

ENVIRONMENTAL AWARENESS AND CONCERNS OF
PRE-SERVICE TEACHERS IN A PRIVATE NON-PROFIT
UNIVERSITY

A MASTER'S THESIS

BY

EZEL TEKİN

THE PROGRAM OF CURRICULUM AND INSTRUCTION
BILKENT UNIVERSITY
ANKARA

MAY 2012

To My Family

ENVIRONMENTAL AWARENESS AND CONCERNS OF PRE-
SERVICE TEACHERS IN A PRIVATE NON-PROFIT UNIVERSITY

The Graduate School of Education
of
Bilkent University

by

Ezel Tekin

In Partial Fulfillment of the Requirements for the Degree of

Master of Arts

in

The Program of Curriculum and Instruction
Bilkent University
Ankara

May 2012

BİLKENT UNIVERSITY
GRADUATE SCHOOL OF EDUCATION
ENVIRONMENTAL AWARENESS AND CONCERNS OF PRE-SERVICE
TEACHERS IN A PRIVATE NON-PROFIT UNIVERSITY

Ezel Tekin

May 2012

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Arts in Curriculum and Instruction.

.....

Prof. Dr. M. K. Sands

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Arts in Curriculum and Instruction.

.....

Prof. Dr. Alipaşa Ayas

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Arts in Curriculum and Instruction.

.....

Asst. Prof. Dr. Gabriella McDonald

Approval of the Graduate School of Education

.....

Director: Prof. Dr. M. K. Sands

ABSTRACT

ENVIRONMENTAL AWARENESS AND CONCERNS OF PRE-SERVICE TEACHERS IN A PRIVATE NON-PROFIT UNIVERSITY

Ezel Tekin

M.A., Program of Curriculum and Instruction

Supervisor: Prof. Dr. M. K. Sands

May 2012

The purpose of this study is to investigate the environmental awareness and concerns of pre-service teachers in the Graduate School of Education in a private non-profit university Ankara in terms of some demographic factors such as gender, subject area, and length of time in a private non-profit university, Ankara. The Revised New Ecological Paradigm (R-NEP) scale and ten interview questions are used in the present study. The findings revealed that one hundred pre-service teachers have moderate environmental awareness and concerns. The internal consistency of the scale was 0.67. There were significant difference between the pre-service teachers' environmental awareness and concerns with respect to their subject area, and length of time at the university except gender. Also, some suggestions about environmental education are given in this study.

Key words: Environmental awareness and concerns, environmental education, New Ecological Paradigm Scale

ÖZET

VAKIF ÜNİVERSİTESİNDEKİ ÖĞRETMEN ADAYLARININ ÇEVRESEL FARKINDALIĞI VE ENDİŞELERİ

Ezel Tekin

Yüksek Lisans, Eğitim Programları ve Öğretim

Tez Yöneticisi: Prof. Dr. M. K. Sands

Mayıs 2012

Çalışmanın amacı, Ankara'daki bir vakıf üniversitesinin Eğitim Bilimleri Enstitüsü'ndeki öğretmen adaylarının çevresel farkındalığı ve endişelerini cinsiyet, konu alanı ve üniversitede bulunma süreleri gibi bazı demografik faktörler yardımıyla incelemektir. Bu çalışmada Yeni Ekolojik Paradigma ölçeği ve on röportaj sorusu kullanılmıştır. Sonuçlar yüz öğretmen adayının orta düzeyde çevresel farkındalığı ve endişeleri olduğunu ortaya koymuştur. Ölçeğin iç tutarlılık katsayısı 0.67 olarak bulunmuştur. Cinsiyet faktörü hariç konu alanları ve bu üniversitede bulunma süreleri arasında önemli farklılıklar bulunmuştur. Aynı zamanda bu çalışmada çevresel eğitim ile ilgili bazı önerilerde bulunulmuştur.

Anahtar Kelimeler: Çevresel farkındalık ve endişe, çevresel eğitim, Yeni Ekolojik Paradigma ölçeği

ACKNOWLEDGEMENTS

I would like to start this acknowledgement by expressing my deepest gratitude and sincerest appreciation to my supervisor Prof. Dr. M. K. Sands for her excellent guidance, invaluable help and understanding throughout this research. It was an honour for me to have a chance to work with her. I would like to thank Assist. Prof. Dr. Necmi Akşit for his guidance and advice.

I would like to thank my friends Elizabeth Pullen and Yonca Karaman for their invaluable friendship, endless support, help and patience.

I would like to express my deepest appreciation to each member of my family: my mother Sevda Tekin and my father Mehmet Tekin, my sisters Elif and Ezgi, and my brother Emre for their endless love, support, and patience and understanding.

Lastly, I would like to acknowledge Cihat oşgun for his invaluable friendship, endless support, help and patience.

TABLE OF CONTENTS

ABSTRACT	iii
ÖZET	vi
ACKNOWLEDGEMENTS.....	v
TABLE OF CONTENTS	vi
LIST OF TABLES.....	ix
LIST OF FIGURES	x
CHAPTER 1: INTRODUCTION.....	1
Introduction.....	1
Background.....	3
Problem.....	4
Purpose	6
Research questions.....	6
Significance	6
Definition of key terms	7
CHAPTER 2: REVIEW OF RELATED LITERATURE	8
Introduction.....	8
Preview of subsections of the literature review	8
Environmental issues in Turkey	10
Environmental problems	10
Ignorance about environmental issues	14
Environmental education	15
Environmental awareness and concern.....	20

Importance of environmental awareness and concern	20
Recent studies about people’s attitudes toward the environment	22
Background information about the R-NEP scale.....	24
Conclusion	25
CHAPTER 3: METHOD	27
Research design	27
Context.....	27
Participants	28
Instruments	30
Revised New Ecological Paradigm (R-NEP) scale.....	30
Interview guide	33
Method of data collection	34
Quantitative data: questionnaire.....	34
Qualitative data: interview	34
Method of data analysis	35
CHAPTER 4: RESULTS.....	37
Introduction.....	37
Quantitative data: environmental concerns and awareness	37
Environmental concerns and awareness of pre-service teachers	39
Sub-categories of the R-NEP scale	41
Gender differences	46
Subject area differences	48
Length of time at the university	51

Qualitative data: awareness and concerns of environmental issues	53
Pre-service teachers' awareness and concerns towards environmental issues.....	54
Suggestions about environmental education.....	61
CHAPTER 5: DISCUSSION	66
Introduction.....	66
Discussion of the findings	67
R-NEP: Pre-service teachers' concerns and awareness	67
Pre-service teachers' environmental concerns and awareness in terms of a few demographic characteristics	77
Suggestions: environmental education.....	80
Implications for practice	81
Implications for further research	82
Limitations	83
REFERENCES	84
APPENDICES	95
Appendix A: Questionnaire	95
Appendix B: Interview questions	97
Appendix C: Transcriptions.....	98

LIST OF TABLES

Table		Page
1	The number of participants according to three variables.....	29
2	Reliability statistics of the items in the R-NEP scale.....	32
3	Five categories of the R-NEP, with the items per category..	38
4	Independent samples t-test results for genders.....	47
5	Descriptive statistical values of subject areas according to their R-NEP scores.....	49
6	Multiple comparisons among subject areas according to their R-NEP scores.....	50
7	Descriptive statistical values of the groups.....	51
8	Multiple comparisons among the groups.....	53
9	Responses to question 1.....	55
10	Responses to question 2.....	56
11	Responses to question 3.....	57
12	Responses to question 4.....	58
13	Responses to question 5.....	59
14	Responses to question 6.....	60
15	Responses to question 7.....	61
16	Responses to question 8.....	62
17	Responses to question 9.....	63
18	Responses to question 10.....	64

LIST OF FIGURES

Figure		Page
1	Revised New Ecological Paradigm (R-NEP) items and responses of pre-service teachers.....	40
2	Reality of limits to growth.....	42
3	Anti-anthropocentrism.....	43
4	Fragility of nature's balance.....	44
5	Rejection of exemptionalism.....	45
6	The possibility of eco-crisis.....	46
7	Box-plot for females and males.....	47
8	Box-plot for each subject area.....	48
9	Box-plot for the groups.....	52

CHAPTER 1: INTRODUCTION

Introduction

Living organisms depend on components of the environment such as water, soil, and air, in order to survive on the earth. Accordingly, it is profoundly important to keep the components of the environment clean and fresh for the next generations. In fact, Item 56 in the Constitution of the Republic of Turkey says that every citizen has a right to live in a healthy and well-balanced environment. Under this item it is also added that to protect the environment is one of the responsibilities of both the government and citizens of Turkey (Constitution of the Republic of Turkey, 1982). Similarly, Mr. Erođlu, who is the cabinet minister of Environment and Forestry in Turkey, emphasized that the right to a healthy environment is a basic human right. Any steps that are intended to protect the environment are good for humanity. This means that it is not only for the benefit of nature but also the benefit of humans. Moreover, he says that the turning point of the solution to environmental problems is to be aware of the problems. Environmental issues cannot be solved unless they are known (Turkish Ministry of Environment and Forestry, 2007, p. VII).

However, according to the Turkish Ministry of Environment and Forestry (2007), in recent decades problems related to the environment have been dramatically increasing. K1řođlu, G1rb1z, S1l1n, Alař and Erkol (2010) claimed that the influence of problems in the environment has been perceived since the late 20th century. According to them, insufficiency of natural resources for human beings is the biggest current environmental issue. One of the main reasons for the increase in

environmental problems is human impact on the environment. Humans cause environmental problems such as pollution and excess consumption of natural resources instead of protecting and saving the earth (Ogueri, 2004).

One reason for such problems may be lack of environmental education. According to Ogueri (2004), people's ignorance about environmental issues could be due to incomplete education, because education is the basic concept to generate awareness towards the environment. In order to show the outcomes of an incomplete education on environmental issues, people's knowledge about those issues should be explored (Ak, 2008). According to Ak (2008, p. 15), Turkey is lacking an effective 'environmental education policy'. Therefore, there should be a persuasive policy of environmental education focusing on issues about the environment (Tuncer, Ertepinar, Tekkaya & Sungur, 2005; Ünal, 2008). Additionally, Kışoğlu et al. (2010) suggested that awareness of people towards environmental problems should be improved with the help of environmental education. In this way, people may realize how the environment is important for the sustainability of life.

To investigate the concerns of pre-service teachers is as important as to investigate the beliefs of teachers and students toward environmental problems, since pre-service teachers will soon become teachers. When their knowledge and concerns toward environmental issues are determined, some regulations can be made in teacher education (Ünal, 2008).

This study directs attention to the environmental concerns and awareness of pre-service teachers in a private non-profit university, Ankara with regard to gender, subject area, and length of time at the university.

Background

Environmental education is not a new concept in the 21st century. Its foundation was laid a long time ago as mentioned in Ünal's research (2008). Ünal (2008) stated that Jean Jacques Rousseau pointed out the requirement of environmental education for people in his book, *Emile* (1762). The phrase, environmental education, continues to be used as an understanding of nature. Its objectives were developed through the 2000s to generate a common understanding regarding environmental protection of the world. According to Tuncer et al. (2005), the beginning of environmental education as a new concept was in the 1960s. Also they mention the improvements of environmental education since its beginning, up until the present day.

The importance of the development of environmental education in the world until the present is still emphasized by researchers such as Uzun & Sağlam (2005), Çakır, İrez, & Doğan (2010). Hart (2010) says that education on the surrounding environment ought to lead not only to national but also international environmental mindedness for all people. Dunlap (2008) articulates that education about environmental issues provides people with 'an ecological worldview' (p. 15).

Researchers investigated the beliefs and concerns of people about environmental issues before they constructed an environmental education approach and policy in

their country. For that purpose, they used measurements of concern, attitudes, awareness, and beliefs to explore people's understandings of ecosystems and the environment. Some examples of measurements are the environment attitude scale (EAS) developed by Atasoy in 2005; the children's attitudes toward the environment scale (CATES) developed by Musser and Diamond for preschool children in 1999; dominant social paradigm (DSP) by Dunlap and Van Liere in 1984; New Environmental Paradigm (NEP) by Dunlap and Van Liere in 1978; and Revised New Ecological Paradigm (R-NEP) by Dunlap, Van Liere, Mertig and Jones in 2000.

One of the most used scales is the New Environmental Paradigm (NEP) scale consisting of 12 items, developed by Dunlap and Van Liere (1978). It has been revised three times. For example, an earlier version of the scale had some outmoded terms so these terms were discarded in the new version of the scale. The second version has 6 items which consist of 'pro- and anti-environmentalist view items for each of the three facets: balance of nature, limits to growth, and anti-anthropocentrism' (Dunlap, 2008, p. 8).

The third (last) version of the scale is called the New Ecological Paradigm scale (Dunlap et al., 2000). This version has 15 items, with eight pro- and seven anti-NEP items which measure people's ecological worldview and environmental concerns.

Problem

Environmental problems have been increasing because of the destruction of nature by people. One of the most important solutions to prevent the growth of

environmental problems is education, which may help to prevent a continuation or worsening of the problem. When the concept of education comes into question, teachers are considered as one of the main subjects. If teachers are well-educated about environmental concepts and issues they can let their students learn more about nature and the environment.

Ibarra, Quilez and Carrasquer (2009) stated that, ‘teacher training is crucial for the development of a sustainable society and it is very important to know how trainee teachers are prepared for working with ecology and environmental education issues’ (p. 66). However, Tuncer et al. (2005) argued that there are inadequate educators in this field and absence of formal environmental education in school curricula is a big problem in Turkey. However, in the national literature, the researchers gave importance only to science teachers and science trainee teacher education on environmental concepts (Şahin & Tuncer, 2008; Yurttaş & Sülün, 2010) and not all subject area teachers.

Therefore this study focuses on the environmental awareness and concerns in subjects other than science. In order to do this the pre-service teachers’ environmental awareness and concerns in a number of subject areas are investigated: Turkish language and literature, mathematics, English language and literature, and computer. Accordingly, the present research demonstrates the importance of environmental education for pre-service teachers. In order to create a better environmental education program for trainee teachers, it is important to begin with an investigation of their concerns and awareness toward the environment.

Purpose

The main purpose of this study is to measure the environmental awareness and concerns of pre-service teachers in a private non-profit university, Ankara. In addition, the research compares the awareness and concerns of the participants toward environmental issues by looking at some demographic factors such as gender, subject area, and length of time in a private non-profit university, Ankara. It also investigates the pre-service teachers' understanding of the environment, and gathers their suggestions for the integration of the environment as a concept into their subjects (biology, Turkish language and literature, mathematics, English language and literature, and computer lessons) based on interviews with them.

Research questions

There are three research questions of the present study. They are:

1. What are pre-service teachers' concerns and awareness towards environmental issues?
2. Is there a difference between the pre-service teachers' environmental awareness and concerns with respect to their gender, subject area, and length of time in a private non-profit university, Ankara?
3. What are the pre-service teachers' suggestions about environmental education?

Significance

The environmental awareness and concern of pre-service teachers should be investigated because their concerns are important as they need to be good role models for their future students, especially as teachers are trained to both guide and

motivate students. The creation of environmentally-minded students is in the hands of teachers.

The present study provides information about the level of environmental awareness and concerns of 100 pre-service teachers. Also, it makes some suggestions for environmental education in subject lessons. In this respect, teachers, environmental organization groups, environmentalist researchers, and universities who have teacher education programs may become aware of pre-service teachers' view on environmental issues and adjust their programs accordingly.

Definition of key terms

Environmental awareness, concerns, and education are defined in this thesis as follows:

Environmental awareness indicates that a person has knowledge, or perception of an environmental issue, which includes the response of them to these issues (Ziadat, 2010).

Environmental concern indicates that a person is affected by, or involved with, environmental issues as much as that he/she is interested to find solutions to environmental issues (Dunlap & Jones, 2002).

Environmental education focuses on teaching about the concepts of the environment. It plays an important role in increasing the awareness of people, as they can become aware of environmental problems (Strife, 2008).

CHAPTER 2: REVIEW OF RELATED LITERATURE

Introduction

This literature review aims to provide essential background information by emphasizing environmental issues and environmental concerns which may relate to a group of pre-service teachers in Turkey, namely in a private non-profit university, Ankara Graduate School of Education.

The literature review mentions general information not only about people's environmental concerns, but also ideas about the necessity of education on environment, environmental concepts, and problems in Turkey. It includes some information about environmental pollution in Turkey.

Background information about the Revised New Ecological Paradigm (R-NEP) scale is also given. It is a common scale in the world, and was used in this research (Dunlap et al., 2000; Dunlap, 2008).

Preview of subsections of the literature review

Issues related with the environment have been increasing for many years all around the world. Especially in Turkey, the problems have dramatically shown their effects in many sectors of life (Akça, Sayılı & Yılmazçoban, 2007). For example, Akça et al. (2007, p. 178) expressed that, 'agriculture is the dominant sector in rural areas of Turkey'. The sector has a great impact on the environment due to the usage of chemicals for crops. This impact may not be positive because agricultural activity

such as using pesticides and fertilizers can cause water pollution. In addition industrialization, another main sector in Turkey, has triggered the increase of environmental problems by leading to pollution (Akça et al., 2007).

There are some studies mentioning environmental problems in Turkey such as those of Yılmaz and Öz (2004), Doygun (2005), Akça et al. (2007), and Yıldız, Yılmaz, Demir and Toy (2011). Some research has pointed out many misconceptions and ignorance about environmental concepts, which are covered in this literature review (Khalid, 2001; Daniel, Stanisstreet, & Boyes, 2004; Nasser, 2009).

One of the most important reasons for this increase in environmental problems is people's carelessness about the environment and environmental issues. This ignorance is stated in this literature review in order to draw attention to it and to consider how to remedy the situation. Another cause is the misconceptions of people towards the environment. For these reasons, environmentalists think environmental education for all people is a solution (Watson & Halse, 2005).

Education plays a critical role in environmental issues because schools can provide the best opportunity for environmental concepts to be covered effectively. Also, the environmental concerns of people can be shaped, especially early in life. Köse, Savran Gencer, Gezer, Erol and Bilen (2011) have indicated the importance of environmental education at a young age, saying that education about environmental concepts should be started for children in the pre-school stage. It is important to prepare them to use natural resources wisely.

Environmental problems and issues, ignorance about them, and environmental issues in education are all necessary concepts for this research on environmental concerns and awareness of pre-service teachers in a private non-profit university, Ankara.

Environmental issues in Turkey

Environmental problems

Some researchers have reflected upon the environmental problems in some cities in Turkey such as Afyonkarahisar, Eskişehir, and Edirne. They also mention the seriousness of the problems from the viewpoint of people who live in Turkey.

In a survey of 159 people from Afyonkarahisar and Eskişehir, it was found that only 7.56% stated that environmental problems were one of the main issues in Turkey. The majority of the participants said that unemployment was the main issue in the country (Akça et al., 2007, p. 179). Of the few who named environmental problems as important, the examples related to problems such as pollution of water, soil, and air, deforestation, and erosion.

Yıldız, et al. (2011) interviewed 350 residents at Atatürk University, Erzurum, in order to assess their knowledge about environmental issues in Erzurum and Turkey. According to the responses distorted urbanization and air pollution were seen as the most crucial problems in the city and the country. Others included noise pollution, soil erosion, water contamination, extinction of plant and animal species, and soil pollution. Also, in the study, it was stated that there are bigger issues other than

environmental problems such as unemployment, terror, education, inflation, health care, and traffic in both the city and the country.

According to the Turkish Environment Status Report, which was published by the Turkish Ministry of Environment and Forestry in 2007, there are many factors that cause air, water, and soil pollution in our country. For example, in the report, it was said that air pollution in Turkey mainly originates from domestic heating and vehicles, but in addition industrialization in cities causes air pollution because factories release chemicals such as sulfur dioxide, suspended particulates, nitrogen oxides, and carbon dioxide into the atmosphere.

The most important cause of increasing environmental problems is human impact on the environment (Turkish Ministry of Environment and Forestry, 2007). For example, population growth leads to industrialization. After that, industrialization makes the air unclean and causes other environmental problems such as acid rain, which occurs with the combination of rain and contaminated air. This harmful rain causes acidification of the lakes. When the lakes and ponds become very acidified, many living organisms die (Bennett, Carpenter & Caraco; Khalid, 2001). Air pollutants such as sulfuric and nitric acids may cause soil and water pollution due to acid rain (Turkish Ministry of Environment and Forestry, 2007).

Likewise, water pollution arises from three main sources. One is the influx of untreated or minimally treated water reservoirs. Another is leakage and runoff of pesticides and chemicals into ground water, rivers, and lakes. Also, litter consisting of plastics, batteries, containers, papers, and wrappers are left in and around rivers and lakes (Turkish Ministry of Environment and Forestry, 2007). It is an important

problem of Turkey, and causes considerable environmental pollution, both in cities and countryside. In addition, the report, environmental status in Turkey, stated that unplanned urbanization has begun appearing as an environmental problem in Turkey since 2007. Yılmaz's (2009) investigation revealed that unplanned (distorted) urbanization is the most important environmental problem in Turkey according to the people who live in Edirne.

In Turkey, the primary environmental problem of 35 per cent of cities such as İstanbul and Edirne is water pollution, 31 per cent of cities such as Trabzon and Malatya is litter, 27 per cent of cities such as Ankara and Erzurum is air pollution, and 7 per cent of cities such as Adana and Bartın is unplanned urbanization (Turkish Ministry of Environment and Forestry, 2007).

Yılmaz (2009), who surveyed the population of Edirne, stated that in their opinion, global warming was important as a cause of ecological crisis in the world. Other problems such as hunger, homelessness, desertification, nuclear power and solid waste problems, while not being a very important problem for Edirne dwellers themselves, were also seen as important. Işıldar (2008) claims that nowadays, people have seen destructive outcomes of global warming in the world. Global warming may damage living organisms, and therefore many species will become extinct. For example, it is claimed that due to global warming, the ice in the icecaps may melt and the habitat of arctic animals may disappear (Mader, 2007).

Kılıç (2006) pointed out that global warming seems the most dangerous environmental problem because it can cause life on earth to fail. Besides global

warming, there are also other environmental issues such as pollution in the seas (marine pollution), desertification, erosion, population growth, and hunger not only in Turkey but also in other countries. Kılıç asserts that modernization efforts (such as industrialization) of developing countries cause these kinds of environmental problems.

In a different study, Esengün, Sayılı & Akça (2006) investigated the opinions of sixteen governmental and non-governmental organizations in Tokat, Turkey about environmental issues in the country. They stated that air pollution is regarded as the most important one. Other important issues in Tokat are said to be domestic, industrial and medical wastes. The authors point out several problems in the process of solving the environmental problems, including lack of education, financial support, and environmental policy.

Environmental problems also affect human health. A research study in Turkey reported that air pollution triggers respiratory tract diseases such as bronchitis, sinusitis, and pneumonia in children (Bayram, Dörtbudak, Evyapan Fişekçi, Kargın & Bülbül, 2006). Bayram et al. argue that patients who are suffering from asthma encounter serious health problems; for example, their eosinophil cells, which play a role in the immune system of the body, may increase and cause allergenic reactions in their bodies due to air pollution. Grass (2008) suggests that respiratory system problems, such as a decrease in lung function and inflammatory reaction, may arise from air pollution.

Ignorance about environmental issues

Some researchers such as Nasser (2009) and Khalid (2001) believe that environmental problems arise due to the misconceptions of people about environmental concepts. The researchers pointed out that there are many misconceptions and ignorance about environmental issues and concepts.

Environmental problems increase rapidly and bring unsolvable consequences because this misconception and ignorance causes people to behave in a way that increases the problem (Nasser, 2009; Khalid, 2001). For example, some people know that, 'A chasing arrows symbol means a plastic container is recyclable' (Ecology Center Organization, 2010). When they do not recycle because of ignorance, there will be an accumulation of waste products in the ecosystem, which will cause environmental pollution in the country.

In his research study, Aydemir (2007) indicated many misconceptions of both teachers and students about environmental concepts such as the greenhouse effect and ozone layer depletion. For example, teachers and students considered that one of the outcomes of ozone layer depletion is the greenhouse effect. They also believed that chemical pollutants generated by the exhausts of cars are the only causes of the destruction of the ozone layer. Some information about the greenhouse effect was accepted incorrectly. For example, it was believed that there are no negative influences of the greenhouse effect on human health. Examples such as those above about misconceptions show that environmental education is not substantial, and not even adequate, in Turkey. The media may also present some concepts about nature incorrectly (Aydemir, 2007).

Daniel et al. (2004) emphasize that much knowledge about global warming is wrong. Nasser (2009) determined that some misconceptions are common among teacher candidates in terms of three issues: ozone depletion, greenhouse effect and acid rain. Similarly, Khalid (2001) identified misconceptions on the same three topics. The participants of the research were 113 elementary pre-service teachers at Mid-western University, USA. Some examples of misconceptions were: ‘the increased greenhouse effect may cause skin cancer, ozone depletion may cause global warming, ozone is a multifunctional layer, and pollutants evaporate with water and later come down as acid rain’ (p. 102). The author suggests that revision must be done in the science teacher education curriculum. It is crucial to treat these kinds of misconceptions in teacher education because pre-service teachers become teachers in schools and they may transmit their misconceptions to pupils. Some participants in Khalid’s survey (2001) said that their misconceptions arose from the media because the media sometimes does not express issues adequately. In addition to this, according to Aydemir (2007), unscientific knowledge given by the media may cause misconceptions.

Environmental education

Environmental issues should be the concern of all human beings, as the environment is their ultimate living space. In order to be able to deal with environmental issues and protect the environment, education is the best way (Larijani, 2010). Education about the environment can be designed for both formal and non-formal education as well as extra-curriculum activities: Eco-school (chapter 1, p. 7) is an example. Similarly, Aydemir (2007) and Hirayama (2003) emphasized that to improve people’s environmental awareness, the school

education curricula must cover environmental problems and issues. In this point, teachers are the important subjects in schools who can create better environmental awareness in students' minds (Larijani, 2010). Before educating students, the teacher education program itself should consider environmental education. In Aydemir's (2007) research, the lack of environmental education for both pre-service and in-service teacher education is emphasized. He discusses the importance of environmental education, emphasizing that education about the environment can improve awareness and build positive attitudes toward the environment. In his view, environmental education in teacher training programs is essential. Tuncer et al. (2005) also mention the absence of formal environmental education and educators in Turkey.

Çakır et al. (2010) indicated that science teacher education plays a big role in students' learning of environmental issues. Since concepts about nature are covered in science lessons many journal authors focus on present and future science teachers. Also, science teachers have a big responsibility to sustain environmental education in schools. However, Ibarra et al. (2009) stated that all teachers, regardless of their subject area, should know environmental concepts so that they are able to be good role models to their students.

Keleş, Uzun and Uzun (2010) examined the effectiveness of the seminar called 'Nature education in Ihlara Valley' on 25 pre-service teachers' environmental attitudes. The teacher trainees were from different subject areas: science, biology, chemistry, physics, social science, mathematics, English, Turkish language and literature, and social studies. Keleş et al. deduced that the seminar led to an

improvement in their attitudes towards nature. They used a pre-test and post-test technique in order to identify the effect of the seminars on the environmental attitudes of pre-service teachers. All in all, it was found that there was a statistically significant difference between pre-test and post-test results. Their scores in the post-test were considerably higher than their scores in the pre-test, this showing that the seminar helped them to improve their score.

In summary, they claimed that it was obvious that pre-service teachers who experienced environmental education would transmit environmental attitudes and awareness to future generations. Therefore, environmental programs or seminars in pre-service teacher education are important.

The study of Kansu and Tüysüz (2009) aimed to find out the effect of three seminars. They were 'Let's learn batteries, The causes of battery pollution, and Environmental consciousness about waste batteries'. The seminars were given during chemistry lessons on the topic of environmental consciousness to 265 high school students in İzmir. Pre-tests and post-tests were applied in order to examine the effectiveness of the seminars. At the end of the study, it was found that there was a statistically significant difference between pre-test and post-test results, the post-test scores of the students being higher than their pre-test scores. The authors thus definitely recommended that these kinds of seminars should be organized for students to increase their awareness of environmental issues.

The research by Köse et al. (2011) also supports the importance of courses about environment and environmental issues in increasing people's awareness towards

nature. They investigated the environmental attitudes of 376 students in Pamukkale University after the students had taken the course named 'Environment, Human and Society'. They got positive attitudes from both female (203) and male (173) university students according to the results of a questionnaire used in their research. Finally, they deduced that education about the environment is a good tool to increase people's awareness toward the environment and environmental issues. They also stated that, by generating more consciousness among citizens, environmental education may reduce those problems of the environment that are derived from human impact.

In the study of Ibarra et al. (2009), the researchers aimed to see the effectiveness of a computer program on teaching environmental problems such as overfishing. Thirty students in Spain participated. Ibarra et al. (2009) postulated that children struggle to understand how ecosystems work and how environmental problems arise. For this reason, they used an interactive computer program on fishing to teach the students about the issue of overfishing. They found that the computer program was effective in teaching the children that indiscriminate fishing leads to a depletion of fish stocks and even extinction of species.

Çakır, et al. (2010) assert that there are some factors such as family, media, and culture that influence people's environmental views, but the most effective one is definitely education in schools. On the other hand, some researchers think that schools are not the only place that gives environmental education to students. For example, Dunlap (2008) claims that education about environment and environmental issues both in schools and out of schools during informal education,

is a very helpful way to increase environmental awareness and consciousness of youth. Also, environmental education should be started in primary school and continue to the university level, in order to give a continuity of environmental education making it possible to have environmentally-minded people in society. Kasapoğlu and Turan (2008) investigated whether there is a relationship between environmental attitudes and behaviour of a group of students in Ankara. The study revealed that 248 secondary school students from four schools in Ankara have low environmental behavior although their attitudes toward the environment are high. Kasapoğlu and Turan (2008, p. 229) advised that compulsory environmental education should be integrated into school curricula in order to increase 'participation in environmental activities'.

Jekayinfa and Yusuf (2004) investigated the opinions of 150 pre-service teachers in Ilorin, Nigeria about environmental education. The participants recommended that environmental education should be covered in the social studies curriculum instead of in a separate environmental education course. Also, it should be covered at all levels in schools. The authors also advocated that relationships between the environment and humans should be covered in social studies.

Recently, a training program about environment for teachers was arranged by TEMA (Turkish Foundation for Combating Soil Erosion, Reforestation and the Protection of Natural Habitats) and the Turkish Ministry of Education in order to improve teachers' environmental awareness (Anatolia News Agency, 2011). The program takes two weeks and the intention is to educate four hundred teachers from 81 provinces of Turkey on environmental concepts within four years. It includes

not only theoretical terms but also practical activities about the environment. In the last two weeks of September, 2011, eighty-five teachers participated in the program in Yalova in the first pilot of the course. This was an important step to create a better society that knows the significance of conservation of the environment. On this point, Köse et al. (2011, p. 94) also indicated the importance of environmental education for university students by saying that, ‘Universities for all programs should provide an education program covering environmental science to nurture conscious and sensitive graduate students toward environment’.

Environmental awareness and concern

Importance of environmental awareness and concern

Concern and awareness are essential starting points to take action for dealing with environmental problems in the world. People’s environmental awareness and concerns are important concepts to discuss for sustainable life. In the literature, researchers put emphasis on environmental awareness and concerns of people in order to structure better environmental education.

Creating environmental awareness in people’s minds is the first step toward preventing environmental problems in the world (Işıldar, 2008). The author also argues that environmental awareness should become an attitude over time otherwise knowledge about the environment, given by education in order to create awareness, cannot be accepted as learned. However, so far, education is inadequate to be able to change the environmental attitudes of people in Turkey. According to Işıldar (2008), people should internalize environmental problems, and concerns about it, so that they can produce solutions to the problems. Furman (1998) conducted a survey

with 430 residents in İstanbul, Turkey in order to identify their environmental knowledge and concerns. The findings of the study revealed that there is a relationship between environmental knowledge and concerns. When the knowledge of the respondents is high their environmental concerns are directly increased. Since knowledge about the environment comes from environmental education, concerns about the environment can be shaped according to the level of knowledge.

Additionally, in this subsection the importance of teachers in the education of students is emphasized. Aminrad, Zakaria and Hadi (2011, p. 15) asserted that ‘the most important people for the saving and protection of nature are students’, which certainly implies that their teachers are equally important. For this reason, pre-service teachers must have high environmental knowledge so that they can transfer it to their students when they become in-service teachers. In addition, teachers are the biggest role models for the students, so their attitudes also impact the students’ attitudes (Kainth, 2009).

Ünal (2008) stated that Turkish pre-service teachers’ perceptions about environmental issues can lead to an increase of their environmental awareness, and in this way positively change the attitudes of their students. For example, when the teacher recycles paper instead of throwing it into the rubbish box and points out the importance of recycling to the students, this can be great example for the students.

Güler (2009) also states that teachers should first of all improve their environmental awareness. Secondly, they should behave more sensitively and protectively towards the environment. At the same time, they should show how important the

environment is in their life. In this way, they can be good role models for their students.

Overall, to be able to design the best environmental education policy, both teachers' and pre-service teachers' perceptions about environmental issues can usefully be explored (Ünal, 2008). Since teachers have a great role in education their behavior toward the environment should be considered first. In each country, there should be much more emphasis in teacher training on environmental concepts (Ibarra, et al., 2009), because after their training they will transfer their knowledge to others.

When people begin to learn more about environment, they become more environmentally conscious and are respectful towards nature.

Recent studies about people's attitudes toward the environment

A number of studies on people's attitudes to the environment have been conducted in Turkey. For example, Çavaş, Çavaş, Tekkaya, Çakiroğlu and Kesercioğlu (2009) explored the environmental attitudes of 1260 secondary school students from twenty-one cities in Turkey. In the results of the study it was stated that the students were aware of environmental problems and willing to come up with solutions to the problems. Şama (2003) measured the environmental attitudes of 442 pre-service teachers towards environmental issues. The participants of the survey comprised first year and last year students in Gazi University, Ankara.

Furman (1998) deduced in his survey conducted in İstanbul that people in both developed countries and developing countries such as Turkey had concerns about environmental issues. However, Erdoğan (2009) stated that although problems

about the environment had appeared nearly four decades ago, people began to be concerned about environmental problems only in the 1990s and 2000s in Turkey.

Günden & Miran (2008) investigated environmental attitudes of farmers in İzmir to the environment. According to these researchers, the farmers' attitude to the environment is important so that they can include protecting the environment while directing agricultural activity.

Studies have been conducted in other countries. For example, Larijani (2010) investigated the awareness of 300 school teachers in 29 schools in India towards environmental issues using an environmental awareness test developed by Yeshodhara and Asha in 2005. The test was composed of 36 multiple-choice questions. The teachers were from different subject areas such as science, social studies, mathematics and languages. The results showed that over half of the participants (57.7%) were aware of environmental problems at a moderate level but fewer had high awareness (24.3%). In another research study, 292 university students from Houston, Texas were surveyed in order to find their environmental attitudes, recycling habits, and relationship between attitudes and recycling habits (Lee, 2008). The author found that the participants' attitudes were moderate. Some participants who had slightly high attitudes were found to recycle more. In Punjab, India, 2500 science and art teachers were surveyed in order to find their environmental awareness (Kainth, 2009). The awareness of science teachers towards environmental issues was more than that of art teachers: a large number of science teachers had high environmental awareness (92.6%), whereas the number of art teachers who had moderate environmental awareness was low (35.9%).

Background information about the R-NEP scale

In the present research, pre-service teachers' concerns and awareness towards environmental concepts were explored using the Revised New Ecological Paradigm (R-NEP) scale designed by Dunlap et al. (2000). This is a questionnaire (Appendix A), which investigates some of the concerns and awareness of the environment of the respondents.

The scale has been considerably used all around the world (Dunlap, 2008). For example, Lee (2008) conducted a survey on the examination of environmental attitudes of university students in Texas, USA. Also, it was used in China by Duan & Fortner (2005) in order to measure perceptions of college students about environmental issues. Another researcher, Lovelock (2010) utilized the scale to measure environmental attitude of people with and without disabilities in New Zealand.

The R-NEP scale has been widely used not only by foreign researchers but also by Turkish researchers in order to evaluate perceptions and concerns toward environmental issues (Tuna, 2004; Günden & Miran, 2008; Erdoğan, 2009). For example, Erdoğan (2009) measured the worldviews of undergraduate students from four universities in Turkey by using the R-NEP scale. Also, Demirel, Gürbüz and Karaküçük (2009) adapted the scale to their research and checked its validity and reliability. They indicated that the R-NEP scale is a useful tool to measure Turkish university students' environmental concerns. Accordingly, this scale was employed by the present study in order to explore environmental awareness and concerns of A private university in Ankara's pre-service teachers.

There are, however, a number of criticisms about the R-NEP scale. One stated that even though the R-NEP scale aims to measure environmental ethics the items included are not sufficient (Lundmark, 2007). She claimed that the scale excessively covers views of anthropocentrism, while the other facets are not well captured. Yavetz, Goldman and Pe'er (2009) also state that the scale is mainly composed of anthropocentric and eco-centric views. Nonetheless, in spite of these comments from two researchers, the scale has been accepted as a common scale to measure the environmental concerns of people (Kostova, Vladimirove and Radoynovska, 2011).

Conclusion

This literature review has shown that there are many studies about environmental problems and concepts. It also suggests that there should be more emphasis on environmental education, not only for science teachers but also for teachers of other subject. The literature review emphasized the importance of environmental awareness among people by including studies in national and international literature.

In fact, people do not take action about environmental activities unless they are aware of the related environmental problems. Vygotsky's (1978) Social Development Theory (SDT) claims that development is formed in society first, and then appears at the individual level, meaning that individuals take responsibility for the development. Based on this theory, it seems that environmental awareness and concerns are formed in society. If so, then environmental education may be one of the best ways to create environmental awareness and concerns among young

people. To be able to do this, teachers should be educated so that they can deliver the relevant information and encourage positive attitudes towards the environment. For this reason environmental education should be integrated in teacher training programs.

After environmental awareness and concerns appear in society generally, environmental problems may be internalized by each person and individuals may take responsibility for environmental action.

The literature review has particularly displayed the background information about research on environmental issues, concerns, education, and causes of environmental problems. Environmental education is important not only for students but also for pre-service and in-service teachers because teachers are the basis of education in the schools. Therefore, the importance of environmental education is emphasized in the literature review section. Additionally, information about the use of the R-NEP scale was given.

CHAPTER 3: METHOD

Research design

This is a mixed method research focusing on environmental awareness and environmental concerns of pre-service teachers in a private non-profit university, Ankara. The follow-up explanations model, which is one of the variants of explanatory design, was used in the present research because qualitative data was considered useful in order to clarify the quantitative data results (Creswell, Clark, Gutmann, & Hanson, 2003). Explanatory design consists of two parts. The first part is the collecting and analyzing of quantitative data. The second part is qualitative data collection. In the follow-up explanations model, the researcher acquires qualitative data to get more information from the quantitative data that was collected before, but the primary emphasis is on the quantitative phase in this model (Gay, Mills, & Airasian, 2009).

Context

This research took place in the Graduate School of Education in a private non-profit university, Ankara, Turkey. It was the first private, nonprofit university in Turkey, founded in Ankara.

The Graduate School of Education has five departments. They are: MA in Computer and Instructional Technology Teacher Education, MA in Curriculum and Instruction, MA in Curriculum and Instruction with Teaching Certificate, MA in Teaching English as a Foreign Language (TEFL), and MA in Education

Management. Two of these departments, the MA in Computer and Instructional Technology Teacher Education, and the MA in Curriculum and Instruction with Teaching Certificate, are designed to prepare well-qualified teachers for high school service in Turkey (OAC, 2010).

Participants

This study administered the survey to 100 pre-service teachers in a private non-profit university, Graduate School of Education. The pre-service teachers in the departments of MA in Computer and Instructional Technology Teacher Education, and MA in Curriculum and Instruction with Teaching Certificate constituted the participants to the study. The participants of this study are therefore pre-service teachers who are continuing their education as students in a private non-profit university, Ankara. The computer education group comprises five-year MA program students. After their fourth year, if they decide to be a teacher, they continue into the fifth year. Other subject area groups comprise two-year MA program students. All participants have a scholarship during their education. The ages of the participants ranged from 21 to 28. They came from either state or private university. Table 1 summarizes the numbers of participants for the quantitative part of the study:

Table 1
The number of participants according to three variables (N:100)

Variables	Groups	N
Gender	Female	71
	Male	29
Subject Area	Biology	12
	Turkish language and literature	14
	Mathematics	22
	English language and literature	14
	Computer	38
Length of time in a private non-profit university, Ankara	Almost one year	44
	Almost two years	16
	Almost five years	40

The one year group was composed of students who were in the first year of their 2-year MA program. The two year group was composed of students in their second year. The five year group is composed of computer education students in the final year of a five-year program, plus two English language and literature students of the same university.

For the qualitative part of the study, purposeful sampling was used to select the interviewees, according to their R-NEP scores and subject area. This was because a higher score suggests more environmental awareness and concerns. The purpose of this sampling selection therefore was to get more valuable responses from the participants about the environment. Since they had shown higher environmental awareness and concerns than others, they are assumed to have the maximum level of environmental awareness within their subject area.

Instruments

Revised New Ecological Paradigm (R-NEP) scale

This scale was developed by Dunlap et al. (2000) to be able to investigate the ecological worldview of humans. It is the revised version of the New Environmental Paradigm scale of Dunlap and Van Liere (1978). The present study utilized this scale in order to investigate environmental concerns and awareness of pre-service teachers in a private non-profit university, Ankara because the scale was designed to measure environmental concerns and awareness.

The scale has 15 items consisting of eight pro-ecological and seven anti-ecological views. These contradictory views help to distinguish conflicting responses of people to the fifteen items.

The R-NEP scale includes five categories. They are the reality of limits to growth, anti-anthropocentrism, the fragility of nature's balance, the rejection of exemptionalism, and the possibility of eco-crisis. Each category has three items, giving a total of fifteen items in the R-NEP scale (Appendix A). They are all clearly based on environmental issues in the world.

Items 1, 6 and 11 cover the first category, the reality of limits to growth. These items question whether earth has enough power to supply the needs of living organisms. This category aims to show respondents' understanding of limited natural resources.

The second category, anti-anthropocentrism, includes items 2, 7 and 12. This category argues that the main aim of nature is not to serve the needs of humans, because other organisms such as plants and animals also have a right to benefit from nature. The anthropocentric view advocates human domination of the earth while anti-anthropocentric view represents environmental friendliness.

The third category, the fragility of nature's balance, contains items 3, 8 and 13. Nature's persistence (durability) in spite of human interference and other natural disasters is discussed in these items. This category measures the level of awareness about the fragility of nature.

The fourth category, rejection of exemptionalism, involves items 4, 9 and 14. This category means that people are not exempt from the laws of nature, and the items look for people's obedience to natural rules. The last category, the possibility of eco-crisis, is composed of items 5, 10 and 15 (Appendix A). Environmental problems caused by human destruction may result in ecological crisis. The possibility of eco-crisis measures whether people understand the possible crisis of nature (Dunlap et al., 2000; Dunlap, 2008; Erdoğan, 2009).

Demirel et al. determined the reliability and validity of the R-NEP scale in 2009. They claimed that the scale is reliable and valid for use with university students in Turkey. The sample of their research was composed of 222 university students in Ankara. 100 of them were men and 122 were women. They examined whether participation in recreational activities affects the university students' environmental attitudes or not. At the end of their research no statistically significant difference

between participation in recreational activities and their environmental attitudes was found (Demirel, et al., 2009).

At the end of the collection of quantitative data, the R-NEP score of each participant was calculated. While the even-numbered items were scored reversely (5 points for *Strongly disagree*, 4 points for *Disagree*, 3 points for *Unsure*, 2 points for *Agree*, 1 point for *Strongly agree*), the odd-numbered items were scored normally (1 point for *Strongly disagree*, 2 points for *Disagree*, 3 points for *Unsure*, 4 points for *Agree*, 5 points for *Strongly agree*). When the responses to the odd-numbered items were selected as *agree* and *strongly agree* this indicated the ‘pro-ecological view’. On the other hand, when the responses to the even-numbered items were selected as *agree* and *strongly agree* this indicated the ‘anti-ecological view’ (Dunlap et al., 2000).

By administering this scale, the environmental concerns and awareness of pre-service teachers in a private non-profit university, Ankara were examined. After carrying out the questionnaire, interviews were conducted.

Also, in the present study, the reliability statistics of the items in the R-NEP scale provided the information in Table 2. Cronbach’s alpha coefficient of 0.67 is higher than 0.6; therefore, the items on the scale are considered to be reliable.

Table 2
Reliability statistics of the items in the R-NEP scale

Cronbach's alpha	Cronbach's alpha based on standardized items	number of items
0.670	0.684	15

The questionnaire in the website has two parts (Appendix A). The first part includes some questions about their personal information and the second part includes 15 items in order to measure their environmental concerns and awareness. The scale is composed of 15 items and is a Likert type scale (1: strongly disagree, 2: disagree, 3: Unsure, 4: agree, 5: strongly agree). The questionnaire includes the items both in English and Turkish in order to allow the participants to read the questions in the language of their choice. The Turkish version of the items was taken from the research of Demirel et al. (2009), who calculated the reliability and validity of the scale for usability in Turkey.

Interview guide

The aim of constructing the interview questions was to understand the pre-service teachers' views on the interaction of humans with the environment more deeply than was permitted by the questionnaire, and to understand their solutions to the environmental issues, including their ideas about environmental education for sustainable life.

This was a structured interview because the interview questions were composed of pre-determined questions (Monroe, 2002). There were ten interview questions. The framework of the six interview questions (Appendix B) mainly referred to the five categories of the R-NEP questionnaire. The first question was about the reality of limits to growth, the second and third questions were about anti-anthropocentrism, and the fourth was about the fragility of nature's balance. The fifth question was about the rejection of exemptionalism, and the sixth was about the possibility of eco-crisis. Also, in those six questions, reasons for the participants' responses were

asked. For example, when they answered the first question by saying ‘yes’ or ‘no’, the interviewer immediately asked for their reasons. Their suggestions about environmental education were asked by means of four other interview questions. An expert opinion was taken for the usability of the interview questions.

Method of data collection

Quantitative data: questionnaire

The study investigated differences in gender, subject area, and length of time in a private non-profit university, Ankara as factors influencing their concerns and awareness towards the environment. One hundred pre-service teachers completed the online questionnaire. The web address of the R-NEP scale, which had been prepared before the data collection, was sent to all participants by e-mail. When they clicked on the website address below they directly reached the questionnaire: (<http://goo.gl/gTKZL>)

The data were collected during the 2010-2011 academic years, spring and summer semesters and 2011-2012 academic years, fall semester.

Qualitative data: interview

Interviews were done on the campus of the university, in a quiet room of the buildings. The participants were interviewed separately from each other. Each interview session was done face-to-face and recorded. The purpose of the interview was explained to the interviewee at the beginning of the session. The interview question sheet was given to the interviewees before the voice recording was started, to allow them time to write some key words of their answers to each question. This

was done because the participants were expected to answer the questions in English, which was a second language for them. Making notes beforehand helped the interviewees feel comfortable during the recording. Some of them read from the notes they had written, during the voice recording, because they felt more relaxed while reading. The interview data was collected at the beginning of 2011-2012 academic year, spring semester.

Method of data analysis

The quantitative data was analyzed using SPSS (Statistical Package for the Social Sciences v.19). To find out what the pre-service teachers' awareness and concerns towards environmental issues are, which is the first research question of the present study, descriptive statistics were used and displayed using the SPSS program. For the qualitative data, the responses to six of the interview questions also answered the first research question.

In order to investigate answers to the second research question of the present study - is there a significant difference between the pre-service teachers' environmental awareness and concerns with respect to their gender, subject area, and length of time in a private non-profit university, Ankara? - statistical tests were used. Firstly, an independent samples t-test was used to see the differences between males' and females' environmental concerns. Secondly, a one way ANOVA test was used to measure the difference between their subject areas and their environmental concerns. Thirdly, an ANOVA was performed to investigate the difference between their environmental awareness and concerns and length of time at the university.

The recorded interviews were transcribed and categorized in order to determine the knowledge of the interviewees about environmental issues, environmental education, and other suggestions about prevention of environmental problems (Appendix C). After that, the transcribed data were analyzed to identify themes and sub-themes. Their solutions for environmental issues and advice about environmental education were also reported in the results and discussion chapters of the present study. Pre-service teachers' awareness and concerns towards environmental issues were investigated at the end of the study with the help of both the quantitative and qualitative data results.

Before analysis of the interview data, the researcher consulted with an expert in the field of qualitative data analysis to establish the most suitable way of analyzing the qualitative data.

CHAPTER 4: RESULTS

Introduction

In this chapter the results of the quantitative and qualitative data analysis are presented in order to show pre-service teachers' concerns and awareness towards environmental issues. Additionally, the results represent the statistically difference between the pre-service teachers' environmental concerns and awareness with respect to their gender, subject area, and length of time in a private non-profit university, Ankara. The suggestions of the pre-service teachers in the Graduate School of Education in the university about environmental education are also discussed.

Quantitative data: environmental concerns and awareness

The study used the R-NEP scale to collect the demographic characteristics and views of pre-service teachers in a private non-profit university, Ankara about environmental issues. The responses of 100 pre-service teachers to the categories of the scale (reality of limits to growth, anti-anthropocentrism, fragility of nature's balance, rejection of exemptionalism, and the possibility of eco-crisis) were categorized and analyzed. The responses to each item are shown in Table 3.

Table 3

Five categories of the R-NEP, with the items per category

Sub-categories of R-NEP scale	R-NEP items		Averages of agreement
Reality of limits to growth	Pro	1. We are approaching the limit of the number of people the earth can support.	3.70
	Anti	6. The earth has plenty of natural resources if we just learn how to develop them.	3.68
	Pro	11. The earth has only limited room and resources.	3.56
Anti-anthropocentrism	Anti	2. Humans have the right to modify the natural environment to suit their needs.	1.84
	Pro	7. Plants and animals have as much right as humans to exist.	4.56
	Anti	12. Humans were meant to rule over the rest of nature.	3.30
Fragility of nature's balance	Pro	3. When humans interfere with nature, it often produces disastrous consequences.	3.34
	Anti	8. The balance of nature is strong enough to cope with the impacts of modern industrial nations.	2.44
	Pro	13. The balance of nature is very delicate and easily upset.	3.41
Rejection of exemptionalism	Anti	4. Human ingenuity will insure that we do NOT make the earth unlivable.	2.80
	Pro	9. Despite our special abilities humans are still subject to the laws of nature.	4.18
	Anti	14. Humans will eventually learn enough about how nature works to be able to control it.	2.52
The possibility of eco-crisis	Pro	5. Humans are severely abusing the environment.	4.19
	Anti	10. Human destruction of the natural environment has been greatly exaggerated.	1.85

The scale was also used in order to investigate whether there is a statistically significant difference in the environmental awareness and concerns between females and males. In addition, it determined if there was a significant difference among teachers of the five subject areas in terms of their environmental concerns and awareness. Lastly, it examined the environmental concerns and awareness differences between two groups. Group 1 is a group of people who have been in a private non-profit university, Ankara for one year, while group 2 is another group of people who have been in a private non-profit university, Ankara for more than one year.

Environmental concerns and awareness of pre-service teachers

There are fifteen items in the scale. The average of agreement level of each item according to the responses of 100 people was calculated. Figure 1 summarizes the responses of 100 pre-service teachers in the Graduate School of Education in a private non-profit university, Ankara.

As seen in Figure 1 the odd-numbered items commonly received higher averages than the even-numbered items, except for item 6. The average of the odd-numbered items (3.91) is more than three (mean value) and the average of the even-numbered items (2.63) is less than three. The results showed that one hundred pre-service teachers tend to have a pro-ecological view but the values are very close to three so this view is moderate.

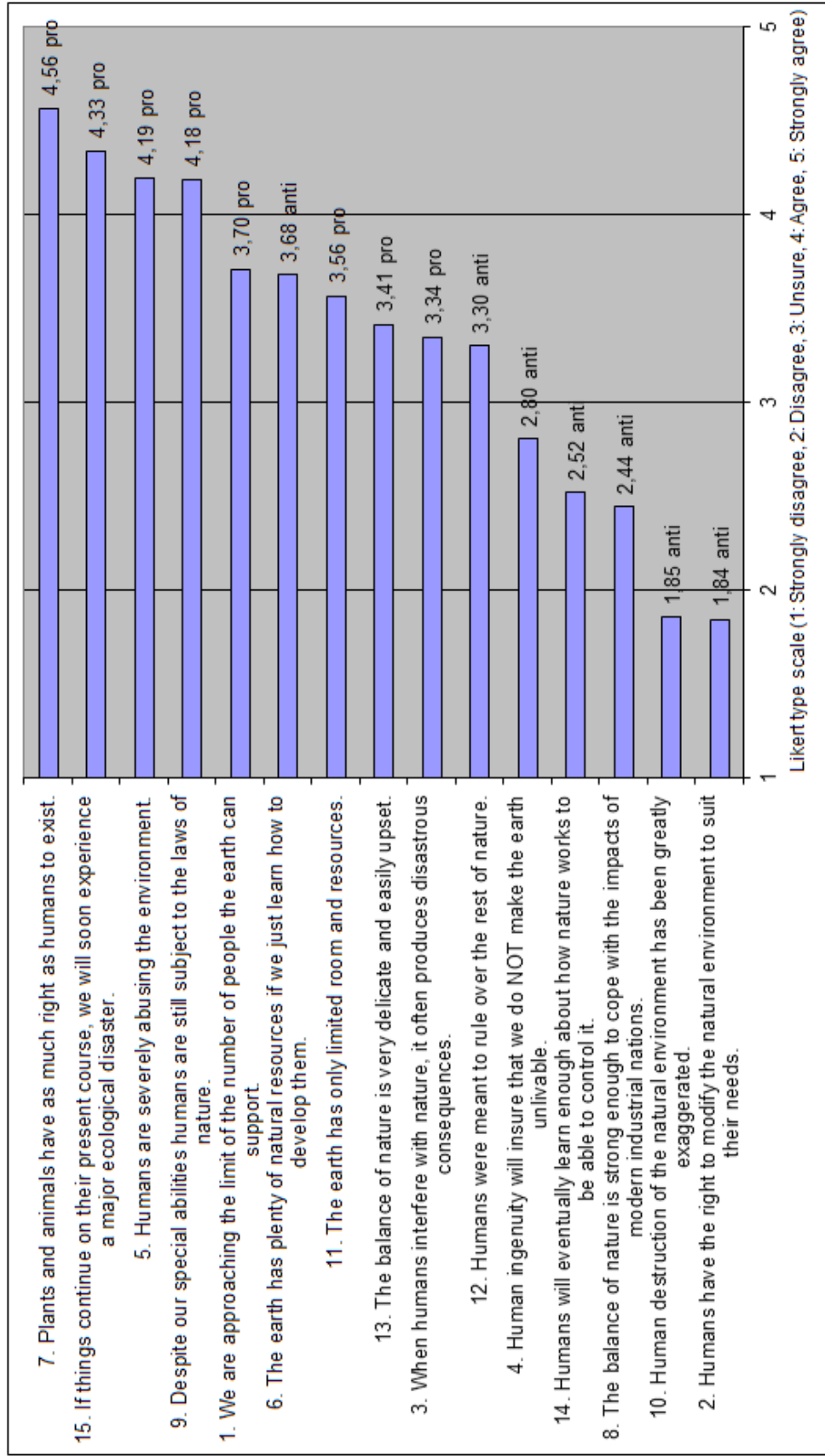


Figure 1. Revised New Ecological Paradigm (R-NEP) items and responses of pre-service teachers (N: 100)

Sub-categories of the R-NEP scale

There are five categories of the scale: the reality of limits to growth, anti-anthropocentrism, fragility of nature's balance, rejection of exemptionalism, and the possibility of eco-crisis. Each of these categories comprised three items. The responses to the reality of limits to growth (1, 6, and 11) show the participants' understanding of limited natural resources on earth. Whether the participants are environmentally-friendly can be decided according to the responses to the items under anti-anthropocentrism (2, 7, and 12). The responses to the third category, fragility of nature's balance (3, 8, and 13), show their awareness towards the characteristics of nature. Rejection of exemptionalism (4, 9, and 14) demonstrates whether that people accept the need to obey the natural rule. The items under the last category, possibility of eco-crisis (5, 10, and 15), measure people's understanding of possible ecological disaster in the future.

Figure 2 to Figure 7 show the percentage of agreement level of each item under each category, using bar charts. Each item was coded as 'i'. For example, item 1 was coded as i1; item 2 was coded as i2, and the others so on.

Reality of limits to growth

Figure 2 shows the percentages of agreement level of items 1, 6 and 11.

- i1: We are approaching the limit of the number of people the earth can support
- i6: The earth has plenty of natural resources if we just learn how to develop them
- i11: The earth has only limited room and resources

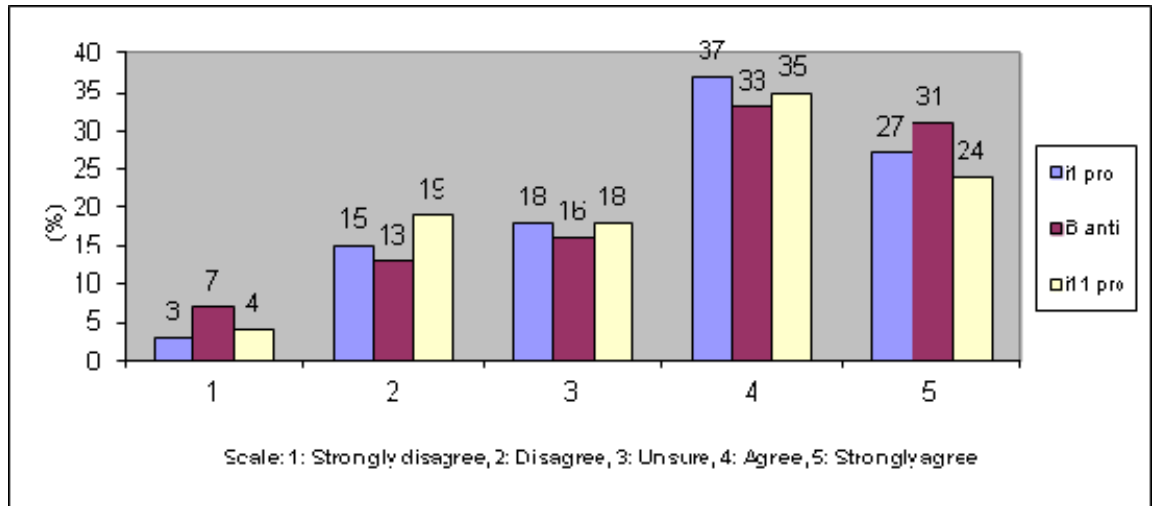


Figure 2. Reality of limits to growth

For two items (1 and 11), the responses were overwhelmingly in agreement (for i1: 64%, for i11: 59%). Unexpectedly, i6 received more agreement (64%) than disagreement (20%). This suggests that the pre-service teachers appear to be rather confused.

Anti-anthropocentrism

Figure 3 shows the percentages of agreement level of items 2, 7 and 12.

i2: Humans have the right to modify the natural environment to suit their needs

i7: Plants and animals have as much right as humans to exist

i12: Humans were meant to rule over the rest of nature

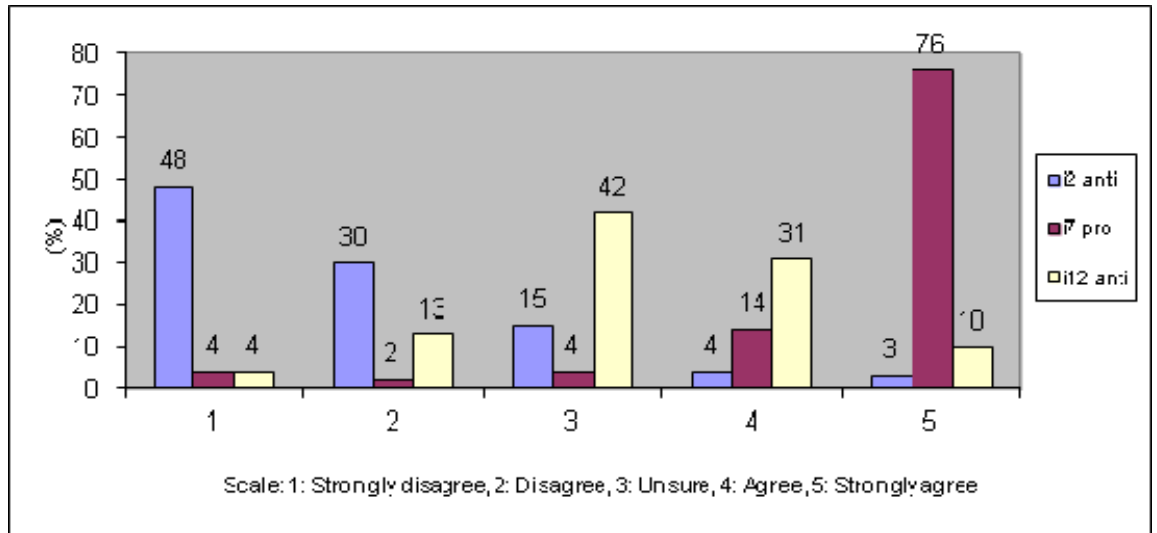


Figure 3. Anti-anthropocentrism

Almost all of the respondents agreed that, ‘plants and animals have as much right as humans to exist’ (i7: 90%). As expected, they disagreed on whether, ‘humans have the right to modify the natural environment to suit their needs’ (i2: 78%). However, interestingly, 42% of the responses were unsure whether ‘humans were meant to rule over the rest of nature’, and 41% agreed.

Fragility of nature’s balance

Figure 4 shows the percentages of agreement level of items 3, 8 and 13.

i3: When humans interfere with nature, it often produces disastrous consequences

i8: The balance of nature is strong enough to cope with the impacts of modern industrial nations

i13: The balance of nature is very delicate and easily upset

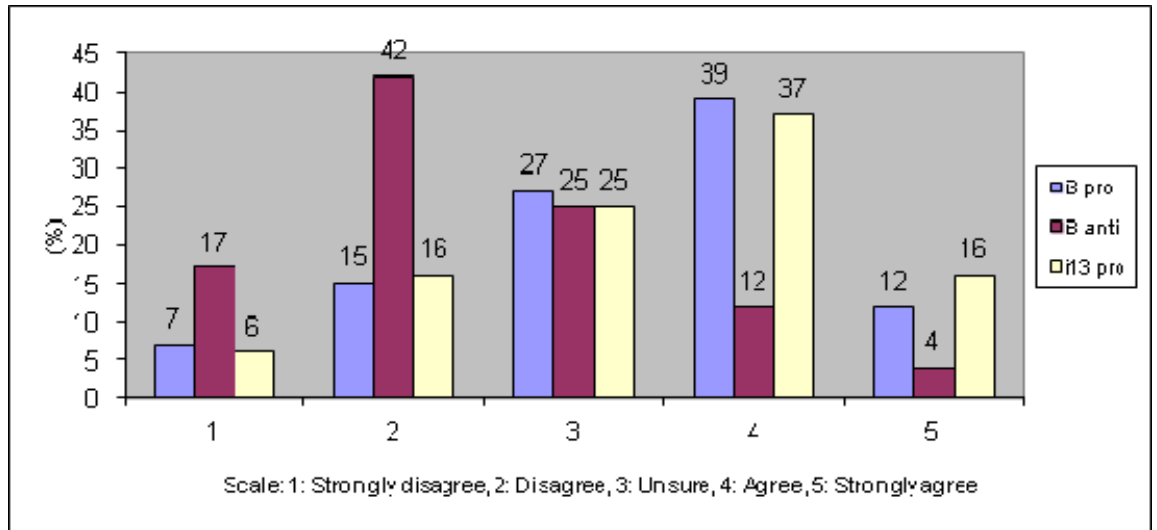


Figure 4. Fragility of nature's balance

Two items (i3 and i13) had a similar response and over half (51% and 53%) were in agreement. It is not surprising that i3 and i13 received similar responses and i8 received less agreement (16%) than disagreement (59%), which states the opposite. Although the pre-service teachers agreed on the pro-ecological view items, their score was only just over 50% which suggests that their awareness is not too high.

Rejection of exemptionalism

Figure 5 shows the percentages of agreement level of items 4, 9 and 14.

i4: Human ingenuity will insure that we do not make the earth unlivable

i9: Despite our special abilities humans are still subject to the laws of nature

i14: Humans will eventually learn enough about how nature works to be able to control it

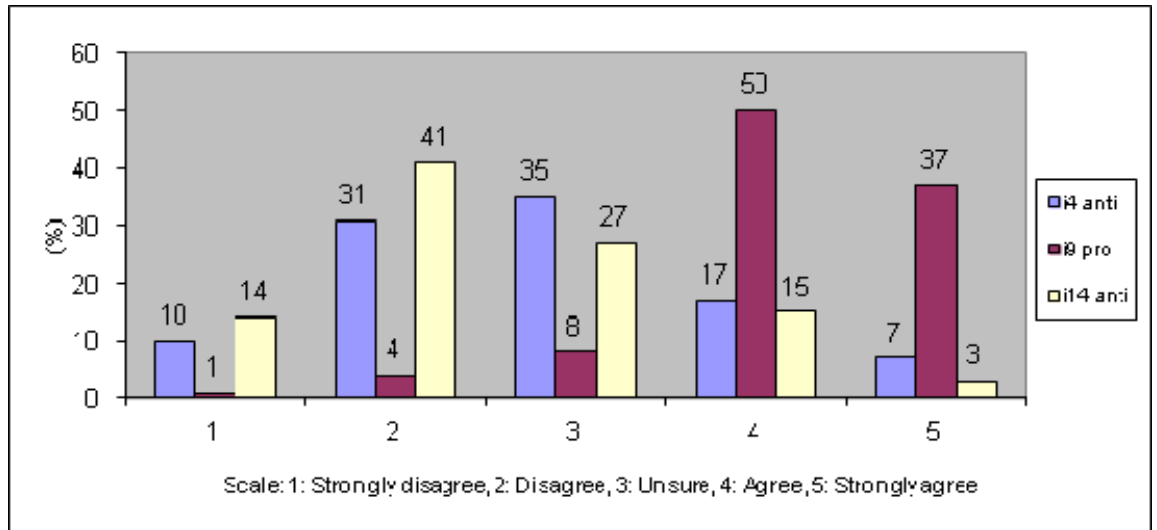


Figure 5. Rejection of exemptionalism

The highest agreement amongst the three items is for i9 (87%). As expected, the two items (i4 and i14) received more disagreement (41% and 55%) than agreement (24% and 18%) because these two items have an opposite view to i9. Item 4 has most pre-service teachers saying they are unsure on whether people make the earth unlivable.

The possibility of eco-crisis

Figure 6 shows the percentages of agreement level of items 5, 10 and 15.

i5: Humans are severely abusing the environment

i10: Human destruction of the natural environment has been greatly exaggerated

i15: If things continue on their present course, we will soon experience a major ecological disaster

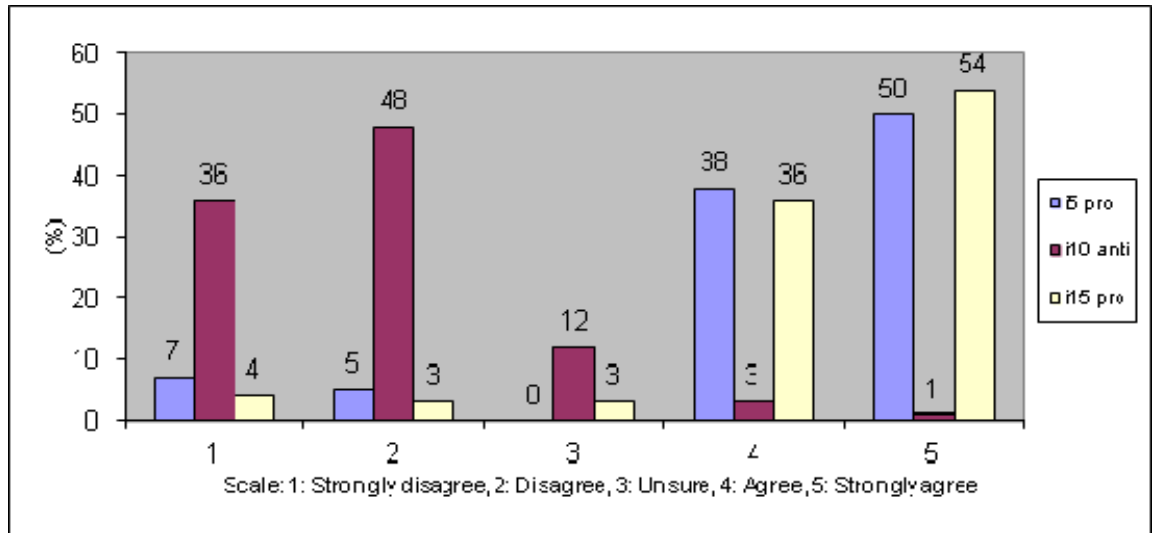


Figure 6. The possibility of eco-crisis

It can be seen that both i5 and i15 receive very high and similar agreements (88% and 90%) respectively. It is not surprising that i5 and i15 received similar responses because of similar meaning, and i10 received less agreement (4%) than disagreement (84%), which states the opposite.

Gender differences

In order to look at the difference between the R-NEP scores of females and males, an independent samples t-test was used. With the help of box-plots, Figure 7 represents the comparison of genders according to their R-NEP scores. The figure shows that females and males have almost the same mean R-NEP scores.

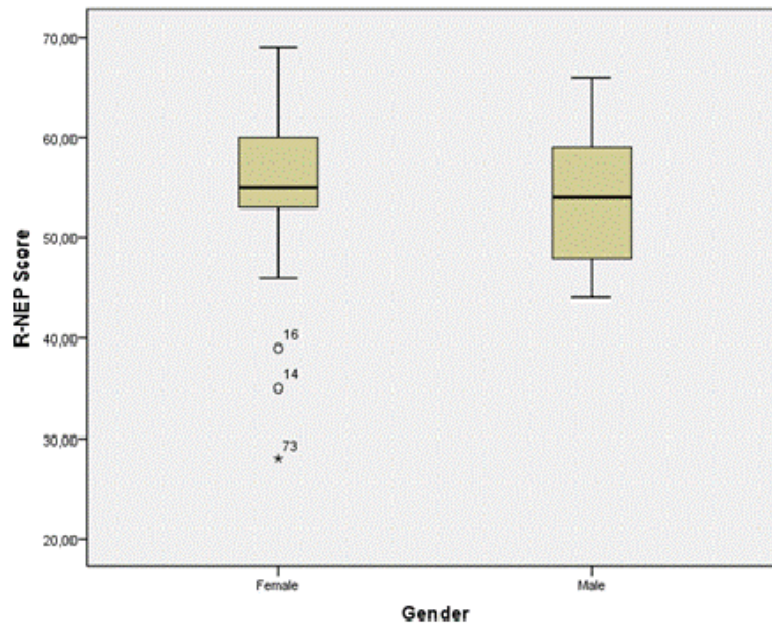


Figure 7. Box-plot for females and males

Table 4 shows that although the R-NEP scores of females were higher ($M = 55.08$, $SE = 0.81$) than the R-NEP scores of males ($M = 54.24$, $SE = 1.15$), there was no statistically significant difference between these two groups ($t(98) = 0.58$, p (two-tailed) = 0.57). This means that, in this study, gender does not have an impact on environmental awareness and concerns.

Table 4
Independent samples t-test results for genders

		Levene's Test for Equality of Variances		T-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
R-NEP Score	Equal variances Assumed	.135	.714	.58	98	.57	.84	1.46	-2.05	3.74

Subject area differences

An ANOVA test was used to determine to see if there is any significant difference among the teachers of the five subject areas sampled (biology, Turkish language and literature, mathematics, English language and literature, and computer education), in terms of their environmental concerns and awareness. Figure 8 shows the comparison of subject area teachers according to their R-NEP scores. The figure shows that the biology group and English language and literature group have almost the same mean R-NEP scores. Additionally, it can be seen from the figure that the computer group has a lower R-NEP score than the other subject area groups.

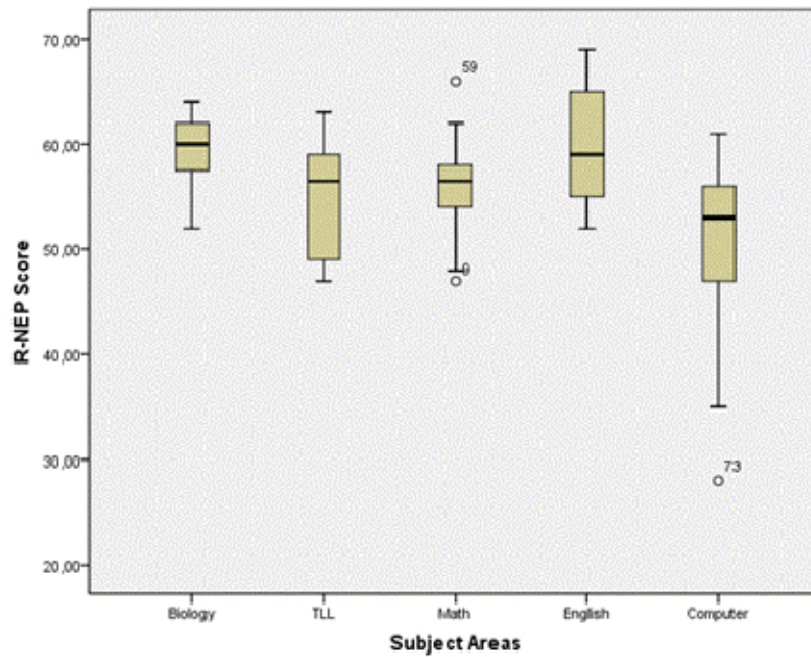


Figure 8. Box-plot for each subject area

Table 5 shows the averages of the R-NEP score of each subject area. The English language and literature group has the highest average ($M= 59.6, SD= 5.6$) while the computer education group has the lowest average ($M= 50.9, SD= 6.9$).

Table 5
Descriptive statistical values of subject areas according to their R-NEP scores

	%	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Biology	12.0	59.2500	3.79294	1.09493	56.8401	61.6599
Turkish language & literature	14.0	54.9286	5.45562	1.45807	51.7786	58.0785
Mathematics	22.0	56.1818	4.42543	.94350	54.2197	58.1439
English language & literature	14.0	59.6429	5.59680	1.49581	56.4114	62.8744
Computer education	38.0	50.8684	6.88583	1.11703	48.6051	53.1317
Total	100.0	54.8400	6.60077	.66008	53.5303	56.1497

ANOVA results show that there is a statistical significant difference between subject areas ($F(4, 95) = 9.11, p < 0.05$). In order to compare multiple means, a *Hochberg post hoc* test was used. Table 6 shows the results of the *Hochberg post hoc* test.

Table 6
Multiple comparisons among subject areas according to their R-NEP scores

(I) Subject Area	(J) Subject Area	Mean Difference (I-J)	Std. Error	Sig.
Biology	TLL	4.32143	2.25377	.442
	Math	3.06818	2.05596	.765
	English	-.39286	2.25377	1.000
	Computer	8.38158*	1.89705	.000
TLL	Biology	-4.32143	2.25377	.442
	Math	-1.25325	1.95863	.999
	English	-4.71429	2.16535	.272
	Computer	4.06015	1.79111	.225
Math	Biology	-3.06818	2.05596	.765
	TLL	1.25325	1.95863	.999
	English	-3.46104	1.95863	.557
	Computer	5.31340*	1.53479	.008
English	Biology	.39286	2.25377	1.000
	TLL	4.71429	2.16535	.272
	Math	3.46104	1.95863	.557
	Computer	8.77444*	1.79111	.000
Computer	Biology	-8.38158*	1.89705	.000
	TLL	-4.06015	1.79111	.225
	Math	-5.31340*	1.53479	.008
	English	-8.77444*	1.79111	.000

*. The mean difference is significant at the 0.05 level.

The results of *Hochberg post hoc* test show that the R-NEP scores of all the other subject area groups were higher than that of the computer education group. However, the difference between R-NEP scores of Turkish language and literature ($M = 54.93$, $SE = 1.46$) and computer education ($M = 50.87$, $SE = 1.12$) was not statistically significant. On the other hand, the difference between computer education and other subject areas was statistically significant. For example, the biology group had a higher R-NEP score ($M = 59.25$, $SE = 1.10$) than the computer education group ($M = 50.87$, $SE = 1.12$) and this difference was statistically significant (p (one-tailed) < 0.001). In fact, the expected result was that the biology group would have the highest R-NEP score because of the content of the subject area. However, it was the English language and literature group which had higher R-NEP score than other groups, but it was not significant. This is possibly because

of their background knowledge about the environment, is greater as they may be more aware of what is happening outside of Turkey due to their greater ease in reading English.

Length of time at the university

Following the studies done by Işıldar (2008) and Sam et al. (2010), the participants were sub-divided according to the length of time they had spent at the university.

An ANOVA test was done in order to investigate environmental concerns and awareness differences among three groups. One group had been at this university for almost one year, the second for almost two years, and the third for almost five years. The university which is in Ankara was listed as the best university in Turkey while the quantitative data were being conducted.

Table 7 shows the descriptive statistics of the groups according to their R-NEP scores.

Table 7
Descriptive statistical values of the groups

Groups	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Almost 1 year	44	57.9773	5.21843	.78671	56.3907	59.5638
Almost 2 years	16	55.9375	4.65430	1.16357	53.4574	58.4176
Almost 5 years	40	50.9500	6.71756	1.06214	48.8016	53.0984
Total	100	54.8400	6.60077	.66008	53.5303	56.1497

ANOVA results show that there is a statistical significant difference among the groups ($F(2, 97) = 15.76, p < 0.05$). Figure 9 shows the R-NEP scores of the three groups with box-plots.

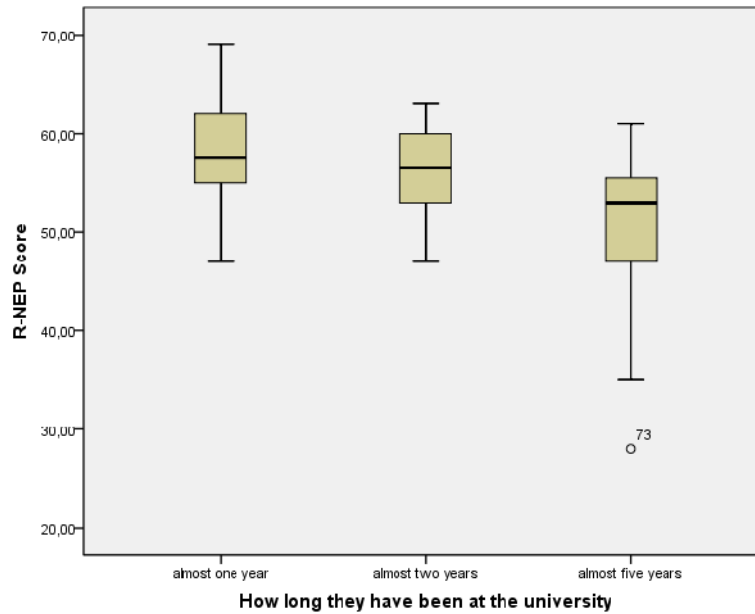


Figure 9. Box-plot for the groups

Table 8 shows the results of *Hochberg post hoc* test whether the difference among three groups is significant or not. The R-NEP scores of the one year group is higher ($M = 57.98$, $SE = 0.79$) than the R-NEP scores of the five year group ($M = 50.95$, $SE = 1.06$). This difference is statistically significant (p (one-tailed) < 0.001). The R-NEP scores of the two year group is also significantly higher ($M = 55.94$, $SE = 1.16$) than the R-NEP scores of five year group ($M = 50.95$, $SE = 1.06$), (p (one-tailed) < 0.001). There is no statistically significant difference between the R-NEP scores of the one year group and the two year group.

It is interesting to note that the five year group consists of the computer education pre-service teachers (with the exception of two English language and literature pre-service teachers). This confirms the statistical difference found in the subject areas: computer education group had significantly lower environmental awareness and concerns than the other subject area groups except Turkish language and literature group.

Table 8
Multiple comparisons among the groups

(I) Length of time at the university	(J) Length of time at the university	Mean Difference (I-J)	Std. Error	Sig.
almost 1 year	almost 2 years	2.03977	1.69135	.542
	almost 5 years	7.02727*	1.26569	.000
almost 2 years	almost 1 year	-2.03977	1.69135	.542
	almost 5 years	4.98750*	1.71375	.013
almost 5 years	almost 1 year	-7.02727*	1.26569	.000
	almost 2 years	-4.98750*	1.71375	.013

*. The mean difference is significant at the 0.05 level.

In summary so far:

- The present study found that gender does not have an impact on the pre-service teachers' level of environmental awareness and concerns.
- The subject area did not have an impact on their level of environmental awareness and concerns, except for the computer education group, whose environmental awareness and concerns were lower than others.
- With regard to the length of time at the university, there was a slight difference in the pre-service teachers' level of environmental awareness and concerns: the five year group had significantly lower environmental awareness and concerns than the other groups.

These results will be discussed in the next chapter.

Qualitative data: awareness and concerns of environmental issues

The objective of this section was to elicit more information about pre-service teachers' awareness and concerns towards environmental issues. Additionally, it was to gather some information about five pre-service teachers' suggestions about if, or how, environmental education should be given in schools.

The qualitative part was conducted after the quantitative part, using ten open-ended questions that were designed to acquire more information about environmental concerns and awareness of five pre-service teachers in this university, Ankara (Appendix B).

Pre-service teachers' awareness and concerns towards environmental issues

Each pre-service teacher's subject area was coded using an abbreviation while managing the qualitative data on the excel data sheet. Thus, the pre-service teacher who was the biologist was coded as BIO. Turkish language and literature was coded as TLL, mathematics was coded as MAT, English language and literature was coded as ELL, and computer education was coded as COM. After the data management process, tables (from 8 to 17) were generated for the ten interview questions. Each table includes themes and subthemes. Additionally, the frequency of each theme and sub-theme are stated in brackets, indicating the number of times each was mentioned by the interviewees.

Table 9 shows the summarized responses of the five pre-service teachers from different subject areas to the first question coded as Q1. Answers to Q1 were grouped under the themes and sub-themes in Table 9. Two themes emerged from the responses to Q1, the human factor and natural resources, the 'human factor' theme being mentioned twice as often as 'natural resources' (12 and 6).

Table 9

Responses to question 1

Q1. Do you think earth has plenty of natural resources, and can meet all demands of humans for many years? why? why not?(the reality of limits to growth)

Themes	Sub-themes
Human factor (12)	<ul style="list-style-type: none"> - Consuming resources without thought (5) - Over consumption (4) - Population growth (1) - Toxic waste (1) - Destroying nature (1)
Natural resources (6)	<ul style="list-style-type: none"> - Adequacy (2) - Inadequacy (4)

Respondents thought that the earth could not meet all the demands of humans for many years due to the human factor and limited natural resources. For example, the respondents thought that people consumed resources without thought and to far too great an extent. They claimed that population grows with time, so this means that the earth could not meet all the demands of humans for many years. They also stated that unless people stop destroying nature all the demands of the population will not be met by the earth in the future. Besides, the respondents argued that natural resources would run out and that toxic waste will accumulate.

Moreover, according to some of the interviewees' (ELL & BIO) responses there are not enough natural resources on the earth because they thought that the resources are limited and inadequate for further growth. However, others (TLL, COM & MAT) considered that natural resources on the earth are adequate for humans for many years. Overall, humans were the important factor in this point according to the responses, rather than the inadequacy of natural resources on earth.

Question 2 was coded as Q2. Answers to Q2 are grouped under the themes and sub-themes in Table 10. The themes were the existence of other living organisms, human behavior, and natural harmony.

Table 10

Responses to question 2

Q2. Do you think that nature exists primarily for human use? why? why not?(anti-anthropocentrism)

Themes	Sub-themes
Existence of living organisms (3)	<ul style="list-style-type: none"> - God supplied natural resources for all living organisms (1) - All living organisms need resources to survive (2)
Human behavior (4)	<ul style="list-style-type: none"> - To survive and remain alive (1) - Selfish (1) - Egocentrism (1) - Belief in God (1)
Natural harmony (3)	<ul style="list-style-type: none"> - Being a part of nature (2) - Presence of ecosystems on Earth (1)

Some of the respondents claimed that nature does not exist primarily for human use because of the existence of other organisms on earth that also need to survive. For example, the BIO pre-service teacher said that God supplied all these things for every creature in order to defend her point of view to this question. The MAT pre-service teacher said, ‘I think nature exists primarily for human use because nature was created for humans’. In his opinion natural resources were created primarily for humans. Similarly, the ELL pre-service teacher said, ‘if we think that human beings need nature to survive and remain alive, it seems like nature has a big function for human use’.

The fact that ‘nature is primarily for human use’ was stated shows egocentrism and selfishness. On the other hand, the TLL pre-service teacher stated that ‘there is a wonderful harmony in nature, we are also involved in this harmony as people but we are just a part of this system, nature does not exist only for humans’. In addition, the computer education pre-service teacher mentioned ecosystems in order to emphasize the harmony in nature.

The third question was coded as Q3. Answers to Q3 were grouped under the themes and sub-themes in Table 11. The themes were human benefit, the existence of other living organisms, and natural balance.

Table 11

Responses to question 3

Q3. Do humans have the right to modify the natural environment to suit their needs? why? why not?(anti-anthropocentrism)

Themes	Sub-themes
Human benefit (8)	<ul style="list-style-type: none"> - Provide a living place (3) - More living places needed due to over population (1) - To make use of a virgin territory like forest or land (1) - To be able to survive (1) - Without intervention to ongoing life (2)
Existence of other living organisms (2)	<ul style="list-style-type: none"> - All living organisms have a right to use resources (2)
Natural balance (3)	<ul style="list-style-type: none"> - Power of nature (1) - Humans adapt themselves according to conditions of nature (1) - Organisms should protect the balance of nature (1)

There were three different points of view to Q3, ‘humans have the right to modify the natural environment’ (BIO, MAT & ELL), ‘humans have no right to modify it’ (COM), and ‘humans cannot modify nature’ (TLL).

Three of the respondents stated that humans have the right to modify the natural environment for their benefit. For example, the MAT pre-service teacher said, ‘human beings have the right to modify nature to suit their needs because people should modify the natural environment to live in well planned places’. Similarly, the ELL pre-service teacher said, ‘we cannot survive if we don’t modify it. If the population overgrows in a certain place, people may spread to another place to live’. However, only the BIO pre-service teacher mentioned that people could modify it only if they did not interfere with ongoing life.

Conversely, the COM pre-service teacher claimed that when people modified the natural environment for their benefit they damaged the natural resources. She

thought that this action would affect the other living organisms' lives negatively so humans have no right to modify the natural environment.

Another opinion was about the balance of nature. The TLL pre-service teacher asserted, 'it is impossible that people rule nature. People should adapt themselves in terms of conditions of nature'. Additionally, the COM pre-service teacher said, 'humans should protect the balance'. These two pre-service teachers (TLL & COM) thought that there was a strong harmony in nature so people should not make any changes while the others (BIO, MAT, & ELL) argued that modification of environment was a necessary process for humans to be able to survive.

Table 12 shows the responses to the fourth question coded as Q4 including the themes and subthemes. Two themes emerged: the human factor and evidences of human interference.

Table 12

Responses to question 4

Q4. Do you think human interference endangers the balance in nature? why? why not?(fragility of nature's balance)

Themes	Sub-themes
Human factor (11)	<ul style="list-style-type: none"> - Consuming resources without thought (1) - Human attitudes towards nature (1) - Recklessness of humans (3) - Unawareness of humans (1) - Destroying nature (4) - The consequences of interference will affect human (1)
Evidences of human interference (5)	<ul style="list-style-type: none"> - Overuse resources and contaminate them (1) - Water, air, earth pollution (1) - Felling trees to construct new buildings (1) - Drought and animal extinctions (1) - Lack of filters on factories' chimney, destroying ozone layer by using perfumes (1)

The respondents stated that human interference endangers balance in nature for many reasons. For example, human attitudes towards nature such as consuming resources without thought, the recklessness and unawareness of humans threatening

the balance of nature and then the consequences of interference such as global warming and climate change would affect humans' lives.

The respondents also mentioned some evidence of human interference such as overuse of resources and contamination, environmental pollution, and felling trees to construct new buildings. The COM pre-service teacher said, 'there are lots of factories that do not have filters on their chimneys. Also, humans have damaged ozone layer while using perfumes'. Moreover, the ELL pre-service teacher said, 'human interference causes unsolvable problems like drought and animal extinctions. So I really think that people endanger balance in nature'. Overall, all of them agreed that the consequences of interference would affect humans in the end.

Table 13 shows the responses to the fifth question coded as Q5.

Table 13

Responses to question 5

Q5. Do you think humans will be able to control nature? why? why not?(rejection of exemptionalism)

Themes	Sub-themes
Controlling nature (7)	<ul style="list-style-type: none"> - With the help of current technology (2) - With the help of education (1) - Unconscious consumption of resources (1) - Over consumption of resources (1) - Unawareness of natural balance (1) - By constructing buildings, felling trees, using petrol (1)
Nature cannot be controlled (4)	<ul style="list-style-type: none"> - Natural disasters cannot be controlled (1) - Inadequate technology (1) - Humans have no ability to control it (2)

There were two opposite views to the fifth question as seen in the themes column.

Most of the responses supported the first theme, that nature may be controlled.

Interestingly, two respondents (TLL & MAT) thought that people could control nature with the help of the current technology, but one respondent (ELL) thought that current technology was not enough to be able to control nature.

The BIO pre-service teacher claimed that natural disasters such as earthquakes and tsunamis cannot be controlled by humans. However, she thought that if people were educated they would be able to control nature.

Table 14 shows the responses to the sixth question coded as Q6. Two themes emerged, the major disaster and minor disaster.

Table 14

Responses to question 6

Q6. Do you think we will experience a major ecological catastrophe? why? why not?(the possibility of eco-crisis)

Themes	Sub-themes
Major disaster (6)	<ul style="list-style-type: none"> - Run out of water (1) - Environmental pollution (1) - Such as climate change (1) - Such as tsunami (1) - Due to human destruction (2)
Minor disaster (3)	<ul style="list-style-type: none"> - Consumption of nonrenewable resources (1) - Such as global warming, climate change (1) - Due to interference of humans (1)

Some of the respondents thought that if humans continued to destroy nature we would experience a major ecological catastrophe such as tsunami, climate change, or run out of water. Surprisingly, the BIO pre-service teacher called climate change a minor ecological catastrophe, while the COM pre-service teacher considered it to be major ecological catastrophe.

The COM pre-service teacher said, ‘I think we will experience a major ecological catastrophe because humans have damaged the balance of nature’. Similarly, the ELL pre-service teacher stated, ‘if there occurred a catastrophe in nature, the interference of humans could be the reason’. Additionally, the BIO pre-service teacher claimed that the consumption of nonrenewable resources could cause a

minor ecological catastrophe such as environmental pollution by releasing chemicals in air.

Suggestions about environmental education

Table 15 shows the responses to the seventh question coded as Q7. Answers to Q7 were grouped as shown.

Table 15

Responses to question 7

Q7. What are your suggestions to prevent environmental issues?

Themes	Sub-themes
Education (13)	<ul style="list-style-type: none"> - About environment (1) - At young ages (1) - Both in schools and family (2) - To create environmental awareness (4) - To change attitudes (2) - To prevent environmental problems (2) - To avoid over use of natural resources (1)
Using media (3)	<ul style="list-style-type: none"> - Way of promoting protecting the environment (1) - To make advertisements about recycling (1) - To prevent environmental problems (1)

The suggestions to prevent environmental problems were mostly about education. Most of the respondents considered that environmental education was important to create environmental awareness and to change people's attitudes towards nature, but this education should be given at young ages, both in schools and within the family.

Besides education, some suggested the use of media to make people more aware of how to prevent environmental problems and the importance of recycling. The ELL pre-service teacher said, 'media is another way of promoting the protection of the environment, for instance public figures, famous authors, TV programmers can be included in some campaigns related to environmental protection'.

Table 16 shows the responses to the eighth question coded as Q8.

Table 16

Responses to question 8

Q8. What are the best ways to increase students' awareness towards environmental issues?

Themes	Sub-themes
Education (15)	<ul style="list-style-type: none"> - Using real life examples (2) - Let students recycle (1) - Teacher attitude (1) - At young ages and in family, and continue in older ages (4) - In science lessons (1) - Environmental activities developed by every teacher (2) - Governments should integrate environmental education with curriculum (1) - Project about environmental disasters and protections (1) - Preparing assignment about nature (2)

All the respondents were agreed that the best way to increase students' awareness towards environmental issues was education. Giving real life examples, doing class activities, preparing projects about environmental issues, and integrating environmental education into the school curriculum could be the best ways to increase students' awareness towards environmental issues according to the interviewees. For example, the ELL pre-service teacher said, 'another way could be to take action to protect the environment with big projects like planting trees and protecting forests in town'. Additionally, the BIO and COM pre-service teachers emphasized the importance of using real life examples about current natural disasters, for example the tsunami in Japan, in order to increase students' awareness of environmental issues.

Table 17 shows the responses to the ninth question coded as Q9.

Table 17

Responses to question 9

Q9. Which topics should be covered by means of environmental education?

Themes	Sub-themes
Topics in biology curriculum (2)	- Living organisms (2)
Environmental issues (8)	- Acid rain (1) - Global warming (1) - Greenhouse effect (1) - Pollution (1) - Climate change (1) - Ozone depletion (1) - Energy (1) - Waste (1)
Prevention (5)	- Raising environmental awareness (1) - Conservation of natural resources (1) - Recycling (1) - Tips for efficient water use (1) - Avoiding nuclear weapons (1)
Media (1)	- Famous people's opinions about nature (1)

The responses of the pre-service teachers were categorized into four themes: the topics in the biology curriculum, environmental issues, prevention, and media. The MAT and BIO pre-service teachers thought that topics about the environment should be covered in biology lessons. All of them except the TLL pre-service teacher stated that some environmental issues such as pollution, acid rain, greenhouse effect, global warming, climate change, ozone depletion, energy, and waste should be covered. The TLL pre-service teacher only mentioned prevention ideas such as recycling, tips for efficient water use and avoiding nuclear weapons.

The BIO pre-service teacher had a different idea, saying, ‘famous people’s ideas about environment, for example Bill Gates’ opinion, may gain students’ attention’.

Table 18

Responses to question 10

Q10. How would you integrate environmental issues in your lesson?

Themes	Sub-themes
Environmental issues (11)	<ul style="list-style-type: none"> - Real life examples (2) - Over consumption of resources (1) - Integrating current problems (1) - Reading, writing, and speaking activities (4) - Preparing projects (1) - Interpreting statistical data (1) - Seminars from experts (1)
Prevention (2)	<ul style="list-style-type: none"> - Use local buses, decrease the consumption of fuel (1) - Recycling (1)

Table 18 shows the responses to the tenth question coded as Q10.

For this last question in the interview the interviewees described how they would integrate environmental issues in their lessons. The BIO pre-service teacher would integrate it by using real life examples about current environmental issues in her lessons. Also, she would expect students to find some prevention ideas for the current issues. The TLL pre-service teacher would integrate it by using reading and writing activities about environmental issues. Additionally, she thought that inviting some experts on the topic might be a good idea. The MAT pre-service teacher would integrate it by giving statistical data about environmental issues to students. The ELL pre-service teacher would integrate it by doing reading and speaking activities related to environment. Lastly, the COM pre-service teacher would do some class activities in order to integrate environmental issues in computer lessons. Only two pre-service teachers (BIO & COM) mentioned prevention; they suggested using the local buses to decrease the consumption of fuel, and recycling.

The responses to the interview questions gave more information about environmental awareness and concerns of a group of pre-service teachers and their

suggestions for environmental education. The quantitative and qualitative data, relevant to each R-NEP category, are discussed together in the next chapter.

CHAPTER 5: DISCUSSION

Introduction

This study investigated the environmental awareness and concerns of pre-service teachers in the Graduate School of Education in a private non-profit university, Ankara in terms of some demographic characteristics. These characteristics were gender (female versus male), subject area (BIO, TLL, MAT, ELL, and COM), and length of time at this university (one year versus more than one year). It also investigated their ideas about environmental education.

100 pre-service teachers were surveyed using the R-NEP scale. This scale was designed by Dunlap et al. in 2000 to measure people's environmental concerns and awareness. According to the survey results, the R-NEP score of each participant was calculated in order to see their level of environmental concerns and awareness. The possible scores of each item ranges from 1 (strongly disagree) to 5 (strongly agree). There are 15 items in the scale, so the score of the R-NEP scale ranges from 15 to 75 points. A high score is related to higher environmental concerns and awareness.

The interviewees were selected according to their R-NEP score in order to find out their knowledge about the R-NEP items. There were ten interview questions in the qualitative study. Their knowledge was investigated using the first six interview questions. The questions are related to the following categories of the scale: the reality of limits to growth, anti-anthropocentrism, the fragility of nature's balance, rejection of exemptionalism, and the possibility of eco-crisis. The last four

interview questions explored the interviewee's suggestions for solutions to environmental issues and environmental education for people.

Discussion of the findings

The internal consistency of the scale was 0.67. 'The closer Cronbach's alpha coefficient is to 1.0 the greater the internal consistency of the items in the scale' (Gliem & Gliem, 2003, p. 87). Other studies had similar coefficients to the present study using the same scale. For example, Furman (1998) found Cronbach's alpha to be 0.60; Günden & Miran (2008), 0.62; Işıldar (2008), 0.62; Demirel, et al. (2009), 0.72; Erdoğan (2009), and Sam, Sam, & Öngen (2010), 0.53. Alnıaçık (2010) found the coefficient of pro-ecological viewed items to be 0.53, and the coefficient of anti-ecological viewed items to be 0.49. According to Alnıaçık the reason behind the low coefficient value in his study is the use of the Turkish version of the scale rather than the original English. In the present study both Turkish and English (original) versions of the items were written on the questionnaire.

R-NEP: Pre-service teachers' concerns and awareness

The relevant quantitative and qualitative data concerning each R-NEP category data were considered together in order to answer and discuss the first research question (What are the pre-service teachers' awareness and concerns towards environmental issues).

As mentioned previously, the scale is divided into five categories, each containing three items according to the content of the items. Three of the categories comprise

two pro-ecological views and one anti-ecological view (the reality of limits to growth, the fragility of nature's balance, and the possibility of eco-crisis). Two of the categories comprise two anti-ecological views and one pro-ecological view (anti-anthropocentrism and rejection of exemptionalism). The aim of this categorization was to arrange the items that had similar meaning together under the relevant -category. It is also to catch any inconsistency in the participants' responses to items that are viewed either as anti or pro-ecological. The results of the quantitative data showed that there are some inconsistent responses in the two categories: the reality of limits to growth and anti-anthropocentrism. Others have consistent responses.

The reality of limits to growth

The category of the reality of limits to growth includes the following (Dunlap et al., 2000):

- i1: We are approaching the limit of the number of people the earth can support
- i6: The earth has plenty of natural resources if we just learn how to develop them
- i11: The earth has only limited room and resources

The reality of limits to growth means that limits to the growth of human population exist, because natural resources are insufficient for the needs of an expanding human population. The results of the quantitative data are interesting in that they show inconsistent responses. All participants agreed that natural resources and space to live are limited whether people use them consciously or not, and that the growth of the human population may outstrip these resources. However, most of them also agreed that 'the earth has plenty of natural resources if we just learn how to develop them'. This showed that the participants do not have a good

understanding of limited natural resources. They know natural resources are limited for the increasing population but they think that people can fix it. This shows that they have awareness but they are not actually concerned about it.

A number of studies of university students have similar results to the present study, including those of Rideout, Hushen, McGinty, Perkins, and Tate, (2005), Erdoğan (2009), Sam et al. (2010), and Alniaçık (2010). This inconsistency was explained by Rideout et al. (2005) who they pointed out that item six may be misinterpreted because of the misuse of the word ‘develop’. They suggested that ‘how to use them appropriately’ can be written instead of ‘how to develop them’ in item six. Dunlap et al. (2000) stated that item six received the lowest pro-ecological view responses from 676 Washington State residents, therefore the claims of Rideout et al. (2005) may be right.

The qualitative data focusing on the category of reality of limits to growth explored the following question: Do you think earth has plenty of natural resources, and can meet all the demands of humans for many years? The responses emphasize that the earth has limited natural resources to support the needs of human beings, and that human beings not only use natural resources but also tend to destroy them through, for example, toxic waste. Başal, Durman and Çelik (2005) emphasized that natural resources are limited when they described the characteristics of natural resources on earth. On the other hand, due to improvements in technology people can benefit from natural resources longer (Başal et al. 2005).

Natural resources are limited and not sufficient for the human population which has increased year by year. As just one example, the population of Turkey was 70 million in 2011 but by 2012 it increased to 72 million. Almaçık (2010) stated that the human population of the world was 1.6 billion in 1900. It increased to 6 billion by 2000. The seven-billionth child was born on October 3, 2012. The current research shows that the participants are aware that the human population is increasing.

Anti-anthropocentrism

The category of anti-anthropocentrism includes the following statements (Dunlap et al., 2000):

i2: Humans have the right to modify the natural environment to suit their needs

i7: Plants and animals have as much right as humans to exist

i12: Humans were meant to rule over the rest of nature

Anthropocentrism is a concept meaning that humans are seen as being at the center of the world. Items 2 and 12 support the idea of anthropocentrism. Item 7 does not accept this idea so it is an anti-anthropocentric view. If people disagree with items 2 and 12, and agree with item 7, this shows that they are anti-anthropocentric.

A large number of respondents (90%) agreed with the right of plants and animals to exist. This item (7) received the most agreement, similar to other surveys (Erdoğan, 2009: 91%; Sam et al., 2010: 91.8%). The participants disagreed with item 2, the right of humans to modify nature, which was the item that received the largest number of disagreement (78%), similar to earlier research (Erdoğan, 2009: 65.1%). However, the percentages of those who were unsure (42%) or agreed (41%) to item 12 were almost equal. One can only assume that the meaning of the

statement, to rule over the rest of nature, was not clear. Due to this inconsistent result it was difficult to say whether the participants are environmentally friendly. They may well be confused or may not have spent much time thinking about this topic. They think that people cannot treat the earth as they want, neither can they modify it, but they are unsure whether humans are meant to rule the world. This means that their responses are conflicting.

The qualitative data focusing on the category of anti-anthropocentrism explored the following question: Do you think that nature exists primarily for human use? Two of the responses imply that religious belief causes them to think that nature is primarily for human use, suggesting that God created nature and the world primarily for human use. Maybe this religious belief triggers people to use the resources unconsciously and selfishly. Human domination, which means nature is primarily for human use, is also available within Christianity. Özerkmen (2002) discussed statements in the Qur'an about human dominance over nature, where it is stated that nature was created for humans. On the other hand, the Qur'an also says that people must not waste natural resources and destroy nature. When they do they will also be affected and may become ill. These kinds of statements in the Qur'an may also trigger people to protect nature.

The third interview question also focuses on the anti-anthropocentrism category: Do humans have the right to modify the natural environment to suit their needs? The responses gave reasons behind the thought (the right of humans to modify nature), namely that people generally change nature in order to build places and environments in which to live. Contrary views claimed that there should not be

environmental destruction because of the existence of other living organisms, supporting the view of that plants and animals have equal rights, and that modifications to the environment such as felling trees interferes with ongoing life and affects the habitats of other living organisms. As a result, depending on each person's viewpoint, modifications to the environment were interpreted differently. Three of them considered it positively: modifications to prevent environmental problems; two of them negatively: modifications which causing the destruction of other organisms' habitats.

Fragility of nature's balance

The category of the fragility of nature's balance includes the following (Dunlap et al., 2000):

i3: When humans interfere with nature, it often produces disastrous consequences

i8: The balance of nature is strong enough to cope with the impacts of modern industrial nations

i13: The balance of nature is very delicate and easily upset

The fragility of nature's balance contains the idea of a delicate balance of nature that can easily be upset by human interference. The destruction of habitats by any means, including industrialization, is included in this idea. Kılıç (2006) stated that technological progress is felt as a continuous pressure on nature's balance.

Although technology can increase people's standard of life, it provokes consumption of natural resources. This may cause nature's balance to be upset.

The responses to the items under this category were consistent. Agreement on items 3 and 13 and disagreement on item 8 showed that the respondents were very

much aware of the fragility of nature, which is the pro-ecological view. They think that nature is fragile and is broken if people interfere with it. Also, they think that nature cannot keep its balance under the impacts of industrial changes. However, as a group they are not convinced that this is a big problem, as approximately 25% don't know whether they agree or disagree. While the results of Rideout et al. (2005) supported the findings in that category, the results of Erdoğan (2009) did not support. In Erdoğan's (2009) study, item eight received more agreement than disagreement, showing that her respondents (university students) felt even less concern than those in this study.

The qualitative data focusing on the category of the fragility of nature's balance explored the following question: Do you think human interference endangers the balance in nature? The respondents mainly said that there are lots of examples which show human interference in nature. They mentioned the overuse of resources and contamination of natural habitats. The pollution of water, air, and soil, felling trees to construct new buildings, and lack of filters on factory chimneys, and destroying the ozone layer by using perfumes were some examples given. After such interference, they continued, people reap consequences such as global warming, climate change, and acid rain. Therefore, the responses in the interviews supported the R-NEP results and showed a high level of awareness about the fragility of nature's balance.

Rejection of exemptionalism

The category of the rejection of exemptionalism includes the following statements (Dunlap et al., 2000):

i4: Human ingenuity will insure that we do not make the earth unlivable

i9: Despite our special abilities humans are still subject to the laws of nature

i14: Humans will eventually learn enough about how nature works to be able to control it

Rejection of exemptionalism asserts that human ingenuity or other characteristics of humans do not make people exempt from the rules of nature (Dunlap et al., 2000).

According to the results of the quantitative data, man is not exempt from obeying the laws of nature but they are unsure whether man is clever enough to keep the world a livable place. The participants are not rejecting man's exemption. They agreed with the statement about the competence of human ingenuity to make nature livable, and they also agreed with the ability of humans to learn enough to control nature eventually. They rejected human exemptionalism by disagreeing with item 9. However, the percentages of being unsure, agreement, and disagreement for item 4 were close (disagreement: 41%, unsure: 35%, and agreement: 24%). Rideout et al. (2005) had similar results. Also, Erdoğan (2009) had similar inconsistency for item 4 but the percentage of agreement in his results is higher than disagreement (disagreement: 25.3%, unsure: 34.6%, and agreement: 40.1%). The reason for the inconsistent responses for item 4 may be that it includes two negative words such as 'not' and 'unlivable'. These two negative words may cause the respondents to have difficulty in understanding it.

The qualitative data focusing on the category of the rejection of exemptionalism explore the following question: Do you think humans will be able to control nature? The responses support the quantitative outcomes, emphasizing that the five

pre-service teachers think that nature may be controlled by humans with the help of current or future technology. People probably miss the important point that humans and other living organisms should adapt themselves according to the rules of nature, otherwise humans will make the earth unlivable in the future. Kılıç (2006) indicated that failure to obey the rules of nature is the reason for the increase in environmental problems, pointing out that technology and industrialization lead people to ignore natural laws.

The possibility of eco-crisis

The category of the possibility of eco-crisis includes the following (Dunlap et al., 2000):

- i5: Humans are severely abusing the environment
- i10: Human destruction of the natural environment has been greatly exaggerated
- i15: If things continue on their present course, we will soon experience a major ecological disaster

In this category, the possibility of an ecological crisis in the future because of the human destruction of nature is raised.

The results of the quantitative data predominantly showed that the responses to the three items were consistent. It was commonly considered that humans destroy nature and that this may cause a major ecological catastrophe. Also, most respondents thought that this issue is not exaggerated. This showed that they are convinced that the human population is heading for disaster. Rideout et al. (2005) and Erdoğan (2009) also found consistent responses for these three items. All

things considered, the results showed the participants' understanding of possible ecological crises.

The interviews focusing on the category of the possibility of eco-crisis explore the following question: Do you think we will experience a major ecological catastrophe? The interviewees who thought, 'human destruction of the natural environment has been greatly exaggerated' claimed that people will not experience a major ecological catastrophe, but instead classified climate change and global warming only as minor disasters. Surprisingly, global warming and climate change were not considered to be major ecological catastrophes. It seems that some pre-service teachers are not aware of the importance of global warming and climate change because of their lack of knowledge or ignorance of environmental problems and natural disasters. Others thought that we will experience a major ecological catastrophe such as drought, or environmental pollution. Kılıç (2006) claimed that nature responds to human destruction physically with events such as flood disasters, earthquakes, or tsunamis; and biologically with diseases such as cancer because of environmental pollution.

The fact that participants showed inconsistency in their responses leads one to assume that their environmental awareness was low. They did not have enough environmental awareness and concerns.

Overall, the participants showed some awareness about environmental problems but are confused about some issues for example the availability of resources. They showed little concern about the problems, for example their lack of decision about

nature's fragility. They assumed that it is someone else's responsibility to solve the problem- industry or those who will develop access to more natural resources.

Pre-service teachers' environmental concerns and awareness in terms of a few demographic characteristics

With regard to the research questions concerning differences of gender, subject-area, and length of time in a private non-profit university, Ankara, the data collected allow the following discussion:

Gender differences

By using the R-NEP scale, Işıldar (2008) examined students' environmental approach and behaviors in the Vocational School of Health Services, Gazi University, Ankara. Işıldar stated that there was no statistical difference between the environmental approach and behaviors of females and males. Işıldar (2008) also stated that studies by Arcury (1990); Stern, Dietz, Kalof and Guagnang (1995); Tarrant and Cordel (1997; and Zelezny, Chua, and Aldrich (2000), which investigated the impact of gender on environmental approach and behaviors, found no significant and consistent relationship between this parameter and environmental approach and behaviors.

Similarly, Demirel, et al. (2009) compared the environmental attitudes of males and females when they explored whether participation in recreational activities affects university students' environmental attitudes or not, using the same scale. They reported that there was no significant difference between the two genders (the number of boys was 100 and the number of girls was 122). Additionally, Arcury

(1990) studied the environmental attitude and knowledge of Kentucky residents and did not find any significant difference between environmental attitudes and knowledge of females and males. These studies all support the result of the present study in terms of gender differences.

However, there were some studies that do not support it, for example that of Larijani (2010), who examined environmental awareness of primary school teachers in India. It was stated that ‘female teachers were found to have higher levels of environmental awareness compared to male teachers’ (p.123). However, they do not give possible reasons for their differences. Another study examined the environmental attitudes of the students at African American College in Texas, conducted by Lee (2008). The author asserted that male students recycled and watched TV programs about nature more than females. This showed that male students in the college were more environmentally-minded than female students. The present study found that the female pre-service teachers had no higher environmental concerns and awareness than did the males. This is possibly because both male and female students have chosen education as a career, and thus probably all have similar interests.

Subject-area differences

The present study found that the computer education group had lower environmental concerns and awareness than the other subject groups. The difference was significant between the computer education group and the other three groups except for the Turkish language and literature group. As expected, biology pre-service teachers have higher environmental concerns and awareness

than others because some topics about the environment are covered in science courses. However, although the difference is not significant English language and literature pre-service teachers were found to have higher environmental concerns and awareness than biology pre-service teachers. It was surprising that there was not a statistically significant difference between the biology group and the other four groups. Environmental awareness and concerns of people did not appear to be related to their subjects in this study but there was a significant difference for one set of data, that from the computer education group. Computer constitutes a major part of the technology. For this reason, technology may make the computer education group become far from nature.

Similarly, Köse et al. (2011) compared different faculty groups such as engineering, medicine, economics and administrative sciences faculties according to their level of attitudes toward the environment. Medicine faculty students had the highest environmental attitudes among these three groups. The difference was found to be significant. The findings explained the reason that the medical faculty students took more science related courses such as biology during their secondary school years.

Years of a private non-profit university experience

In this category three groups were compared according to their environmental concern and awareness. The one year group had been at the university, Ankara for almost one year, the two year group for almost two years, and the five year group for almost five years. Interestingly, according to the results of an ANOVA test, the environmental awareness and concern of the one year group and the two year group were significantly higher than the five year group.

Similarly, there are some researchers who compared the environmental worldview of people in terms of other kinds of parameters. For example, Işıldar (2008) compared two groups, the first group comprised students who were first term students in the Vocational School of Health Services, Gazi University and the second of final term (three years later) students. However, there was no statistically significant difference between these two groups in terms of their environmental awareness. Sam et al. (2010) compared students' views toward environment in Uludağ University according to their level of classes (from first year students to fourth year students). The results of the test showed that there was no statistical difference between them.

The difference between these studies could possibly be the influence of a private university versus state universities. Generally, private universities in Turkey appear to have more money and facilities than state universities, and can probably afford a greater maintenance staff. At this university there is a huge number of workers who constantly clean up around students, thus creating an ideal environment.

Association with this ideal environment and fee-paying students could therefore influence the pre-service teachers to become less aware of current environmental problems and decrease their concern for the environment.

Suggestions: environmental education

This part answers the last research question, which is concerned with the pre-service teachers' suggestions about environmental education.

The participants provided some suggestions about environmental issues in terms of some of the interview questions in the following:

Q7. What are your suggestions to prevent environmental issues?

Q8. What are the best ways to increase students' awareness towards environmental issues?

Q9. Which topics should be covered by means of environmental education?

Q10. How would you integrate environmental issues in your lesson?

Environmental education was the main suggestion in order to increase people's awareness towards environmental issues. According to the interviewees, education should take place in families first, and then it should be continued in schools. Governments should integrate environmental education into schools' curriculum. Teachers, especially science teachers, should use real life examples such as the 2011 tsunami in Japan, and the associated nuclear disaster in Fukushima, and their harmful effects on human life and health in their lessons. Additionally, some topics about current environmental problems such as acid rain, environmental pollution (air, water, and soil), greenhouse effect, global warming, climate change, and ozone depletion should be covered in science lessons. Teachers should let students think about prevention methods such as raising environmental awareness, conservation of natural resources, recycling, tips for efficient water use, avoiding use of nuclear weapons, use of local buses, and decreasing the consumption of fuel. Using media was another suggestion to increase awareness. For example, making more advertisements about recycling may be helpful to turn people's attention to the importance of environmental protection.

Implications for practice

With regard to the findings of the present study there are some implications for teacher education programs, schools, curriculum designers:

- Environmental education should be integrated into teacher training programs at this university. If there is a similar absence in other teacher training programs in Turkish universities, they too may integrate environmental education into their programs.
- Some courses about the environment should take place in each subject area in teacher education; not only in biology but also in Turkish language and literature, mathematics, English language and literature, and computer teacher education so that all subject teachers become more environmentally aware and can encourage their students to have environmental awareness. This is particularly important as teachers are seen as role models.
- The university should encourage students to talk about environmental problems and participate in environmental activities. This could be done via workshops, seminars, posters, projects or clubs.

Implications for further research

There are some implications for further research:

- This study can be repeated using more than a hundred pre-service teachers and at universities in other parts of Turkey.
- It would be a valuable research project to investigate the background knowledge of pre-service teachers about the environment. For example, it can be investigated what kinds of courses about the environment teachers took during their undergraduate years.
- It would be worthwhile to explore what kind of religious beliefs affect the environmental worldview of students.

- Further research can be conducted by interviewing pre-school teachers as environmental education needs to start at an early age (Köse et al., 2011).

Limitations

There are some limitations in the present study.

- This study was conducted in only one university, and only over a short time period. The participants of the survey were 100 pre-service teachers from five subject areas.
- Only pre-service teachers in a number of subject areas were included in the study (biology, Turkish language and literature, mathematics, English language and literature, and computer education). Not all subject areas were covered as only these are offered at the university.
- Only environmental awareness and concerns were investigated; actual knowledge of the participants of the present study about environment was not investigated.
- Only five pre-service teachers were interviewed because of the limited time.
- Interviews were conducted in English which was second language for the interviewees, thus possibly restricting the detail in their answers.
- In item six, ‘how to use them appropriately’ can be written instead of ‘how to develop them’ because at the end of the study it was assumed that this might cause the participants confused about the item.
- Also, item twelve may be considered to be unclear because of the use of the words, ruling over the rest of nature.
- The number of the pre-service teachers in each subject area was not equal and the study included more computer education pre-service teachers.

REFERENCES

- Ak, S. (2008). *Search of primary school teacher candidates' towards environmental awareness due some demographic variables*. (Unpublished master's thesis). Abant İzzet Baysal University, Bolu, Turkey.
- Akça, H., Sayılı, M., & Yılmazçoban, M. (2007). Rural awareness of environmental issues: The case of Turkey. *Polish Journal of Environmental Studies*, 16(2), 177-182.
- Almaçık, Ü. (2010). Çevreci yönelim, çevre dostu davranış ve demografik özellikler: Üniversite öğrencileri üzerinde bir araştırma. *The Journal of Social and Economic Research*, 14(20), 506-532.
- Aminrad, Z., Zakaria, S. Z., & Hadi, A. S. (2011). Influence of age and level of education on environmental awareness and attitude: Case study on Iranian students in Malaysian Universities. *The Social Sciences*, 6(1), 15-19.
- Anatolia News Agency. (2011, September 20). Ecology training for teachers [Electronic version]. *Hürriyet Daily News*.
- Arcury, T. A. (1990). Environmental attitudes and environmental knowledge. *Human Organization*, 49, 300-304.
- Atasoy, E. (2005). *Çevre için eğitim: İlköğretim öğrencilerinin çevresel tutum ve çevre bilgisi üzerine bir çalışma*. (Unpublished doctoral dissertation). Institute of Social Sciences, Uludağ University, Bursa, Turkey.
- Aydemir, M. (2007). *The investigation of teachers with respect to knowledge level on environmental concepts*. (Unpublished master's thesis). Retrieved from ProQuest Dissertations and Theses.

- Başal, K., Durman, M., & Çelik, M. Y. (2005). Leading of development process; Natural process. *Muğla Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, Spring(14)*, 61-71.
- Bayram, H., Dörtbudak, Z., Evyapan Fişekçi, F., Kargın, M., & Bülbül, B. (2006). Hava kirliliğinin insan sağlığına etkileri, dünyada, ülkemizde ve bölgemizde hava kirliliği sorunu. *Dicle Tıp Dergisi, 33(2)*, 105-112.
Retrieved from
<http://www.dicle.edu.tr/fakulte/tip/dergi/yayin/11.Havakirliliginininsansagliginaetkileri.pdf>
- Bennett, E. M., Carpenter, S. R., & Caraco, N. F. (2001). Human impact on erodable phosphorus and eutrophication: A global perspective. *Journal of Bioscience, 51(3)*, 227-234.
- Constitution of the Republic of Turkey. (1982). The Grand National Assembly of Turkey. *Resmi Gazete, 32(17863)*, 2-44.
- Creswell, J. W., Clark, V. L., Gutmann, M., & Hanson, W. (2003). Advanced mixed methods research designs. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioral research* (pp. 209–240). Thousand Oaks, CA: Sage.
- Çakır, M., İrez, S., & Doğan, Ö. (2010). Understandings of current environmental issues: Turkish case study in six teacher education colleges. *Educational Studies, 36(1)*, 21-33.
- Çavaş, B., Çavaş, P., Tekkaya, C., Çakiroğlu, J., & Kesercioğlu, T. (2009). Turkish students' views on environmental challenges with respect to gender: An analysis of ROSE data. *Science Education International, 20(1)*, 69-78.

- Daniel, B., Stanisstreet, M., & Boyes, E. (2004). How can we best reduce global warming? School students' ideas and misconceptions. *International Journal of Environmental Studies*, 61(2), 211-222.
- Demirel, M., Gürbüz, B., & Karaküçük, S. (2009). Effects of recreational activities participation on environmental attitudes and reliability and validity of new ecological paradigm scale. *Spormetre Beden Eğitimi ve Spor Bilimleri Dergisi*, 7(2), 47-50.
- Doygun, H. (2005). Urban development in Adana, Turkey, and its environmental consequences. *International Journal of Environmental Studies*, 62(4), 391-401.
- Duan, H., & Fortner, R. W. (2005). Chinese college students' perceptions about global versus local environmental issues. *Journal of Environmental Education*, 36(4), 23-32.
- Dunlap, R. E., & Jones, R. E. (2002). Environmental concern: Conceptual and measurement issues. In R. E. Dunlap, & W. Michelson (Eds.), *Handbook of environmental sociology* (pp. 482-524). Westport, CT: Greenwood Press.
- Dunlap, R. E., & Van Liere, K. D. (1978). The new environmental paradigm: A proposed measuring instrument and preliminary results. *Journal of Environmental Education*, 9(4), 10-19.
- Dunlap, R. E., & Van Liere, K. D. (1984). Commitment to the dominant social paradigm and concern for environmental quality. *Social Science Quarterly*, 65(4), 1013-1028.

- Dunlap, R. E., Van Liere, K. D., Mertig, A., & Jones, R. E. (2000). Measuring endorsement of the new ecological paradigm: A revised NEP scale. *Journal of Social Issues, 56*, 425-442.
- Dunlap, R. E. (2008). The new environmental paradigm scale: From marginality to worldwide use. *The Journal of Environmental Education, 40*(1), 3-18.
- Ecology Center Organization (2010). Seven misconceptions about plastic and plastic recycling. *Ecology center*. Retrieved June from <http://www.ecologycenter.org/ptf/misconceptions.html>
- Erdoğan, N. (2009). Testing the new ecological paradigm scale: Turkish case. *African Journal of Agricultural Research, 4*(10), 1023-1031.
- Esengün, K., Sayılı, M., & Akça, H. (2006). Perceptions of environmental issues in a Turkish province. *Polish Journal of Environmental Studies, 15*(4), 635-642.
- Furman, A. (1998). A note on environmental concern in a developing country: Results from an Istanbul survey. *Environment and Behavior, 30*(4), 520-534. Retrieved from <http://eab.sagepub.com/content/30/4/520>.
- Gay, L., Mills, E., & Airasian, P. (2009). *Educational research competencies for analysis and applications*. Upper Saddle River, N.J.: Pearson Education.
- Gliem, J. A., & Gliem, R. R. (2003). Calculating, interpreting, and reporting cronbach's alpha reliability coefficient for likert type scales. *Midwest Research to Practice Conference in Adult, Continuing, and Community Education, 82-84*.
- Grass, D. S. (2008). *Assessing the impacts of air pollution and extreme weather on human health in the urban environment*. (Unpublished doctoral

- dissertation). Columbia University, New York, USA. Retrieved from ProQuest Dissertations and Theses.
- Güler, T. (2009). The effects of an ecology based environmental education on teachers' opinions about environmental education. *Education and Science*, 34(151), 30-43.
- Günden, C., & Miran, B. (2008). An application of the new environmental paradigm to determining environmental attitudes of farmers: The case of Izmir, Torbali. *Ekoloji*, 18(69), 41-50.
- Hart, P. (2010). No longer a 'little added frill': The transformative potential of environmental education for educational change. *Teacher Education Quarterly*, 37(4), 155-177.
- Hirayama, K. (2003). Corporate environmental education in Japan: Current situation and problems. *International Review for Environmental Strategies* 4(1), 85-93.
- Ibarra, J., Quílez, M. J., & Carrasquer, J. (2009). Environmental issues and ecological understanding in teachers training. *Acta Didactica Napocensia*, 2(2), 65-72.
- Işıldar, G. Y. (2008). Evaluation of the effects of environmental education on environmental approaches and behaviors of vocational school students. *Türk Eğitim Bilimleri Dergisi*, 6(4), 759-778.
- Jekayinfa, A.A., & Yusuf, A. (2004). An investigation into student teachers' views on the introduction of environmental education into the Nigerian social studies curriculum. *Institute Journal of Studies in Education* 2(1), 84-92.
- Kainth, G. S. (2009). Environmental awareness among school teachers. *The Icfai University Journal of Environmental Economics*, 4(1), 34-50.

- Kansu, Y., & Tüysüz, C. (2009). Creating an environmental awareness to high school students about waste batteries. *Journal of Natural and Applied Sciences, 13*(2), 123-127.
- Kasapoğlu, A., & Turan, F. (2008). Attitude-behaviour relationship in environmental education: A case study from Turkey. *International Journal of Environmental Studies, 65*(2), 219–231.
- Keleş, Ö., Uzun, N., & Varnacı Uzun, F. (2010). The change of teacher candidates' environmental consciousness, attitude, thought and behaviors with nature training project and the assessment of its permanence. *Electronic Journal of Social Sciences, 9*(32), 384-401.
- Khalid, T. (2001). Pre-service teachers' misconceptions regarding three environmental issues. *Canadian Journal of Environmental Education, 6*(1), 102-120. Retrieved from <http://cjee.lakeheadu.ca/index.php/cjee/article/viewFile/290/198>.
- Kılıç, S. (2006). An ecological approach to modern society. *Kocaeli Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 12*(2), 108-127.
- Kışoğlu, M., Gürbüz, H., Sülün, A., Alaş, A., & Erkol, M. (2010). Environmental literacy and evaluation of studies conducted on environmental literacy in Turkey. *International Online Journal of Educational Sciences, 2*(3), 772-791.
- Kostova, Z., Vladimirova, E., & Radoynovska, B. (2011). The environmental concern of nine grade students from a secondary professional school. *Bulgarian Journal of Science and Education Policy, 5*(1), 178-218.

- Köse, S., Savran Gencer, A., Gezer, K., Erol, G. H., & Bilen, K. (2011). Investigation of undergraduate students' environmental attitudes. *International Electronic Journal of Environmental Education, 1*(2), 85-96.
- Larijani, M. (2010). Assessment of environmental awareness among higher primary school teachers. *Journal of Human Ecology, 31*(2), 121-124.
- Lee, E. B. (2008). Environmental attitudes and information sources among African American College students. *The Journal of Environmental Education 40*(1), 29-42.
- Lovelock, B. (2010). Disability and going green: A comparison of the environmental values and behaviours of persons with and without disability. *Disability & Society, 25*(4), 467–484.
- Lundmark, C. (2007). The new ecological paradigm revisited: Anchoring the NEP scale in environmental ethics. *Environmental Education Research, 13*(3), 329-347.
- Mader, S. (2007). *Biology* (9th ed.). New York, USA: McGraw-Hill Companies.
- Monroe, M. C. (2002). Evaluation's friendly voice: The structured open-ended interview. *Applied Environmental Education and Communication, 1*, 101–106.
- Musser, L. M., & Diamond, K. E. (1999). The children's attitudes toward the environment scale for preschool children. *The Journal of Environmental Education, 30*, 23–30.
- Nasser, A. (2009). Misconceptions about environmental issues, attitudes, and environmental behavior of pre-service teachers. *Paper presented at the annual meeting of the North American Association For Environmental*

- Education, Oregon Convention Center, Portland.* Retrieved from http://www.allacademic.com/meta/p314557_index.html
- OAC- Online academic catalog-Undergraduate and Graduate Programs 2010-2011.
Retrieved from <http://catalog.bilkent.edu.tr/current/faculty/f38.html>
- Ogueri, A. C. (2004). *The need for environmental education in secondary education level in Nigeria: Problems and challenges.* (Unpublished master's thesis). Roskilde University, Denmark.
- Özerkmen, N. (2002). From anthropocentric perspective to eco-centric perspective. *Ankara Üniversitesi Dil ve Tarih-Coğrafya Fakültesi Dergisi* 42(1-2), 167-185.
- Rideout, B. E., Hushen, K., McGinty, D., Perkins, S., & Tate, J. (2005). Endorsement of the new ecological paradigm in systematic and e-mail samples of college students. *The Journal of Environmental Education*, 36(2), 15-23.
- Sam N., Sam R., & Öngen B. (2010). Investigating levels of self-esteem and environmental attitudes from the perspectives. *Akademik Bakış Dergisi: Uluslararası Hakemli Sosyal Bilimler E-Dergisi*, 21(July, August, September), 1-16.
- Stern, P. C., Dietz, T., Kalof, L., & Guagnang, G. A. (1995). Values, beliefs and pro- environmental action: Attitude formation toward emergent attitude objects. *Journal of Applied Social Psychology*, 27, 723-743.
- Strife, S. (2008). *The concrete jungle: Environmental awareness and experiences of nature among urban children.* (Unpublished doctoral dissertation). University of Colorado Boulder, Colorado, USA. Retrieved from ProQuest Dissertations and Theses.

- Şahin, E., & Tuncer, G. (2008). Science teachers: Are they key factor for a sustainable future?. *Sixth International Conference Sustainable Development, Culture and Education*, 35, Eskişehir, Turkey.
- Şama, E. (2003). Teacher candidates' attitudes toward environmental problems. *Gazi Eğitim Fakültesi Dergisi*, 23(2), 99-110.
- Tarrant, M. A., & Cordell, H. K. (1997). The effect of respondent characteristics on general environmental attitude-behavior correspondence. *Environment and Behavior*, 29, 618–637.
- Tuna, M. (2004). *Public environmental attitudes in Turkey*. (Unpublished doctoral dissertation). Muğla University Department of Sociology, Muğla.
- Tuncer, G., Ertepinar, H., Tekkaya, C., & Sungur, S. (2005). Environmental attitudes of young people in Turkey: Effects of school type and gender. *Environmental Education Research*, 11, 215-233.
- Turkish Ministry of Environment and Forestry. (2007). Environmental status in Turkey (5th ed.). Eğitim ve Yayın Dairesi Başkanlığı. Ankara, Turkey.
- Uzun, N., & Sağlam, N. (2005). Effect of socio-economic status on environmental awareness and environmental academic success. *Hacettepe University Journal of Education*, 29, 194-202.
- Ünal, N. (2008). *Pre-sevice teacher's perceptions toward global versus local environmental issues*. (Unpublished master's thesis). Middle East Technical University, Ankara, Turkey. Retrieved from ProQuest Dissertations and Theses.
- Vygotsky, L.S. (1978). *Mind and society: The development of higher mental processes*. Cambridge, MA: Harvard University Press. Retrieved from <http://www.learning-theories.com/vygotskys-social-learning-theory.html>

- Watson, K., & Halse, C. (2005). Environmental attitudes of pre-service teachers: A conceptual and methodological dilemma in cross-cultural data collection. *Asia Pacific Education Review*, 6(1), 59-71.
- Yavetz B., Goldman D., & Pe'er S. (2009). Environmental literacy of pre-service teachers in Israel: a comparison between students at the onset and end of their studies. *Environmental Education Research*, 15(4), 393-415.
- Yıldız, N. D., Yılmaz, H., Demir, M., & Toy, S. (2011). Effects of personal characteristics on environmental awareness: A questionnaire survey with university campus people in a developing country, Turkey. *Scientific Research and Essays*, 6(2), 332-340. Available online at <http://www.academicjournals.org/SRE>
- Yılmaz, R. (2009). Investigation on the environmental consciousness level in Edirne and its relations with socio-economic structures. *Journal of Tekirdağ Agricultural Faculty*, 6(1), 79-92.
- Yılmaz, S., & Öz, S. (2004). Determination of public awareness towards air pollution. *Akdeniz University Journal of the Faculty of Agriculture*, 17(2): 1301-2215.
- Yurttaş, G. D., & Sülün Y. (2010). What are the most important environmental problems according to the pre-service science teachers? *Procedia - Social and Behavioral Sciences*, 2(2), 3412-3416. Retrieved from <http://www.sciencedirect.com/science/article/pii/S1877042810005653>
- Zelezny, L. C., Chua, P., & Aldrich, C. (2000). Elaborating on gender differences in environmentalism. *Journal of Social Issues*, 56(3), 443-457.
- Ziadat, A. H. (2010). Major factors contributing to environmental awareness among people in a third world country, Jordan. *Environment, Development and*

Sustainability, 12(1), 135-145. Retrieved from

<http://www.springerlink.com/index/10.1007/s10668-009-9185-4>

APPENDICES

Appendix A: Questionnaire

Environmental Awareness and Concern of Pre-Service Teachers

A private non-profit university in Ankara, 2010

Dear Participant,

As part of my MA thesis in Bilkent University, Ankara MA CITE program, this questionnaire is designed to look for the environmental awareness and concerns of pre-service teachers by using the revised version of Dunlap, Van Liere, Mertig, & Jones (2000) Revised New Ecological Paradigm (R-NEP) scale.

The questionnaire has two parts.

Part 1: questions about your personal information

Part 2: 15 items to measure your environmental concerns

All your answers and your personal information will be kept confidential. Your answers are invaluable for my research. Thank you very much.

Researcher: Ezel TEKİN

Bilkent University

MA CITE

PART I: Personal Information

Name & Surname:

Male:

Female:

Age:

Subject Area:

How many years have you been at this university?:

Part II: Revised New Ecological Paradigm (R-NEP) Scale

1: Strongly disagree, 2: Disagree, 3: Unsure, 4: Agree, 5: Strongly agree

No		Strongly disagree	Disagree	Unsure	Agree	Strongly agree
1	We are approaching the limit of the number of people the earth can support.	1	2	3	4	5
2	Humans have the right to modify the natural environment to suit their needs.	1	2	3	4	5
3	When humans interfere with nature, it often produces disastrous consequences.	1	2	3	4	5
4	Human ingenuity will insure that we do NOT make the earth unlivable.	1	2	3	4	5
5	Humans are severely abusing the environment.	1	2	3	4	5
6	The earth has plenty of natural resources if we just learn how to develop them.	1	2	3	4	5
7	Plants and animals have as much right as humans to exist.	1	2	3	4	5
8	The balance of nature is strong enough to cope with the impacts of modern industrial nations.	1	2	3	4	5
9	Despite our special abilities humans are still subject to the laws of nature.	1	2	3	4	5
10	Human destruction of the natural environment has been greatly exaggerated.	1	2	3	4	5
11	The earth has only limited room and resources.	1	2	3	4	5
12	Humans were meant to rule over the rest of nature.	1	2	3	4	5
13	The balance of nature is very delicate and easily upset.	1	2	3	4	5
14	Humans will eventually learn enough about how nature works to be able to control it.	1	2	3	4	5
15	If things continue on their present course, we will soon experience a major ecological disaster.	1	2	3	4	5

Appendix B: Interview questions

1. Do you think the earth has plenty of natural resources, and can meet all demands of human for many years? Why or why not? (The reality of growth limits)
2. Do you think that nature exists primarily for human use? Why? Why not? (Anti-anthropocentrism)
3. Do humans have the right to modify the natural environment to suit their needs? Why? Why not? (Anti-anthropocentrism)
4. Do you think human interference endangers balance in nature? Why? Why not? (Fragility of nature's balance)
5. Do you think humans will be able to control the nature? Why or why not? (Rejection of exemptionalism)
6. Do you think we will experience a major ecological catastrophe? Why? Why not? (Possibility of eco-crisis)
7. What are your suggestions to prevent environmental issues?
8. What are the best ways to increase students' awareness towards environmental issues?
9. Which topics should be covered by means of environmental education?
10. How would you integrate environmental issues in your lesson?

Appendix C: Transcriptions

BIO

1. Do you think the earth has plenty of natural resources, and can meet all demands of human for many years? Why or why not? (The reality of growth limits)

No, I think ... the earth ... doesn't have these plenty of natural resources for all life because the human being ... consumes these resources unconsciously ... and if they keep doing this ... their ... their result, the result of this will be really bad for both human and other living organisms. Why ... why I am thinking like that because ... God ... while he is creating this world he considers... he considered everything I think and it increase both human and other living organisms and I think like that

2. Do you think that nature exists primarily for human use? Why? Why not? (Anti-anthropocentrism)

... no I don't think so because ... it's not for only human being ... again ... the God supplied all these things for everybody for everything every creatures and if he keeps being selfish ... it won't be again a good result. This is not only for just human there are many organisms in the world and they need to nurture they need to ... find a eating thing to survive

3. Do humans have the right to modify the natural environment to suit their needs? Why? Why not? (Anti-anthropocentrism)

... I think yes ... but ... he can do it the human being can do it just ... not preventing the ongoing life because ... he can change something but it shouldn't ... prevent the survivin surviving ... because ... he can do something better for earth he can change ... something in a good manner ... for example ... if they ... cut the forest area for a living place ... they can ... they can plant they can reach the area with plants in the

closed area for example if they cut something they can again add it in the environment I mean replace. So it doesn't mean that ... they can not change anything, no they can but they need to consider everything

4. Do you think human interference endangers balance in nature? Why? Why not? (Fragility of nature's balance)

Absolutely does ... because ... as I mention before ... human being really ... consumes everything especially nature it consumes everything and with unconsciously they do not think the future and they do not think the next generations ... in that situation of course ... the balance in nature destroyed and ... because of for example something such as global warming ... some changes in weather conditions, agriculture and ... all these things at last come to human and ... they have to ... stand for the results of these things. If they do this to environment to do these bad things to environment we should consider the result and I think he does. Absolutely he does. I mean he endanger the balance in nature.

5. Do you think humans will be able to control the nature? Why or why not? (Rejection of exemptionalism)

If they are educated yes ... of course they control everything ... but he need to consider ... the way that he use it for example ... they can control because lots of things they can handle but ... for example there are something which cannot be change for example the disaster ... the nature of disasters, for example earthquakes or tsunami ... dryness and these kind of things ... maybe cannot be controlled in somehow but there are something ... that we can control to prevent some these disasters

6. Do you think we will experience a major ecological catastrophe? Why? Why not? (Possibility of eco-crisis)

... I think we start to ... have this ... live this situation but it's not a natural disaster level. It's not in that level. We live these kind of things for example ... some global warming effects ... starts for example in weather conditions some researchers believe that ... the weather conditions will be colder and now we can see it ... but some researchers were disagree with that we will ... we will have some very hot weather conditions so we see some results the researchers' point we reached that but I think it's not natural disaster level. If we keep doing these things ... especially in the industry really terrible consumptions they release very bad chemicals and ... which cannot be recycled so these kinds of things ... will affect earth

7. What are your suggestions to prevent environmental issues?

Of course first of all we need to consider the education because ... if you educate a student well you will get the results in twenty years time. You know the person's education takes just twelve years and is a really long time and it starts in the family and considering that ... there are twenty years you need to educate a person that you have a chance to educate him or her so education is the first thing I think ... because it that way you can create an awareness ... of the student and when he has an awareness ... of environment you will think his future because he will have a baby in future and he will... he will live in that life and in a bad life I think nobody wants to people in that life and I think the first way of doing this is education. What else... for example advertisement thing ... it really affects for example ... people stop throwing their batteries there is a advertisement now. They can collect your ... batteries and they can recycle again. For example, there are something bottle cap for wheelchair. There are something that they can consider and people can have an idea "aha... if I do not throw it away" they can use it in that way so by this way they can have an idea.

8. What are the best ways to increase students' awareness towards environmental issues?

Of course school because it is small version of life ... considering that ... you can create an idea in the students' mind by real life examples ... if they consume the products that they use in class for example it may be really small but easier, pencils, everything that they use in class could be recycled again. If they ...if you can give this idea to them if you keep warning them they can do it just by self without having any warning. What else? For example, teacher. Teacher is a really good model in the class and ...if you do it in front of them they can observe you and ... especially in our ... in secondary education level the students are looking for a model and they really they are really ... genius and they can understand who can be a good model and who cannot be. So by your behavior as a teacher you can give this to them. This is another way. What else? ... and of course family. From now by nurturing good generations and again we come to education

9. Which topics should be covered by means of environmental education?

There are thousands ... especially but it depends on where this education is conduct. It will be conducted in high level part ... biology lesson is the best way for doing that because we just consider living things living organisms, living creatures and you can cover environment in that level. We can cover human, pollution, ... acid rain, global warming, everything. In GCSE there are wonderful topics that we cover ... on the other hand in MEB curriculum ... there is a unit called having an awareness in students about environment. So by doing these things for example adding Atatürk's idea into that thing and it can affect maybe. The famous people's ideas, for example Bill Gates's idea, it gains attention.

What else? Greenhouse effect, global warming, natural energy resources, life, environmental factors, recycling can be covered with environmental education.

10. How would you integrate environmental issues in your lesson?

... As my subject area is biology it is really easy to add ... integrate these things we are trying to deal with these issues ... if I need to give some examples for example nuclear power stations you know in Japan ... in the closest time there was an explosion and ... it really affect people now everybody ... I read a newspaper on that. It says that it will affect America in summer time because the waste which is ... which mixed in the ocean goes to American side nowadays so American people start to ... have an anxiety about that. For example we can mention about these kinds of things they can easily take an into account. What else the raise in petrol fuel price because some of students come to school by bus the service bus prices changes according to fuel price and if you just mention about this “how much petrol being consumed do you think” ... starting from daily life example you can generalize something. Integrating global warming, greenhouse effect, and disease because of the air pollution like asthma, extinction, and real life examples about them let them inquire the problems. People should prefer the local busses, decrease the consumption of fuel. By mentioning these you can easily integrate the environmental issues in your subject.

TLL

1. Do you think the earth has plenty of natural resources, and can meet all demands of human for many years? Why or why not? (The reality of growth limits)

I think that the earth has plenty of natural sources but it does not mean that they will be enough for human for many years...because population is growing day by day and unfortunately people has not an awareness of this serious situation. People just focus on consuming unfortunately. That's all.

2. Do you think that nature exists primarily for human use? Why? Why not? (Anti-anthropocentrism)

I think this idea is a little bit like egocentrism.....There is a wonderful harmony in nature. We are also involved in this harmony as people but we are just a part of this system. Nature does not exist for only humans.

3. Do humans have the right to modify the natural environment to suit their needs? Why? Why not? (Anti-anthropocentrism)

I think no.... Nature is over human ... it is impossible that people rule the nature. People should adapt themselves in terms of conditions of nature... actually.

4. Do you think human interference endangers balance in nature? Why? Why not? (Fragility of nature's balance)

... Yes, I think so... I really have a respect for natural harmony. I think so because there are some evidences... For instance water, air, earth pollution; over population, contamination of underground water...etc. and I think that nobody has a right for ruining this harmony. People should stop to control the nature.

5. Do you think humans will be able to control the nature? Why or why not? (Rejection of exemptionalism)

...Yes, but unfortunately yes. Technology develops day by day and people are not enligh.... enlightened about the thread. Nature alerts and very few people are aware of this situation.

6. Do you think we will experience a major ecological catastrophe? Why?
Why not? (Possibility of eco-crisis)

Yes. I think so... Water resources are under thread. People pollute all natural resources especially factories. I think Capitalist system has not a respect for nature.

7. What are your suggestions to prevent environmental issues?

...We should raise awareness of people. I think this is the most important thing. Especially in Turkey, people has a habit on throwing rubbish in the grounds. We can all see around a lot of people in around... It's the simple thing! People don't care about the nature. They don't think about their grandsons' life... future life.

8. What are the best ways to increase students' awareness towards environmental issues?

Ok. Actually I am not a science teacher of course ... of course science teacher has develop wonderful class activities of field trips or something like that but children should be aware of the situation. I think it is the most important thing. ...Even I am a literature teacher, I can develop some environmental activities on reading or writing. It's possible. Every teacher can do something about it. I think that we can develop activities about environmental issues.

9. Which topics should be covered by means of environmental education?

For example... Pollution, importance of natural resources, animals in danger in ext.... sorry ... extinction etc.

10. How would you integrate environmental issues in your lesson?

As I said before, I am a literature teacher but I can use some activities on writing or reading about environmental issues. We can organize some conversations about the environmental experts. It is possible

I can... I can want students to write an article about pollution, natural resources or collecting and sharing current news about environmental issues. We can do something.

MAT

1. Do you think the earth has plenty of natural resources, and can meet all demands of human for many years? Why or why not? (The reality of growth limits)

...Yes, I think that the earth has plenty of natural resources. However, all demands of human cannot meet for many years because using these resources unconsciously will destroy the earth and after years passed we will not probably get our demand from the nature.

2. Do you think that nature exists primarily for human use? Why? Why not? (Anti-anthropocentrism)

...Yes, I think nature exists primarily for human use because nature was created for humans however human beings should protect it for their life.

3. Do humans have the right to modify the natural environment to suit their needs? Why? Why not? (Anti-anthropocentrism)

I think that this is a difficult one to answer because for many reasons human beings have right to modify to suit their needs because people should modify the natural environment to live in a sufficient and well planned places, which require to modify the nature in some ways.

4. Do you think human interference endangers balance in nature? Why? Why not? (Fragility of nature's balance)

... Yes, human interference endangers balance in nature because human cannot predict the consequences if they make something for their needs ... and they are also unaware of the importance of the nature. Therefore, this can cause an unbalanced situation in nature.

I think that people cannot know nature balance that means people only fell down trees, use water, construct new buildings etc. without think the nature.

5. Do you think humans will be able to control the nature? Why or why not?

(Rejection of exemptionalism)

...Yes, humans will be able to control the nature... Humans started to destroy the nature with the help of technology and using natural resources unconsciously. This control causes some bad effects to our nature such as air pollution since while constructing buildings people usually destroy the nature by felling down trees, using petrol, which cause air pollution. We can also extend this example for water contamination and other pollutions.

6. Do you think we will experience a major ecological catastrophe? Why?

Why not? (Possibility of eco-crisis)

Yes, I think that we will experience a major ecological catastrophe because if the destruction continues then we will probably deal with a big natural disaster. Maybe tsunami can be an example.

7. What are your suggestions to prevent environmental issues?

I think that every... everybody should take some precaution to prevent our nature. For example, environmental education can be a suggestion. ...They should think the side effects to balance of nature while over using water, washing dishes or clothes, driving cars.

People should try to decrease the levels of water contamination, air pollution etc.

We should also inform people to prevent our nature about these topics.

8. What are the best ways to increase students' awareness towards environmental issues?

...In the lessons, students should prepare some work about our nature. They should make some projects about natural disasters by humans to understand the facts. This will contribute their learning about nature.

9. Which topics should be covered by means of environmental education?

I think that in biology lessons there are many topics that cover environmental issues. These topics should be covered. For example, air pollutions, global warming, water contamination. ...These topics can be appropriate topics to cover to provide students understand the environment and our nature.

10. How would you integrate environmental issues in your lesson?

... This is about my lesson. I will probably give some data, which are commonly about nature and environmental issues. I will sometimes give some graphs about natural disaster and sometimes water contamination data in a year to interpret them. This will provide student interpret the nature with numbers and they will probably understand environmental issues clearly with the help of numbers.

ELL

1. Do you think the earth has plenty of natural resources, and can meet all demands of human for many years? Why or why not? (The reality of growth limits)

I think that natural resources can meet all demands of human beings, however, the way people consume them may cause big problems in the near future. Considering the consumption, people overuse resources or waste a big part of it in a short time. On the other hand, it seems to me that chemicals, rubbish dumps, nuclear waste, and environmental contaminants stimulate the waste of natural resources. So, I think that the resources are limited and human being.. humans should be careful about consuming them. that's all I can say

2. Do you think that nature exists primarily for human use? Why? Why not? (Anti-anthropocentrism)

Well, ... I do not have background knowledge to give a certain idea. However, if we think that human beings need nature to survive and remain alive, it seems like nature has a big function for human use. So, we have a right to use.. to make use of nature as human beings

3. Do humans have the right to modify the natural environment to suit their needs? Why? Why not? (Anti-anthropocentrism)

To some extent the answer could be yes, humans.. because humans can modify the natural environment to suit their needs. The reason is that we share this planet with nature I mean animals, plants, and geological structures like mountains, oceans, and rivers, so that humans cannot meet their needs smoothly without modifications. For example, if the population overgrows in a certain place, people may spread to a certain place to live.. to another place to live. So I can give another example which

is also related to that, if there is a natural disaster that happens beyond the control, people have to find a solution to help themselves and this could be like to make use of a virgin territory like forest or land. so we .. we have a kind of right to modify the natural environment because we cannot survive if we don't modify it

4. Do you think human interference endangers balance in nature? Why? Why not? (Fragility of nature's balance)

Yes, human interference endangers balance in nature. The reason is that people overuse the resources and contaminate them in a short time. This causes insolvable problems like dryness and animal extinctions. So I really think that people endanger balance in nature.

5. Do you think humans will be able to control the nature? Why or why not? (Rejection of exemptionalism)

I do not think that humans will be able to control the nature because people do not seem to have the technology to change the time of rain or manipulate climatic events. I don't think so we have a such a big power to control the nature

6. Do you think we will experience a major ecological catastrophe? Why? Why not? (Possibility of eco-crisis)

I think that there would be a catastrophe in distant future. However, I really do not expect a major ecological catastrophe ... like the removal of a continent or a clash of planets in near future. If there occurred a catastrophe in nature, the interference of human could be the reason. So ... I think that humans have a bad effect on nature so in the near future we have not a big ecological catastrophe but a minor ecological catastrophe in the future

7. What are your suggestions to prevent environmental issues?

... .. we can find many suggestions to prevent environmental issues. but for ..in my opinion primarily, raising environmental awareness is a suggestion and educating young people and Furthermore if we educate young people, this means that they will raise their children with this consciousness in the future so I believe in that people will if people have this consciousness they will affect others like their friends their parents or other friends so we should educate young people and another suggestion could be using of media Media is another way of promoting protecting environment for instance public figures, famous authors, TV programmers can be included to make some campaigns related to environmental.. environment protection. Lastly, my last suggestion is that people should expect to be respectful to nature in society, so in societythey should internalize acting in a protective way to nature, instead of just talking about it so that's all

8. What are the best ways to increase students' awareness towards environmental issues?

... .. If we consider students.. Governments has a big role in you know changing in curriculum students so governments should integrate environmental education with curriculum so that teachers can smoothly include such topics in classroom activities instead of making up on a day and forgetting about it another day and raise students with that awareness because it is in the curriculum they are required to do that and Another way could be to take action to protect environment with big projects like planting trees and protecting forests in town.

9. Which topics should be covered by means of environmental education?

In my opinion, recycling,tips for efficient water use and avoiding nuclear weapons

10. How would you integrate environmental issues in your lesson?

... .. Okey. I would cover reading text related to environment as I will be teaching English classes in the future. I think I can cover like such texts and such bookswhich are related to environment and I can also make some project works to have students make research and show their understanding of environmental problems. another 11.. idea could be coming up with environmental topics in speaking classes because we really have to take care their speaking so if I come up with such topics I think pupil will have vision of environment in my classes so that's all I can say.

COM

1. Do you think the earth has plenty of natural resources and can meet all demands of human for many years? Why or why not? (The reality of growth limits)

I do not think that the earth can meet all demands of human for many years, ... because humans have damaged the whole resources. In fact, the earth has plenty of natural resources, but I believe that the needs of people are very much and they have consumed resources so fast.

2. Do you think that nature exists primarily for human use? Why? Why not? (Anti-anthropocentrism)

I believe that nature exists for not only human use but also the whole alive because of the natural balance. We can consider natural balance as ecosystem. This system can indirectly be beneficial for humans, but it is not for only human life in basic.

3. Do humans have the right to modify the natural environment to suit their needs? Why? Why not? (Anti-anthropocentrism)

Humans do not have the right to modify the natural environment to suit their needs, because there are lots of alive on the world. I believe that other alive ... alives also have a right to benefit from the resources of nature like humans. However, none of them have a right to over consume the resources. They should protect the balance.

4. Do you think human interference endangers balance in nature? Why? Why not? (Fragility of nature's balance)

I think that human interference endangers balance in nature, humans use... lots of things, which have damaged the nature, and they have not taken some pre.... precautions to reduce their harms. For instance, there are lots of factories, which do not have filters on their chimney. Also, humans have damaged ozone layer while

using perfumes. And ... also there are lots of examples can be given about the attitudes of humans against nature.

5. Do you think humans will be able to control the nature? Why or why not?

(Rejection of exemptionalism)

I don't think so. ... I don't think so... humans will be able to control the nature ...I think that the crucial point is that nature has limited resources to use. I believe that humans consume more resources than nature can provide to use for them.

6. Do you think we will experience a major ecological catastrophe? Why?

Why not? (Possibility of eco-crisis)

I think we will experience ...major ecological catastrophe because humans have damaged the balance of nature. For instance, damaging balance in nature causes climate change, which affects the balance in weather condition.

7. What are your suggestions to prevent environmental issues?

People needs to be more educated about environmental factors. I think that media should be beneficial to achieve this goal, which is related to both teach people how to protect environment and lead them to understand what they should avoid from. This precaution can enable people to increase the awareness of environmental issues.

8. What are the best ways to increase students' awareness towards environmental issues?

I believe that ... the .. best way depends on target group. For instance, if the target students are between 4 and 6 years old, teachers have given them to information as a story mode. Then, they should lead them to apply what they have learnt before. Teachers give them examples to enable them to understand how serious issue it is via activating their sheme... schema. Also, I think that childhood

period is the best one to learn this kinds of crucial subjects and an upswing in the awareness of them. On the other hand, for other kinds of students, who are at high school, they should observe, apply, research and ... the teacher should lead them to activate these actions. Finally, for all groups of these students, parents should need to educate their children, because education basically start at family.

9. Which topics should be covered by means of environmental education?

The topics should be covered by means of environmental education can be.. should be reduce, reuse, recycle, climate change, energy, waste, pollution, ozone depletion and etc.

10. How would you integrate environmental issues in your lesson?

I prepare some ...when.. I want to integrate environmental issues in my lessons I prepared some activities related with the environmental issues and explain it with some real life examples to enable them to match the examples with their life and cover the importance of the topic. For instance, when I base on... based on the recycling as a topic and teach children, I give them some examples related with bad smells of the garbages cause long-lived materials to be exposed to those smells for a long years. Explanation of the example is that this should lead us to separate long-lived materials and directly recycling. Then, I can explain the aim of the recycling. That's it.