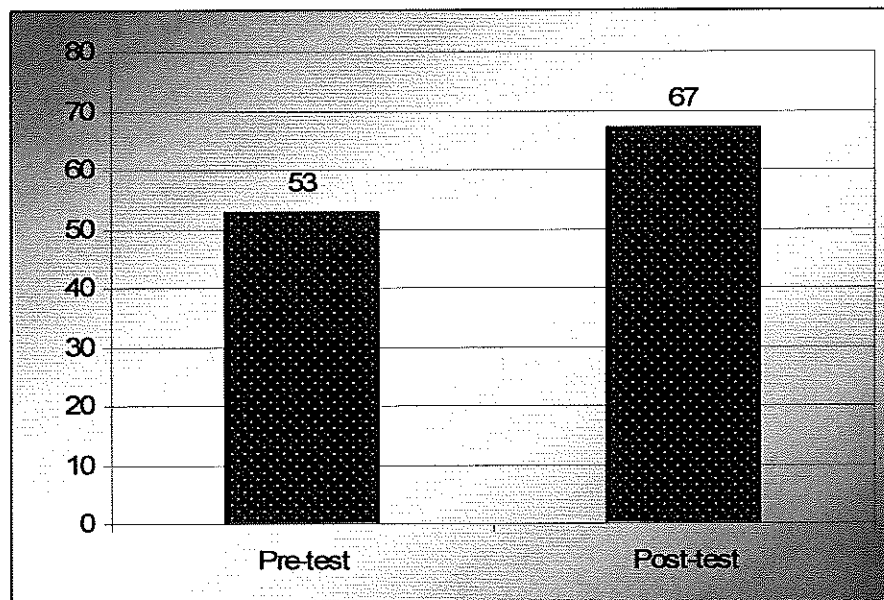
2. We are approaching the limit of the number of people the earth can support:



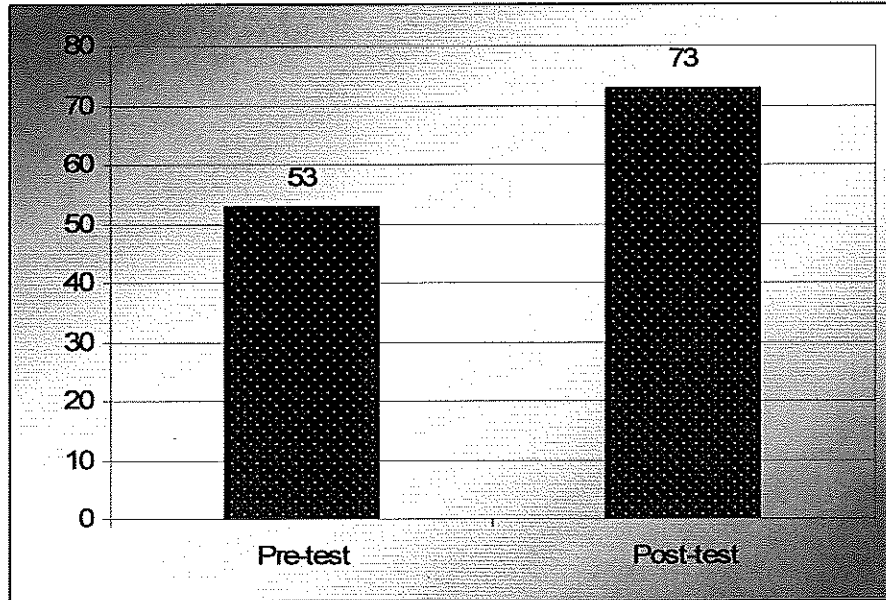
3. *When humans interfere with nature it often produces disastrous consequences:*



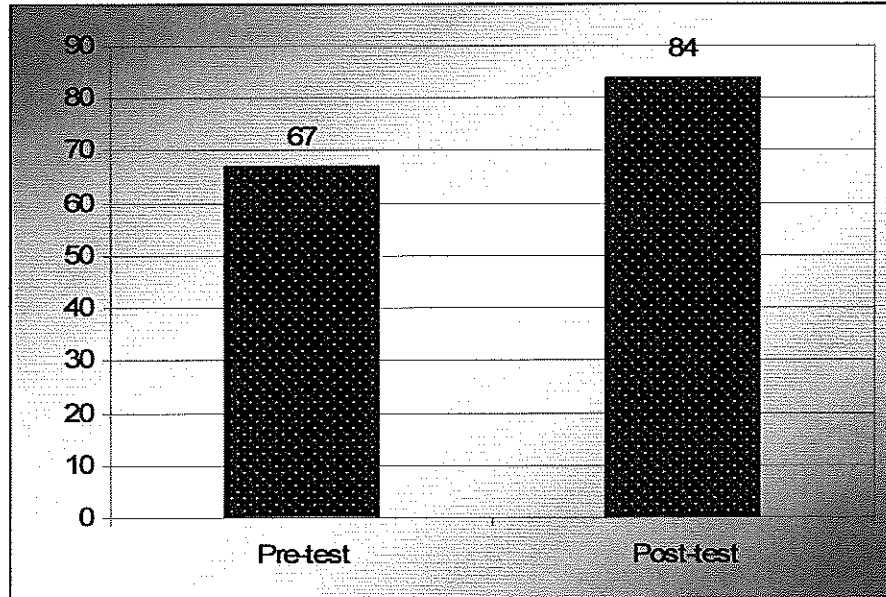
4. *The earth has plenty of natural resources if we just learn how to develop them:*



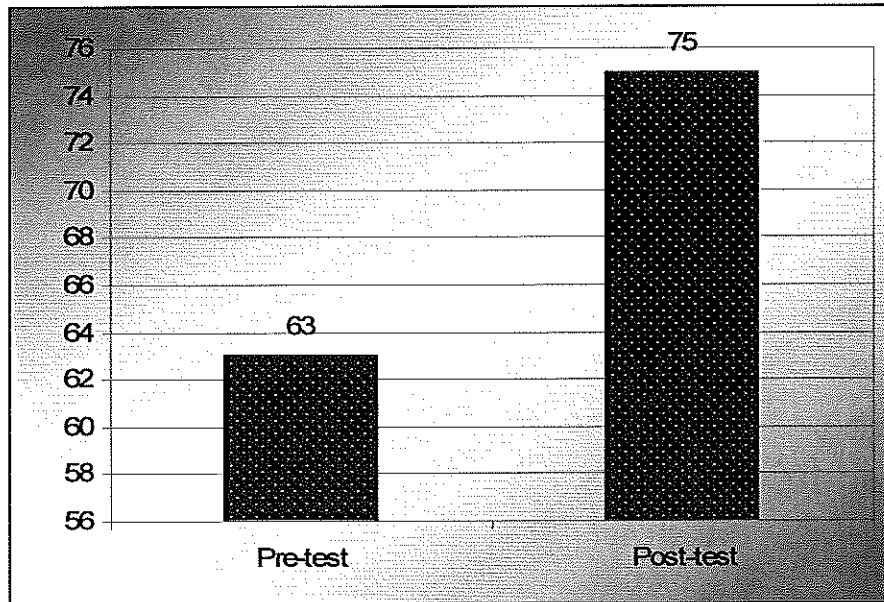
5. *Special areas should be provided for the endangered species:*



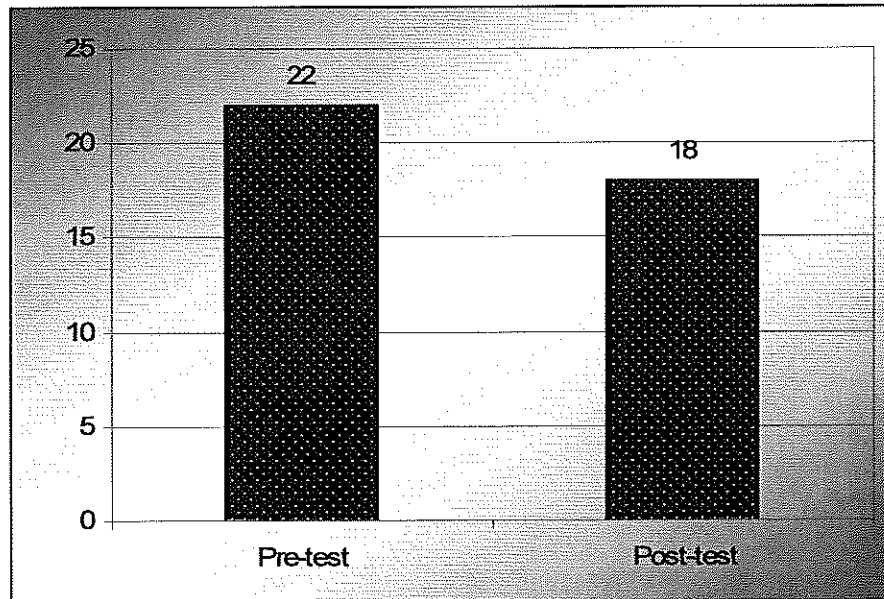
6. *Plants and animals have as much right as humans to exist:*



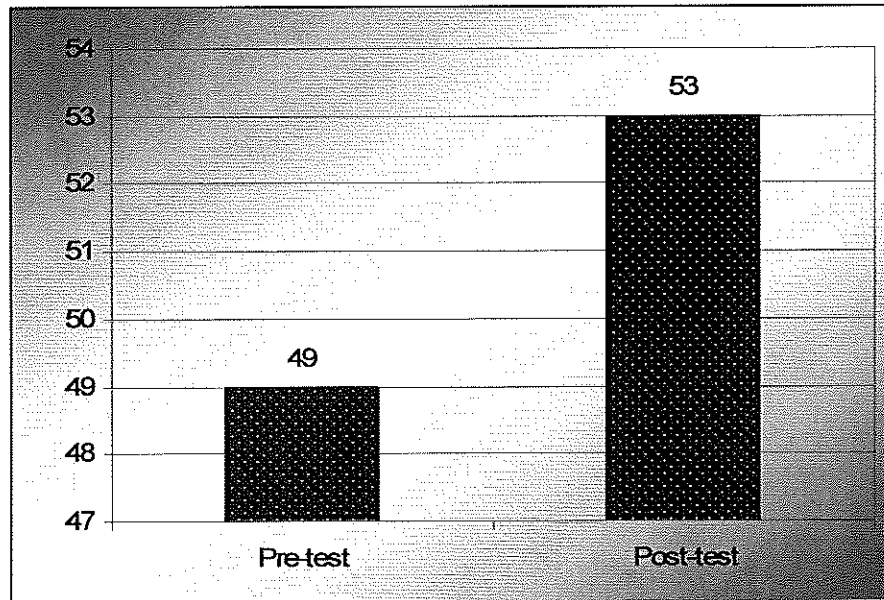
7. *Several animals and plants species exposed to extinction in Turkey:*



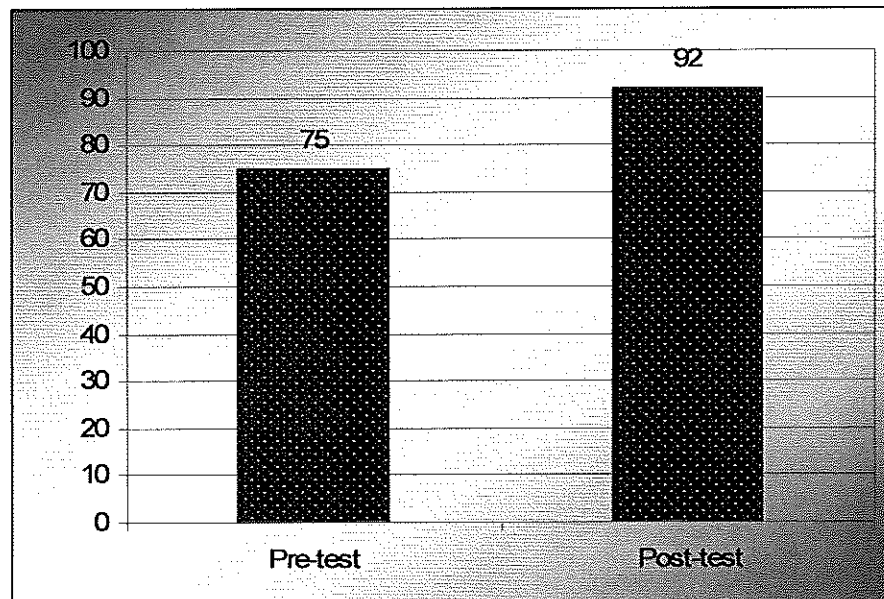
8. *Animals that provide meet for the human are the most important species to be protected:*



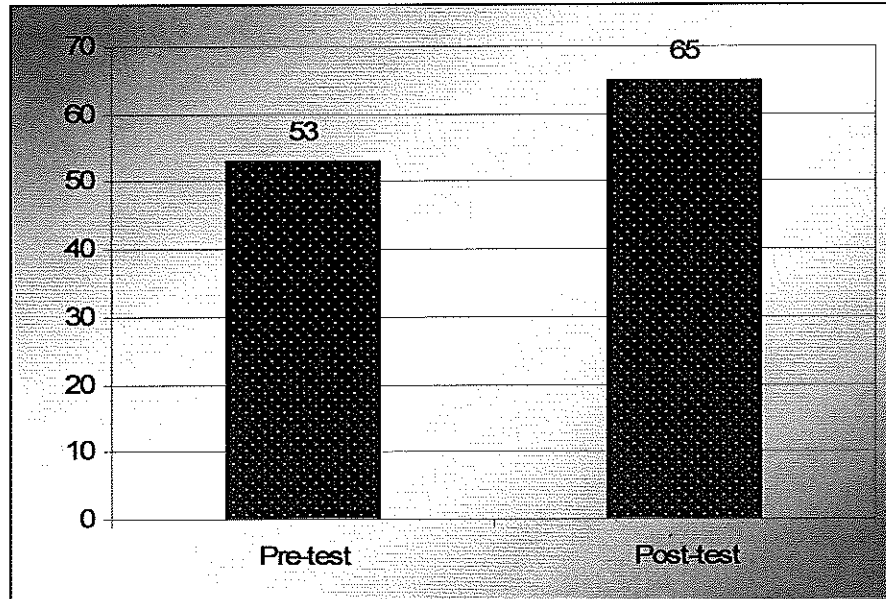
9. *Poisonous snakes and insects should be killed because of threatening the human life:*



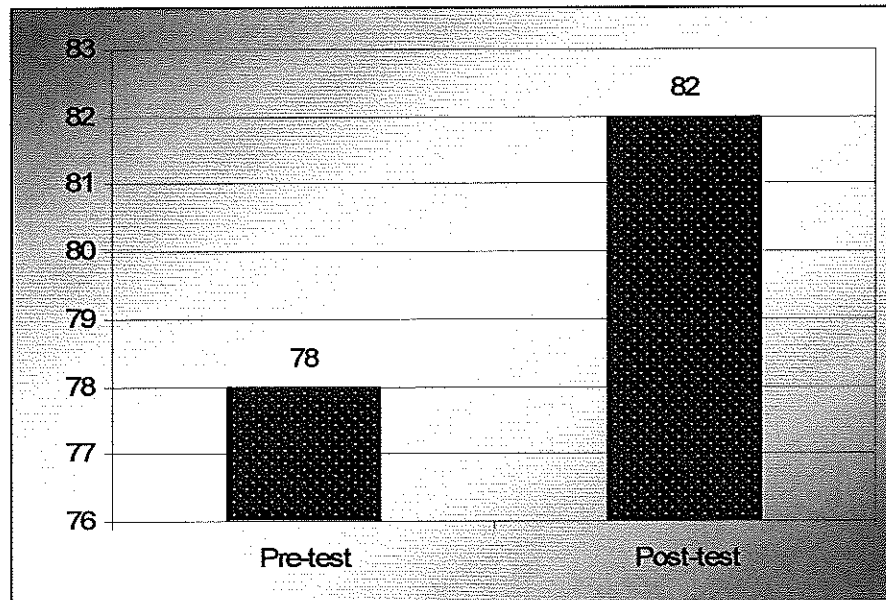
10. *It is important that everyone should be aware of the environmental problem:*



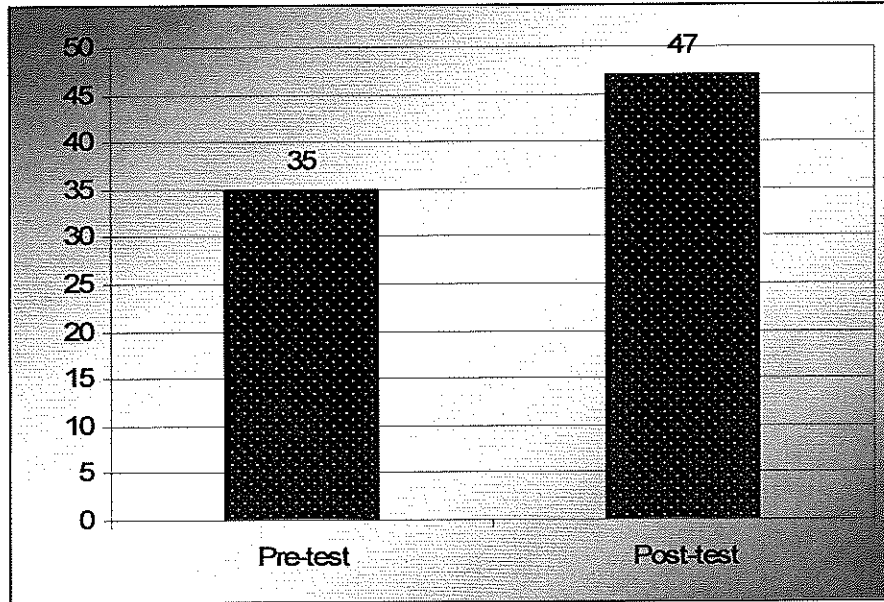
11. *I feel personally responsible for helping to solve environmental problems:*



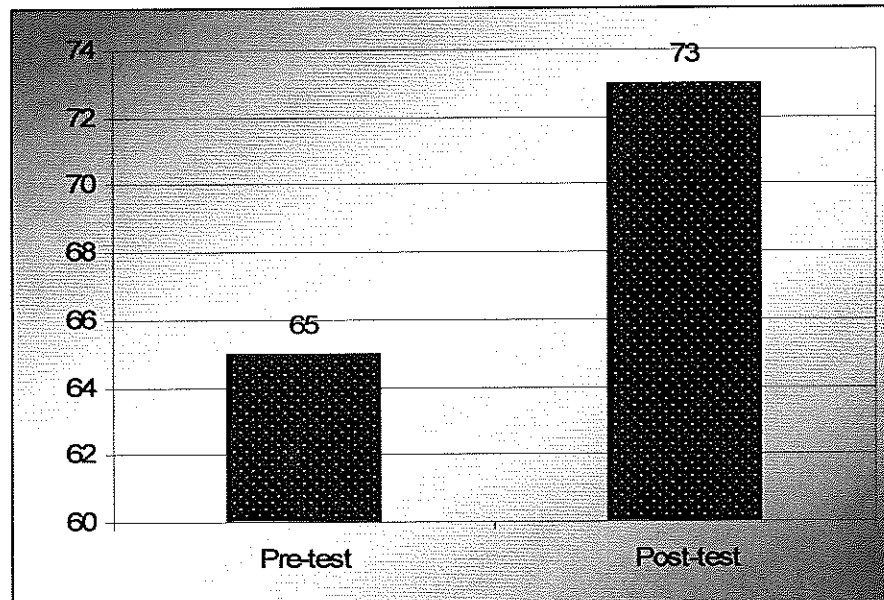
12. *Plants and animals have an important role in environment:*



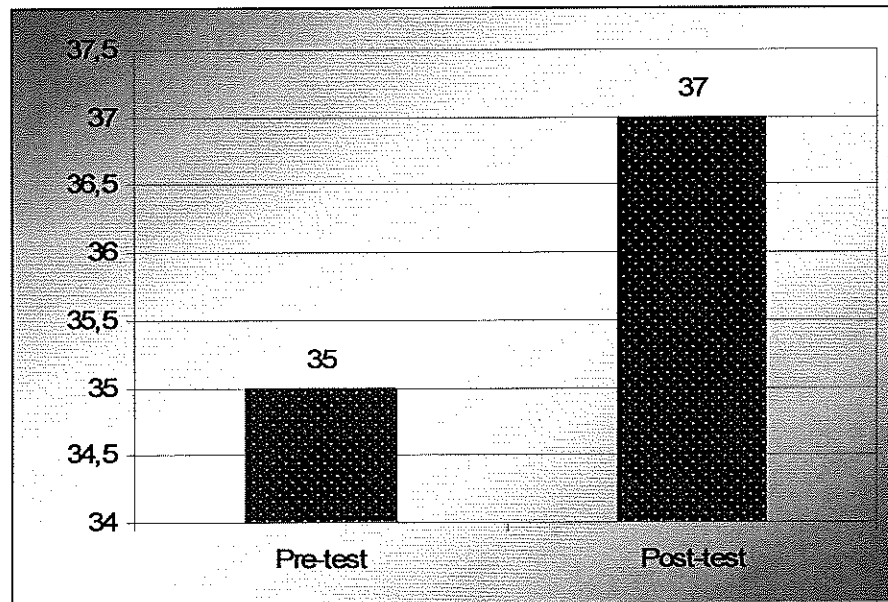
13. Social activities have an important effect on solving environmental problems:



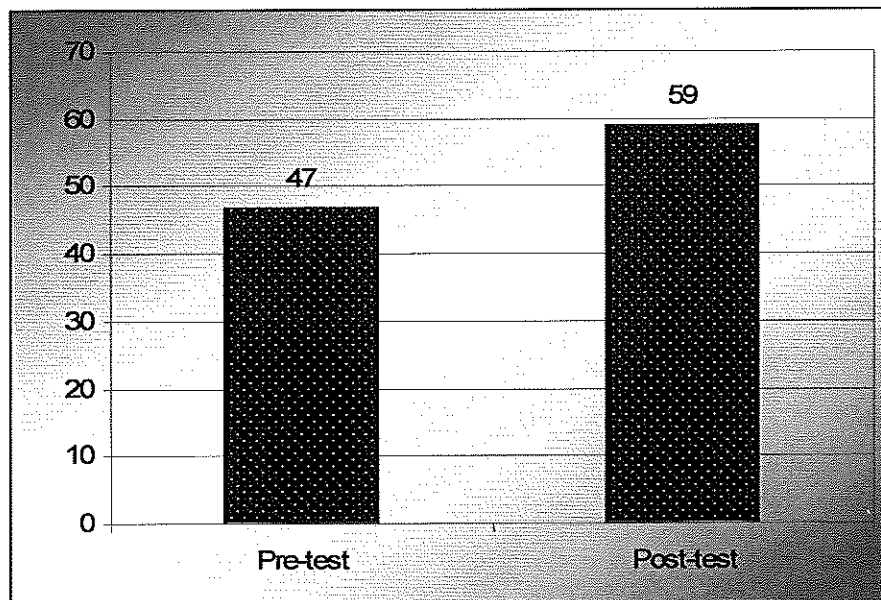
14. Sustainable use of water and electricity is important for natural resources:



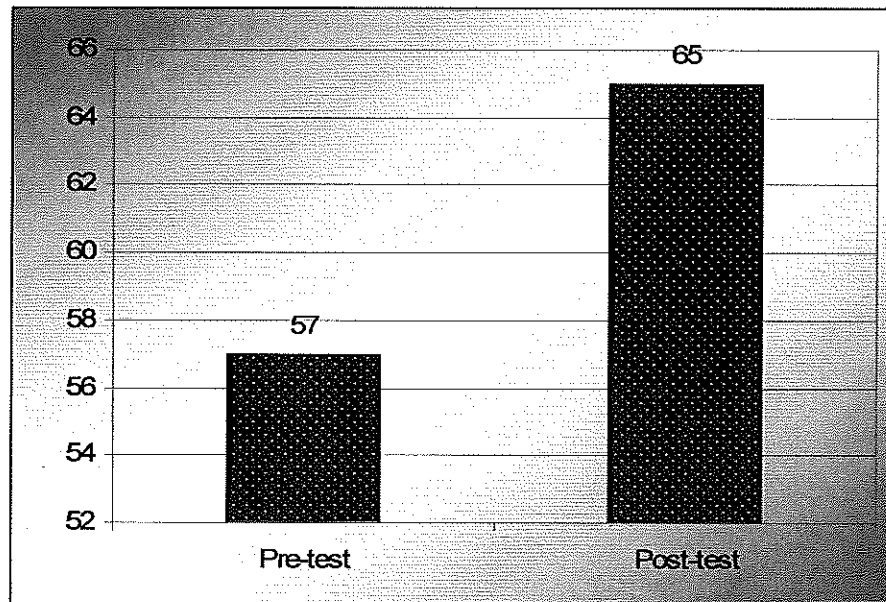
15. Spending too much time in shopping centres effect the natural sources and consumption in negative way:



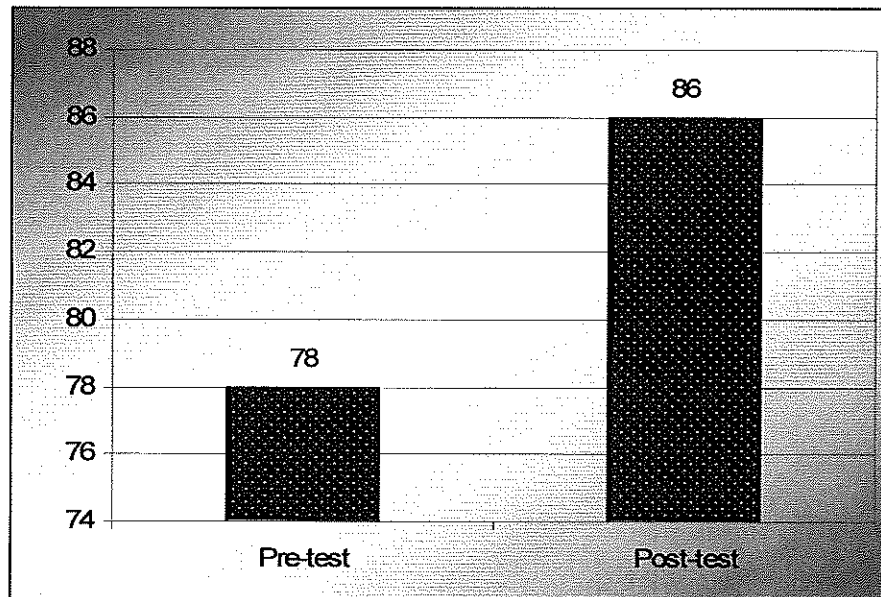
16. Everyone effects the environment negatively; however it changes by the consumption patterns:



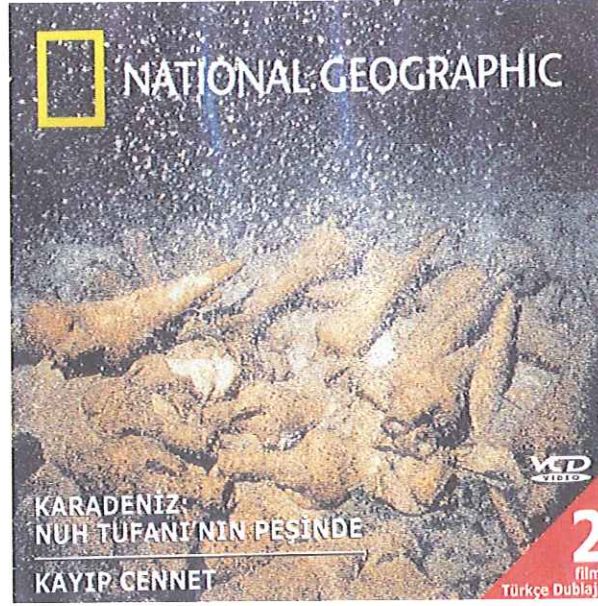
17. Consuming fast food is harmful both for us and the environment:



18. Environmental pollution affects the human life in negative manner:



Appendix J: Short film: Lose Paradise (National Geographic)



FILM 1: KARADENİZ: NUH TUFANI'NIN PEŞİNDE

Robert D. Ballard, antik kültürlerin bulunduğu kıyı şeridi boyunca, tarihsel bir sel sonucu oluşan zehirli sulara, Karadeniz'in esrarını keşfediyor. Tunç Çağı'na ait en az 4000 yıllık iskeletler, Karadeniz kıyısında, İkiyazda'da yeniden gün ışığına çıkıyor. Ballard'ın buluşları, günümüz Türkiye'si kıyılarında 7500 yıl önce yaşayan insanların kutsal kitaplarda da belirtildiği gibi büyük bir tufandan kaçtıkları görüşünü destekliyor. Ballard'la, Karadeniz'in 150 metre derinliğine Nuh Tufanı'nı izinde bir yolculuğa çıkan.

Program süresi: Yaklaşık 60 dakika

FILM 2: KAYIP CENNET

Program süresi: Yaklaşık 30 dakika

National Geographic Society'e desteğiniz için teşekkür ederiz. Sizlerin katkılarıyla National Geographic Society eğitim keşifler, araştırma ve çevrenin korunması yoluyla küresel anlayış artırma yolundaki kar amaçlı taşımayan misyonunu yerine getirebilmektedir.

Bu film National Geographic Television ve Wiley, David Productions ortak yapımıdır. Başkan: Tim Kelly; Uygulamalar, Standartlar ve Araştırmadan Sorumlu Başkan Yardımcısı: Scott Wiersman; Yönetici Prodüksiyon: Michael Rosenfeld; Prodüksiyonlar: Marijo David ve Foster Wiley; Yazarlar: Patrick Prentice ve Marijo David; Montaj: Foster Wiley; Sesler: Gregor Foster Wiley; Müzik: Scott Manahan; Fotoğraf: Foster Wiley; Film Araştırma: Meg Jones; Kapsak Fotoğrafı: © Martin Bauer, WITOL; Arka Kapsak Fotoğrafı: © David Paul / CORBIS

Program Telif Hakkı: © 2001 NGI, Inc. Her hakta mahfuzdur. 2003 yılında Türkiye'de basılmıştır. Türkiye'deki film lisans ve dağıtım hakları A.E. Yayıncılık Ltd.'e aittir.

Bu ürün satış amacıyla üretilmiştir. İçindeki programın, yarıya veya daha azını izlemek için izlenmesi yasaktır, yerel, bölgesel TV'lerde, sunuma eşik yerlerde gösterimi, kiraya verilmesi yasaktır. Aksi, 3257 ve 5846 sayılı yasalar gereği suç sayılır. Yasalara uygun durumları tarafımıza bildiriniz.



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