INVESTIGATION OF PERCEPTIONS OF HIGH SCHOOL TEACHERS ON ENVIRONMENTAL EDUCATION AND ENVIRONMENTAL KNOWLEDGE LEVEL OF THEIR STUDENTS

by

Serena Kürkçüoğlu

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To my first love, Hırant Kürkçü

To my posh and hot granny, Armen Kürkçü

You will always be in my heart.

I love you so much.

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In recent years, there has been an increasing concern in environmental education policies in Turkey. With the addition of the environmental learning objectives to the high school curricula, which started to be revised in 2008, the students are expected to graduate with high skills of environmental literacy. However, nationwide implementations of the new curriculum of geography, biology, chemistry, and physics have not been reported. The views of teachers, who are the most important person in the curriculum implementation process, can be important factors to identify problems encountered.

This study was conducted to investigate high school teachers' opinions on the revised curricula of physics, chemistry, biology, and geography lessons as well as self-criticisms of their competency for environmental education. The study also analyzes environmental knowledge questionnaires given to 12^{th} grade students who were taught the new four year high school curricula.

The sample included 20 teachers who were given semi-structured interviews about the integration of environmental issues into their lessons. The teachers were working in three different private high schools in Istanbul and 161 students of these teachers were applied a questionnaire which let them rate themselves on environmental means and assess their knowledge. The interviews and questionnaires were statistically analyzed.

As a conclusion, the self-efficacy of teachers in environmental education tends to be low, that is because the number of courses with environmental content is inadequate and sufficient attention is not paid to the environmental issues in teacher education. However, the suggested hours to spend for environmental topics for each subject lesson are generally more than 20% of the total lesson hours. This study concludes the need of both pre-service and in-service environmental education competency.

ÇEVRE EĞİTİMİ ÜZERİNE LİSE ÖĞRETMENLERİNİN ALGILARININ VE ÖĞRENCİLERİNİN BİLGİ SEVİYELERİNİN ARAŞTIRILMASI

Türkiye'de son yıllarda çevre eğitimi politikalarına verilen önem gittikçe artmaktadır. Çeşitli çevre kazanımlarının 2008 yılında başlayan değişiklikler ile lise müfredatlarına eklenmesinin etkisiyle, öğrencilerin yüksek çevre okur-yazarlığı becerisiyle mezun olmaları amaçlanmaktadır. Ancak henüz fizik, kimya, biyoloji ve coğrafya derslerinin yeni müfredat uygulamaları ülke çapında raporlanmamıştır. Bu anlamda müfredatı uygulayan en önemli kişi olan öğretmenlerin görüşleri, yaşanan problemleri tanımlamada önemli olabilir.

Bu çalışma, lise öğretmenlerinin fizik, kimya, biyoloji ve coğrafya müfredat değişiklikleri hakkında fikirlerini araştırmak ve çevre eğitimi konusunda yeterlilikleri yönünden özeleştiri yapmalarını sağlamak amacıyla yapılmıştır. Ayrıca çalışmada, dört senelik yeni müfredatın ilk mezunları olacak 12. sınıf öğrencilerine uygulanmış çevre bilgisi ile ilgili bir ölçek kullanılmıştır.

Örneklemi oluşturan 20 öğretmene, çevre eğitiminin ders programlarına bütünleştirilmesini konu alan yarı yapılandırılmış görüşme yapılmıştır. Öğretmenler, İstanbul'da yer alan üç farklı özel okulda çalışmaktadır. Bu öğretmenlerin 12. sınıfa devam etmekte olan 161 öğrencisine de kendilerini değerlendirebilecekleri ve çevre bilgilerini ölçebilecekleri bir anket uygulanmıştır. Öğretmen görüşmeleri ve öğrenci ölçekleri istatistiksel olarak değerlendirilmiştir.

Sonuç olarak, öğretmenlerin çevre eğitimi konusundaki öz yeterlilikleri düşük çıkmıştır. Bunun sebebi, öğretmen eğitiminde çevre ile ilgili derslerin içeriklerinin ve sayılarının yetersiz olması ve bu konuya çok fazla önem verilmemesi olabilir. Ancak, ilgili derslerin müfredat programlarında, çevre içerikli konulara önerilen süre, toplam ders süresinin ortalama %20 sinden fazladır. Bu çalışmanın sonuçları hem hizmet içindeki öğretmenlere hem de aday öğretmenlere çevre eğitiminin verilmesi gerektiğini ortaya koymaktadır.

TABLE OF CONTENTS

ANSWER DISTRIBUTION FOR EACH ITEM)

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

One of the most widely-spoken topics of today is environmental education throughout the world. “Sustainable development” became a very popular term due to the threatened future of the Earth. “Sustainable development requires active and knowledgeable citizens and informed political and economic decision makers capable of making the right choices while taking necessary complex interrelated economic, social, and environmental decisions” (UNESCO, 1997; p.7). Today, many countries list the environmental education as one of their agenda items. It is believed that environmental education and environmental literacy will overcome the problem of sustainability (Teksöz et al., 2010).

Environmental education has a broader definition since it embraces ecological issues, development practices, and social concerns (Grodzinka-Jurczak et al., 2006). It is the education for sustainable living practice and lifestyles. It is a process of developing the skills and behavior necessary to understand and accept the relationship between people, culture, and the natural environment, whose aim is to prepare people either youth or adults in practical decision-making and to teach environmentally friendly behavior. Environmental education should therefore be a fundamental and integral part of education for all members of the society.

Teachers play important roles in advancing environmental education efforts and the environmental literacy of future generations (World Commission on the Environment and Development, 1987). Teachers are the key factors to ensure that their students, who are the citizens of the future, get adequate knowledge to preserve and conserve the environment. It is necessary for teachers to have knowledge about the environment in order to give environmental education to students effectively. Also, it is important to be conscious about sustainable development in order to give them environmental awareness.

The teacher training programs are very important for the development of the teachers of the future. Education at university level should be adequate for preparing teacher candidates be ready to supply effective environmental literacy to their students. In most countries, Education Faculties of universities do not open courses –it is neither obligatory

nor elective- on environmental education. For example, there are fourteen Education Faculties (Appendix A) which include secondary school education departments throughout Turkey. By investigating the official websites of each fourteen faculties, there are no special environmental education courses inside the secondary school education departments' programs related to revised high school curricula. So it is obvious that teacher candidates do not graduate from universities with adequate knowledge and skills about environmental issues.

Teacher knowledge has always been an integral component in developing environmentally literate students and thus, the success of a formal environmental education in schools highly depends on the knowledge that teachers have. In order to promote and teach environmental education across the curriculum, regardless of their special branch, teachers should have adequate knowledge and understanding of the relevant environmental concepts.

1.1. Statement of the Problem

Various institutions and foundations started to give priorities to environmental education for literacy and sustainability since 1970's. The very first steps are taken in the kindergartens and primary schools. Parallel to new emerging environmental problems and the need to educate young population about these problems, Primary School Science and Technology Curriculum was revised in 2005 (ttkb.meb.gov.tr/program.aspx). Currently, children are growing up with much more awareness of the problem of sustainability right from the school, media, and daily life activities.

The curriculum revision continued in 2008 with 9^{th} grade physics, chemistry, and biology curricula. Each following year revisions were made with the next grade. The revisions adapted the proper lesson units and also added extra units to a 4-year high school program and included several environmental objectives. On the other hand, geography lesson is also very relevant to environmental concerns and it is essential in the means of understanding nature and environment. So these four subject lessons are selected in this study to be analyzed from the point of environmental education in high school. While

searching the content of the environmental objectives, the adequateness of teachers was considered.

Changing the curriculum without proper teacher training is not going to be effective. The problem arises when the teachers feel themselves inadequate or anxious. Even though the new curricula include environmental content, many education faculties do not have any environmental education courses to train teacher candidates.

1.2. Purpose of the Study

The main purpose of this study is to analyze the teachers' ideas about the revised curricula and self-criticism of their adequateness in environmental education. The study also includes an analysis of environmental knowledge of 12^{th} grade students who are the first generation exposed to the four year high school curricula.

1.3. Significance of the Study

Since currently environmental literacy is a widely spoken topic in the world, there should also be some educational development in Turkey in the means of environmental education. This study will give a perspective on the ideas of Turkish high school teachers according to their self-efficacy in teaching environmental topics. Regarding these ideas, there will be a list of needs to improve the education system in Turkey.

While finalizing this thesis, suggestions for further development of environmental education will be given.

2. LITERATURE REVIEW

2.1. Environmental Knowledge and Literacy

Environmental education gained international recognition in the 1972 United Nations Conference on Human Environment in Stockholm, Sweden. Participants at the United Nations Education, Scientific, and Cultural Organization UNESCO workshop, proposed a global framework for environmental education, referred to as the Belgrade Charter. The Charter's goal statement for environmental education has been generally accepted by professionals in the field. The Charter (1975) states:

> "Environmental education should constitute a comprehensive lifelong education, responsive to changes in a rapidly changing world. It should prepare the individual for life through an understanding of the major problems of the contemporary world, and the provision of skills and attributes needed to play a productive role towards improving life and protecting the environment with due regard given to ethical values.
>
> The goal of environmental education is to develop a world population that is aware of, and concerned about the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones."

The world's first intergovernmental conference on environmental education was organized by UNESCO in cooperation with the U.N. Environment Program (UNEP) and was convened in Tbilisi, Georgia in 1977. The Tbilisi declaration mentioned the important role of environmental education in the preservation and improvement of the world's environment, as well as in the sound and balanced development of the world's communities. In this declaration the role, characteristics, and the objectives of environmental education were constituted. The objectives of environmental education included awareness, knowledge, attitudes, skills, and participation.

To obtain an effective environmental education, the level of environmental knowledge and literacy of teachers are very important. There are some studies done

previously on environmental literacy of pre-service teachers as well as in-service teachers in Turkey and in the world.

A study was done by Teksöz et al. (2010), who examined the relationships among the sub-dimensions of environmental literacy. They administered an "Environmental Literacy Questionnaire" in the Education Faculties and analyzed the data according to four dimensions: environmental knowledge, environmental attitudes, environmental uses, and environmental concerns. The results showed that although the environmental awareness of pre-service teachers was high, their environmental knowledge scores were unacceptably low.

A study done by Che Kalbi (1999) in Malaysia showed that teachers' knowledge on the environment was between moderate to high level. In another cultural context, Hsu and Roth (1999) assessed Taiwanese secondary teachers' environmental literacy and the teachers' environmental behavior. It is found that Taiwanese teachers have positive environmental attitudes and high level of environmental sensitivity. The results also showed that Taiwanese teachers' knowledge of environmental action strategies; environmental responsibility and environmental attitudes were the best predictors of their intention to engage in responsible environmental behavior.

Research in various countries has shown that knowledge about environment is related to teachers' attitude, confidence and willingness in implementing environmental education in their teaching. When teachers clearly have a negative attitude towards the environment, they show less confidence when teaching environmental concepts (Skanavis, 2001). In contrast, teachers who received training in environmental education, and so have a better understanding of the concepts, have a positive attitude towards teaching and willing to integrate environmental education in the curriculum compared to the ones who do not receive training (Wilke, 1985).

2.2. Self-efficacy of Teachers in Environmental Education

Self-efficacy is defined as people's judgment about their own capacity to manage activities necessary to perform at a certain level, and their ability to carry out these

activities successfully (Bandura, 1986.) Self-efficacy influences a person's ability to initiate a task and to succeed at it.

In all kinds of education, teacher self-efficacy is one of the most important elements, which affects both teachers' and their students' performances. Teachers with high levels of self-efficacy beliefs show more effort in teaching; they are more enthusiastic about teaching their subjects; and they are more successful in adopting the appropriate teaching and learning techniques (Hoy and Woolfolk, 1993).

Self-efficacy theory predicts that teachers with a high sense of efficacy work harder and persist longer even when students are difficult to teach, partly because these teachers believe in themselves and in their students (Woolfolk, 1998). The students of teachers who have high self-efficacy show high academic achievement than the students who have teachers with lower self-efficacy perception levels (Chambers and Hardy, 2005). According to Good and Brophy (2003), teachers with high self-efficacy perception levels maintain student participation at a higher level through spending more time keeping track of their students, supervising their works during a lesson, and providing them with group works and collaborative tasks.

In a study done by Çimen at al. (2011), some pre-service biology teachers' self-efficacy belief levels in environmental education were investigated by a survey. The results show that the level of self-efficacy beliefs of teachers is high. The mean self-efficacy score of female biology teacher candidates is a little bit higher than the mean score of male candidates but the scores do not show any significant variation ($t_{(59)}$=.0082; p>.05). Also, it is found that there is a significant correlation between the self-efficacy level of teachers and the number of years in training. The mean self-efficacy belief scores of first-year and fifth-year biology teacher candidates show significant variation ($t_{(59)}$=2.989; p<.05).

According to another study, it was found that the level of self-efficacy beliefs of teachers was not significantly correlated with the variable of sex (Aydın and Boz, 2010).

2.3. Teacher Training in Environmental Education

Teacher training in environmental issues is very important, but it is more important how they reflect these issues to the students. This issue has been discussed throughout the world. According to a study done in Malaysia by Mageswary et al. (2006), the level of environmental knowledge among students reported to be high but still not sufficient to contribute to the change in attitude and their behavior. Teacher adequacy directly affects the students' knowledge and attitude, so it can be stated that teacher training programs are very essential for effective environmental education.

Environmental educators have observed that "…teacher education programs in environmental education remain relatively scarce and poorly developed" (Disinger and Howe, 1990). At the international level, the Center of Education Research and Innovation of the Organization for Economic Cooperation and Development (OECD) undertook an in depth study of environmental education policy development in five OECD countries which are Austria, Australia, Finland, Germany, and Norway (OECD, 1995). According to this study, it is found that teacher training in environmental education is the weakest point in the teacher training programs in all five countries. The study also stated that few teachers thought that they were well prepared for teaching environmental issues.

Finland is one of the leading countries in effective and equal education, which can be proved by looking at the high scores of PISA (the Program for International Student Assessment). In Finland, teacher training programs on environmental education started since 1990's. Finland's Ministry of Education sponsored the development of an environmental education course for practicing teachers at the beginning of 1990's. One to three persons from each teacher training unit at various universities and training schools attended a tutor training session (Kapyla and Wahlstrom, 2000). In fall 1993, the tutors started to lead study groups in their departments to help their colleagues implement environmental education practices as a part of a teacher education curriculum. The goal of the study was to train a significant number of the teacher trainers. The evaluation of the study was done according to those criteria: a) the effectiveness of the implementation process; b) the impact of the program on the views and theoretical thinking of the teacher trainers on aims, contents, and methods of environmental education; c) The changes in

environmental education practices and pro-environmental actions of teacher trainers; d) the factors that facilitated or hindered the implementation of the program by tutors. The most important evaluation aspect was the practice whereas the final aim in the study was to create an advanced model of environmental education to be used in large-scale in-service teacher training. This had worked well and they created new teaching materials, enhanced teaching practices and helped many teachers to incorporate environmental education into their subjects.

A study done by McKeown-Ice (2000), aimed to assess the status of environmental education in pre-service teacher education programs in United States. This assessment was done by a survey which was sent to several teacher training institutions. According to the survey results, the most influential factors in determining the nature of the environmental education component were ranked as faculty interest or knowledge and state certification guidelines by the respondents. The respondents were also asked to rank the barriers to environmental education at their institution at the pre-service level. Limited course time conflicting with mandated course content was the major barrier. Also, they were asked to evaluate their institution's effectiveness related to environmental education. About two-thirds of the respondents rated their institutions as poor to adequate.

Several questions in the survey addressed the institutionalization of environmental education in the teacher preparation program (McKeown-Ice, 2000). Few colleges and universities across the United States offered a major, minor, concentration, specialization, or even a course in environmental education and required environmental education experience in their coursework or field experiences. All schools required pre-service teachers to take coursework in the natural and social sciences; however less than one-third of the responding institutions give students a background in environmental issues. About one-third of responding institutions had one full-time and/or part-time faculty member who specialized in environmental education, whereas about half had none.

The same study indicated the most frequently used instruction methods for environmental education. Discussion, problem solving, and critical thinking led in secondary programs, whereas integration across the curriculum, problem solving, critical thinking, and cooperative learning led at the elementary level.

A major question among environmental educators is whether environmental education should be integrated into the curriculum or taught as a separate course. The survey (McKeown-Ice, 2000) which was applied to teacher training institutions revealed that pre-service environmental education was usually integrated into coursework, primarily into science lessons. According to this study, it was understood that the environmental education component of the teacher-preparation program at many institutions was driven by only one person. Because environmental education was not institutionalized, its presence in the curriculum was at the mercy of the continued employment of one person.

Same study indicated that in many teacher training institutions, only students specializing in science education are introduced to environmental education at the secondary level. However, at the elementary level of majority of the students are required to take science or general methods that more frequently include environmental education. Prior to the survey, the research team observed that advisors at some institutions recommend that students who are interested in teaching environmental education enter science education. To determine if this observation was true, they added a question to the survey, "if a student expresses an interest in teaching about the environment, which program does your institution advise that she/he enters?". The results showed a strong bias for science.

North Carolina was the first state in the United States to have a statewide environmental education certification program. The purpose of this program is to recognize and honor educators who complete a required number of professional development experiences in environmental education (North Carolina Department of Environment and Natural Resources, 1995). The certification program consists of principles, concepts and objectives of environmental education. The first part of the program describes the goals, definitions, characteristics, evaluation, and development process of environmental education in North Carolina. The second part of the program includes the in-service and pre-service teacher education, higher education, curriculum correlation, environmental data, evaluation, environmental education centers, government agencies, funding, partnership, the media, and adult education. A study was done by Bennet and Matthews in 2005 to evaluate the certification program. Findings indicated that most of the environmental education certified teachers have been teaching between 10-20 years. This

shows that teachers do not enter into ambitious undertakings, such as seeking environmental education certification until they are well established in their careers. This has important implications for environmental education teaching practices. Unless teachers receive pre-service environmental education in their teacher education programs, such as at universities, they may spend at least ten years of their teaching careers without the benefit of formal methods and materials on teaching environmental education.

In another study done in United States, it is mentioned that teacher education institutions were forced by state legislations and state boards of education to include numerous courses in general and professional education, leaving little room for specialty areas such as environmental education (Plevyak, 2001). Moreover, finding a place for environmental education in pre-service teacher institution programs was difficult because instruction comprises not only the natural sciences, but also social, political, and economic concepts. Thus, environmental education content and methods usually are included in pre-service curriculum within the context of science and social studies method courses.

Lane et al., in their 1996 analysis of Wisconsin's state-mandated environmental education requirement concludes that a more in-depth study should be performed to investigate the environmental education approaches and strategies used by teacher education institutions. The research that has been done in this area indicates that a more practical initial strategy for incorporating environmental issues into the curriculum may be through integration into existing program formats rather than a radical restructuring to incorporate separate environmental education courses.

An environmental education course design was organized in a study done at a university in Israel. Pe'er et al. (2007) indicated that environmental knowledge of students in teacher training programs in Israel is low. As a consequence of inadequate teaching about environment in Israeli high schools, only some students, mainly in biology and chemistry education, are expected to have some conceptual knowledge about the environmental issues.

In an article published in 2010, it is indicated that an environmental education course was designed for both practicing teachers and non-formal educators in Northern Kentucky

University, USA (Kelley, 2010). To meet the needs of teachers and non-formal educators, the following criteria for course design were developed:

- Focus on facts and key concepts related to understanding environmental problems and solutions.
- Present material at an introductory level to accommodate the variable background of course participants.
- Dedicate a significant amount of class time to demonstrating resources: the Internet, videos, field trips, hands-on activities, local outdoor education areas, and presentations by local environmental professionals.
- Provide course participants the opportunity to incorporate information learned in the course into lesson plans.

The course was open to teachers seeking an environmental education endorsement, senior in science (i.e. biology, chemistry, and geology) education programs and nonformal educators. Nearly 50% of the class time was dedicated to laboratory and field trip activities. As a conclusion, it was reported that the lecture, laboratory, field trip, and open laboratory course design proved to be a successful method for delivering a graduate course for environmental educators. At the end of the semester, fifteen of sixteen students who took the course filled the evaluation forms. All of the feedbacks were positive.

Considering the above mentioned studies, it can be concluded that some action plans should be put in practice for greater inclusion of environmental education in pre-service education. The following themes have emerged most consistently:

- *Faculty development:* The capacity of the education faculties should be increased and open environmental related educational courses for training teacher candidates who are capable of and inspired to integrate environmental education into their courses.
- *More practice in the classroom:* Through hands-on activities and field trips, pre-service teachers can feel more comfortable and be motivated by the energy and enthusiasm children have for natural world.

- *Interdisciplinary education:* Cooperation is needed among environmental educators, teachers and school administrators to achieve multiple educational goals.
- *The role of professional organizations:* Governmental or nongovernmental organizations should increase their participants in their conferences and seminars including education faculty from teacher training programs.

2.4. The Role of Curriculum in Supporting Environmental Education

The curriculum plays an essential role as preparing a learning environment. So the curriculum should be suitable for the teacher to design environmental literacy activities in the lesson.

In Malaysia, environmental education has been introduced in primary and secondary schools since 1998. The environmental concepts have been implemented across the curriculum by integrating them into all subjects. According to Shaari and Osman (2011), two lessons place emphasis on environmental education in Malaysia, which are biology and geography. Both include so much environmental related subjects inside.

The similar situation is present in Thailand. There is not a separate environmental education course at the basic education level but is taught only in science course (Thathong, 2010). However, the truth is that environmental education is related to all subjects.

Environmental Literacy, which is assumed to be the ultimate aim of environmental education, seems to have been neglected in Turkey for several years. This has been receiving greater attention with the initiation of a new Science and Technology Curriculum for elementary schools since 2004 (Erdogan, 2007). Also the high school physics, chemistry, biology, and geography curricula have changed based on the same goals. These curricula are different from the previous ones in that environmental issues have been added to and integrated with the science dimension. One of the key goals of these curricula is to develop environmental awareness and consciousness, and increase scientific process skills of students (Özgelen and Yilmaz-Tuzun, 2007). As the new curricula let youth to become

more aware of these issues, the academicians began to study in this topic. There are two studies done by Erdogan in last five years about environmental literacy and environmental education in Turkey (Erdogan, 2007; Erdogan et al., 2009). In 2007, Erdogan studied on content analysis of objectives of environmental literacy in elementary school science curriculum and compared Turkey's situation with Bulgaria. In 2009, a similar study was performed to compare Turkey with Macedonia. According to the results, in both countries most attention was given to knowledge, less to skills and attitudes, and little to environmentally responsible behavior (Erdogan, 2009).

2.5. Environmental Related Subject Areas in Turkish High School Curricula

The most environmentally related subject areas are geography, chemistry, physics, and biology in Turkish national high school curricula. This can be realized by the list of learning objectives found in the required curricula of each of those courses (ttkb.meb.gov.tr/program.aspx).

2.5.1. High School Geography Curricula

Geography is the science that studies the lands, features, inhabitants, and phenomena of Earth. It is the second most environmentally concerned branch in the national high school curriculum; depending on the number of environmental learning objectives in the national curricula. According to the published teaching programs from Ministry of Education in Turkey, among the aims of this lesson there exist;

- The ability of investigating geographic issues in human-nature relationship.
- The development of human consciousness in the mechanism of ecosystems.
- The understanding of role of environmental, social, cultural, and economic organizations' effects on local and global level.

The national high school geography curriculum is being changed since 2010 (ttkb.meb.gov.tr/program.aspx). Like the science branch lessons, the objectives of

geography lesson are being revised. The new acquisitions of 9th grade are put in progress in 2010-2011 academic year. They will revise the following grades year by year.

The new geography curriculum pays attention to the development of global perception of Earth while aiming the local perception of environment. That is because they added a new learning area in the curriculum named "Global Environment: Regions and Countries". Since there is no more difficulty in reaching to global news, teachers and students should be able to be aware of what is going on in local and global area. Also there is another learning area that exists in all 9th, 10th, 11st, and 12nd grades named "Environment and Community". This area deals with environmental issues and takes nearly 2 months to cover the acquisitions.

Here the big ideas of each geography curriculum (9-12 grades) are listed:

(a) Natural Systems
(b) Human Systems
(c) Spatial Synthesis : Turkey
(d) Global Environment: Regions and Countries
(e) Environment and Community

According to the new geography curricula in 9-12 grades, the objectives related to environmental concerns are listed as below (ttkb.meb.gov.tr/program.aspx).

Students will be able to:

- Make sense of the interaction between human and nature.
- Exemplify the usage styles of nature and environment by checking the needs of humans.
- Analyze the effects of natural environment to human activities and the adjustment process of human to natural environment.
- Analyze the consequences of anthropogenic changes on natural environment by giving examples.
- Explain the soil diversity according to its formation process.
- Classify the plants according to their general characteristics.

- Investigate the factors that affect biodiversity.
- Analyze the elements that constitute the ecosystems, matter cycles and energy flow according to their continuity.
- Analyze the elements of marine ecosystems.
- Analyze the usage of nonrenewable energy sources in the means of depletion and alternative sources.
- Evaluate the environmental results of differences in natural source usage among countries.
- Exemplify the negative environmental effects of production, delivery and consumption of mines and energy sources.
- Investigate the usage of natural sources in the means of environmental sensitiveness.
- Comprehend the importance of effective usage of natural sources on environmental planning.
- Investigate the global effects of environmental problems.
- Analyze the environmental consequences and anthropogenic effects of technological changes.
- Evaluate the different types of wastes according to their effects on environment and human health.
- Investigate the protection methods from the wastes.
- Evaluate the recycling strategies in the means of sustainability of nonrenewable sources.
- Develop strategies for avoiding environmental problems.
- Explain the limitations of natural environment according to food chain and carrying capacity.
- Make inferences on the risks of human-nature interaction.
- Investigate the threats on natural heritage.
- Have environmental consciousness.

There is not a recommended time schedule for each chapter to be covered throughout the academic year in the geography lesson curricula (ttkb.gov.meb.tr/program.aspx). So it totally belongs to the teachers' initiative to spend less or more time to cover the topic.

2.5.2. High School Chemistry Curricula

The national high school chemistry curriculum is also being changed since 2008. The new curriculum gives importance to many objectives related to Chemistry-Technology-Community-Environment Relationships (ttkb.meb.gov.tr/program.aspx). These objectives are supposed to bring out different views of chemistry lesson like:

- Chemistry in daily life
- Environmental problems occurring due to chemical activities
- Reducing the environmental effects again using chemicals
- Raising awareness on the usage of chemicals in daily life

Here are some related objectives about chemistry-technology-community relations taken from the Turkish high school chemistry curriculum:

Students will be able to:

- Solve the daily life problems by using the acquired chemistry knowledge.
- Realize social, economic and technological effects of chemistry.
- Give examples to positive and negative effects of science and technological developments on human and nature.
- Examine the importance of studying science and technology.
- Examine the applicability of chemistry on social and economic fields.
- Realize the applicability of chemistry knowledge in daily life.
- Interpret the effects of chemical developments on society, economy and environment.
- Comprehend the importance of inquiry based thinking on interpretation of earth.
- Investigate the social cost of scientific development.

Besides these, there are some new acquisitions related with chemistry and environment. In each grade, the curriculum focuses on searching an answer for these questions: “What effects does chemistry have on environment?”, “What should community do to reduce them?”.

Students will be able to:

- Compare the benefits and harms of various chemical substances.
- Give examples to resources that spread harmful substances to the environment.
- Classify the harmful chemical substances according to their harm degrees and affecting environment.
- Investigate the permanence of harmful substances in the environment.
- Examine the relationship among environment, industry and energy.
- Examine the nuclear energy in the means of society, economy and environment.
- Explain the importance of fusion as one of the most important energy sources of future.
- Investigate the importance of secondary energy source, hydrogen, in the means of cost and sustainable environment.
- Explain the formation of ozone in the atmosphere and indicate the importance for the environment.
- Associate the production and usage of sulfur compounds with environmental pollution.

Figure 2.1 shows the suggested number of lesson hours and percentage that will be organized to teach environmental objectives throughout the academic year (ttkb.meb.gov.tr/program.aspx).

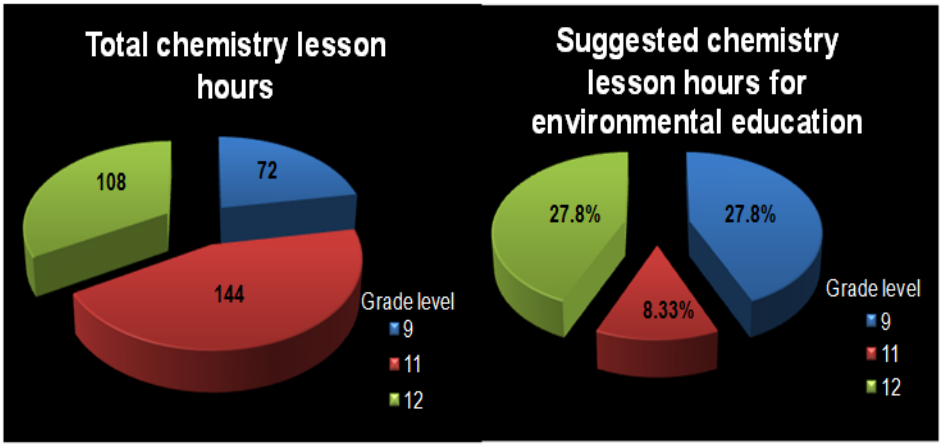

Figure 2.1. Suggested chemistry lesson hours for environmental education

As it can be seen from the figure, there are no relevant environmental learning objectives in grade 10.

2.5.3. High School Physics Curricula

The curricula of physics lesson have also changed since 2008 beginning from the 9th grade and the following grades year by year. The main idea of the curricula is life based learning. The pioneers are Australia and New Zealand for life based learning approach (ttkb.meb.gov.tr/program.aspx). The objectives of Physics-Technology-Community-Environment and life based learning approaches are related in the high school physics curricula. These two approaches aim to correlate abstract concepts with daily life issues. The skills in Physics-Technology-Community-Environment objectives enable students to understand science –technology and community-environment interaction.

The objectives related to environmental issues in physics 9-12 grades curricula are listed as below (ttkb.meb.gov.tr/program.aspx).

Students will be able to:

- Compare the advantages and disadvantages of renewable and nonrenewable energy sources.
- Realize the importance of using renewable energy sources.
- Use the energy sources economically.
- Explain the harms and protection methods of nuclear radiation.

It can be concluded that high school physics lesson contains only the energy concept related to environmental issues. The related objectives are given only in the 9th grade according to the national curriculum.

Figure 2.2 shows the suggested number of lesson hours and percentage that will be organized to teach environmental objectives throughout the academic year. Since the only environmental related chapter is “energy” in 9th grade physics lesson, the figure includes only the 9th grade content. The given learning objectives are included in the 9th grade physics curriculum.

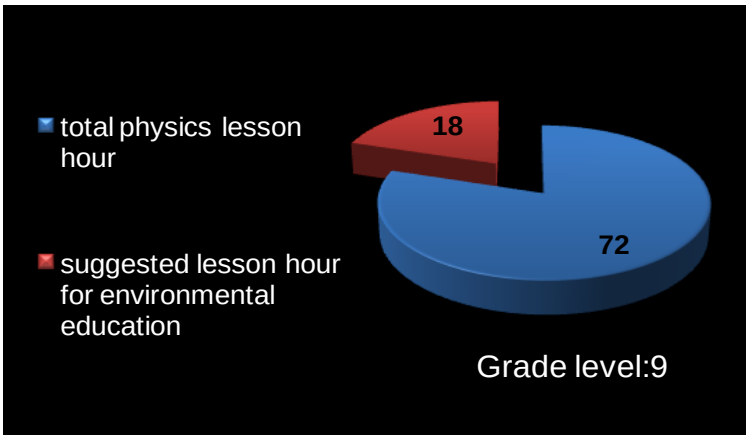

Figure 2.2. Suggested physics lesson hours for environmental education

2.5.4. High School Biology Curricula

Biology is the most related branch of science that associates its topics to environmental concerns. This can be said by counting the number of environmental learning objectives found in the biology curriculum.

The curricula of biology lesson have been changed since 2008, beginning from the 9th grade and the following grades year by year. According to new Turkish high school biology curriculum, one of the general aims in this field is to realize the importance of scientific values in the means of individual, community and environment. Another general aim in this field is to introduce and protect the biological diversity that we have on earth.

The new curriculum gives importance to many objectives related to Science-Technology-Community-Environment Relationships (ttkb.meb.gov.tr/program.aspx). The ones totally related to environmental education are listed as below:

Students will be able to:

- Realize that waste management is a serious environmental problem and should be recycled or annihilated consciously to reduce the negative effects.
- Explain how to protect the natural resources, living organisms and habitats by using technological systems and to reduce the harmful wastes resulting of the usage of them.
- Comprehend the causes and effects of local, national and global environmental problems.
- Discuss the solutions of local, national and global environmental problems.
- Comprehend the protection methods of environment, wild life and natural resources.
- Know the responsibilities of both individual and community in order to protect the environment, wild life and natural resources.
- Give examples to how humans effect the environment.
- Realize that scientific and technological developments are essential needs for individual, community and environment.

Here are some specific objectives about science-technology-community relations taken from the Turkish high school biology curriculum.

Students will be able to:

- Explain the main causes and results of daily environmental problems by giving relevant examples.
- Comprehend the role of the individual in indicating the environmental problems.
- Indicate the effects of environmental problems on health by giving daily life examples.
- Suggest solutions to environmental problems.
- Participate actively to activities of searching solutions to environmental problems.
- Explain the relationship among population, community and ecosystem by giving examples.
- Discuss the effects of biotic and abiotic factors in ecosystems.

- Exemplify the role of producers, consumers and decomposers in matter-energy flow.
- Interpret the relationship among food chain, food web and food pyramid.
- Comprehend the energy flow within the food pyramid in ecosystems.
- Explain the importance of nutrient cycles by drawing relevant shapes.
- Explain the structure of community and indicate the factors affecting the structure by giving examples.
- Explain the competition among the species and within the species in a community by giving examples.
- Explain the symbiotic relations among the species in a community.
- Indicate the causes of extinction of some species.
- Exemplify the results of overgrowth in a population.
- Explain the factors of distribution of animal and plant species on earth.
- Explain the relationship between a biome and ecosystem.
- Summarize the concept of evolution.
- Discuss the effects of climate change on life and evolution continuum.
- Exemplify the importance of matter and nutrient resources.
- Discuss the sustainability of matter and nutrient resources.
- State the precautions for sustainability of biodiversity.
- State the importance of protecting the local species used in agriculture and stockbreeding.
- Discuss the ways of treating a polluted environment.
- Participate actively to treatment facilities of environment.
- Exemplify the relationship among environmental ethics, protecting environment and sustainable development.

Figure 2.3 shows the suggested number of lesson hours and percentage that will be allocated to teach environmental learning objectives throughout the academic year.

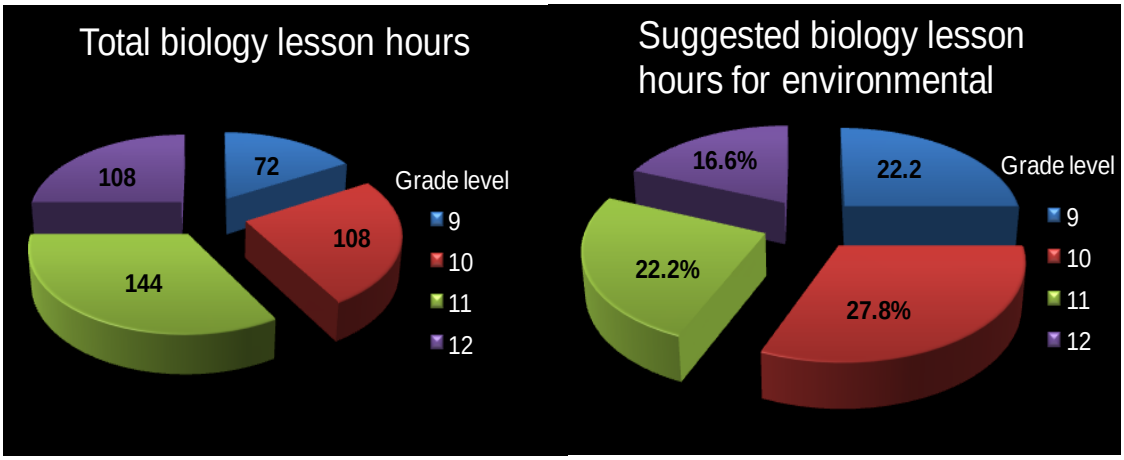

Figure 2.3. Suggested biology lesson hours for environmental education

2.6. Gender Difference in Environmental Education

Studies done about environmental literacy in United States indicated that female participants showed more support for the environment over the economy than male participants and more support for environmental regulations than male participants (Coyle, 2005). The same report showed that male participants demonstrated greater environmental knowledge than female participants.

Loughland et al. (2003) noted gender differences in the affective domain in a study of young peoples' conceptions of the environment in Australia. They found that girls were more likely than boys to have an interest in the environment.

Some have linked these socialized gender roles to women's greater environmental concern by arguing that caring for the environment similarly engages the altruistic element of caring for others (Zelezny et al. 2000). It is also argued that the "caregiver" role, with which women tend to identify, prioritizes the health and well-being of family members and hence leads to a higher level of concern for potentially risky environmental settings; however, men, who tend to identify with the role of the primary family "breadwinner", are more greatly concerned with economic as opposed to environmental issues (Wehrmeyer and McNeil, 2000).

A study done by Shobeiri et al. in 2006, reports the environmental attitudes of secondary school teachers in India and Iran. The researchers also analyzed the gender differences in many ways. The findings reveal that there is a significant difference between two countries in terms of the level of teachers' environmental attitude. The number of Indian teachers with high level of environmental attitude is more than their counterparts in Iran. In the overall comparison, the statistical results indicate that there is a significant difference in the level of environmental attitude between male and female teachers. In India, female teachers have more positive attitudes on wild life, forests, and population explosion. However, the study conducted by Shaila (2003) indicated that the gender has no effect on environmental attitude, the previous one mentioned that female teachers have better attitude towards environment. In four sub factors namely hygiene, pollutes, population explosion, and environmental concern female teachers scored significantly higher than male teachers (Shobeiri et al., 2006).

In a study done by Alp et al. in 2006 in Turkey, an analysis about environmental knowledge and behavior of students was done. Mean scores for behavioral intentions, environmentally responsible behaviors and affects were significantly different by gender, while no statistical significance was found on students' environmental knowledge. The significant gender difference indicated that girls had more favorable behavioral intentions and environmentally responsible behaviors than boys.

Another study done in North Carolina compared the effects of the traditional and outdoor experiences by analyzing the gain scores of the boys and girls separately (Carrier, 2009). According to the results of this study, boys increased their environmental attitudes more in the treatment (outdoor) condition than in the traditional condition. Both genders increased their behavior scores in the treatment condition when compared to the traditional condition; however, boys increased more in the treatment condition than girls. So it is obvious that more active and student-oriented environmental education can increase the knowledge level of the students. The factors that contribute to students' learning styles, use authentic locations, and provide opportunities for engaging active learners, student learning may be enhanced.

3. METHODOLOGY

In this study, interviews were conducted with teachers of four different courses which are related fields to environmental education. Their ideas about the curriculum revisions, their adaptation to the new curricula, and their adequateness in terms of environmental issues were investigated. Also, the students of these teachers were applied a questionnaire to find out if the environmental acquisitions in the curricula were acquired or not. The instrument used in this study could provide further information to assess student knowledge on environmental concepts.

3.1. Sample

The present study was carried out in three different private high schools in Istanbul, Turkey. This study includes interviews with some teachers in these schools. The selected courses were geography, chemistry, physics, and biology, which are directly related to environmental concerns, and are more convenient to include such issues in their lesson hours. The study also includes a questionnaire which aims to evaluate the ideas of students on their own environmental knowledge by rating themselves and to assess this knowledge with true-false statements. It was conducted on the 12^{th} grade students, who are the students of the teachers who were interviewed. Only the 12^{th} graders were selected to apply the questionnaire because they are the only ones who studied the entire new four year high school curricula.

The study was done at the end of 2011 and the beginning of 2012, with 161 students and 20 teachers, who were chosen by convenience sampling. The specific information about the branch teachers is listed below:

- *Discipline:* Five geography teachers, five chemistry teachers, five physics teachers and five biology teachers.
- *Academic Experience:* Three years to thirty nine years.
- *Gender:* 12 women and 8 men.

- *Age range:* 27 to 60.
- *Universities they have graduated from:* Boğaziçi University, Marmara University, Ankara University, İstanbul University, Dokuz Eylül University, Orta Doğu Technical University, İstanbul Technical University and Yıldız Technical University
- *Weekly lecture hours:* 4 to 27.

Table 3.1 shows the distribution of branch teachers according to the gender difference:

Table 3.1. Distribution of the teacher sample in terms of gender and branch

BRANCH / GENDER	MALE	FEMALE
GEOGRAPHY	4	1
CHEMISTRY	1	4
PHYSICS	2	3
BIOLOGY	1	4
TOTAL	8	12

Table 3.2 shows the numbers of both female and male participants to student questionnaires:

Table 3.2. Gender distribution of the student sample

GENDER	NUMBER OF STUDENTS
MALE	76
FEMALE	85
TOTAL	161

3.2. Design and Procedure

This research includes both qualitative and quantitative aspects in terms of data collection and analysis. The qualitative part belongs to in-service teacher interviews and the quantitative part belongs to the application of the questionnaires to the 12th grade students.

The teacher results presented in this study are based on one-to-one semi-structured interviews with in-service physics, biology, chemistry, and geography teachers. There are several advantages of using the personal interview as the method of collecting data. First, it has the potential to overcome the poor response rates of a questionnaire survey (Austin, 1981). According to Richardson et al. (1965) and Smith (1975), it is well suited for the exploration of attitudes, values, beliefs, and motives. Gordon (1975) indicated that it provided the opportunity to evaluate the validity of the respondents' answers by observing non-verbal indicators, which was particularly useful when discussing sensitive issues. Bailey (1987) stated that it could facilitate comparability by ensuring that all questions are answered by each respondent and ensured that the respondent is unable to receive assistance from others while formulating a response. The reason for using this particular method in this study is that it is well suited for exploration of the perceptions and opinions of respondents regarding complex and sometimes sensitive issues. It generally enables probing for more information and clarification of answers.

Kidder (1981) has suggested that response rates between 70% and 80% are typical for interview surveys as many potential respondents who do not have the confidence to write down responses will often participate. Face to face contact with a researcher can motivate respondents to participate who would otherwise not bother with a questionnaire (Gordon, 1975). While interviewing the teachers, this perspective was considered. Teachers were aimed not to bother with writing comments or answers in a questionnaire or extenuate the questions.

An interview guide was developed before the interviews which comprises a list of questions and topics that need to be covered during the conversation, usually in a particular order. The difference of semi-structured interviews from standardized interviews is to have

the opportunities to change the words but not the meaning of questions. Clearly, in this type of interview, validity and reliability depend, not upon the repeated use of the same words in each question, but upon conveying equivalence of meaning (Denzin and Lincoln, 1987). It is this equivalence of meaning which helps to standardize the semi-structured interview and facilitate comparability. Since the aim of this study is to investigate the feelings and ideas of the teachers about the environmental learning objectives in the revised curricula, the study employed semi-structured face-to-face interviews.

The open-ended interview questions were piloted on two people. They were prepared in Turkish and were conducted in Turkish. However, the answers were translated into English for the purposes of this study. Visits to the schools of interviewees were made by appointment. They were interviewed by the researcher only and were assured that their responses would not be published by referring names.

The interviewees were asked and granted permission for recording the interviews. The use of audio tapes when permitted has ensured that an identical replication of the contents of each interview is available which will facilitate analysis (May, 1989). Audio taping is frequently the method of choice, as it provides a detailed insight into the performance of both the respondent and the interviewer. Further, access to the nuances of the interactions between respondent and the interviewer help validate the accuracy and completeness of the information collected. Audio taping also reduces the potential for interviewer error by, for example, recording data incorrectly or cheating by logging an answer to a question that was not asked (Barriball and While, 1994).

The duration of each interview varied from five to ten minutes. Afterwards, the interviews were transcribed and analyzed for this study. The original Turkish interview questions are given in Appendix B. The interview questions translated to English were:

1. Are you talking about environmental issues in your lessons? If yes, how often?
2. Do you have any difficulty in talking about environmental issues in the classroom such as lack of knowledge? Do you feel adequate yourself while doing this?
3. Did you take any environmental science courses while you were studying your undergraduate program at the university?

4. Did you participate in any environmental seminars/educational programs? If yes, which ones? If no, what is the reason?
5. Have you ever lead to environmental projects in your school? If yes, which ones? If no, what was the reason?
6. Do you follow environmental news and advancement from media? If yes, what is the last thing you heard/read/watched about the environment?
7. Do you think an environmental science course should be given to teacher candidates in Education Faculties of universities?

During the interviews, unstructured follow-up questions were also used to elicit more information on the topic. These questions commonly took the form of "Why do you think like that?", "What do you mean by that? "Could you explain that a bit more?". However, the researcher was careful not to affect the interviewee or give her own ideas on the topic.

The questionnaire which was applied to the 12^{th} grade students of those interviewed teachers were analyzed quantitatively. The questionnaire included randomly selected environmental objectives which are listed in the national curricula from 9^{th} to 12^{th} grade. The students were expected to rate themselves from one (does not define me at all) to nine (defines me completely). After rating themselves, they were asked to indicate some statements as true or false to check the reliability of their answers. Each true-false statement measures whether a learning outcome was acquired or not. The questionnaire can be found in Appendix C. Also, Appendix D contains an answer key for the true-false statements.

Table 3.3 lists the matching of the learning outcomes and related true-false statements:

Table 3.3. Related learning outcomes and true-false statements couples

OBJECTIVE NUMBER	TRUE-FALSE STATEMENT NUMBER
1	5
2	13
3	14
4	15
5	16
6	1
7	6
8	12
9	17
10	3
11	11
12	20
13	19
14	18
15	2
16	4
17	9
18	8
19	10
20	7

3.3. Data Analysis

Interviews were recorded and transcribed verbatim. The analysis of the data employed was associated with the constant comparative method in which any newly collected data are compared with previous data that were collected in one or more earlier studies. The constant comparative method together with theoretical sampling constitutes the core of qualitative analysis in the grounded theory approach developed by Glaser and Strauss (Glaser and Strauss, 1967; Strauss, 1987, Glaser, 1992). Comparison is also the dominant principle of the analysis process in other traditions of qualitative research. Much academic research have offered interpretations, explanations and illustrations of grounded theory, as well as providing relevant techniques and procedures (Strauss and Corbin, 1998; Wester 1995; Denzin and Lincoln, 1994; Strauss, 1987; Chenitz and Swanson, 1986; Miles and Huberman, 1984).

The basic strategy of the method is to do just what its name implies - constantly compare. The researcher begins with a particular incident from an interview, field notes, or document and compares it with another incident in the same set of data or in another set (Merriam, 1998). By comparing, the researcher is able to do what is necessary to develop a theory more or less inductively, namely categorizing, coding, delineating categories and connecting them. Constant comparison goes hand in hand with theoretical sampling. Each piece of data must be compared with every other piece of relevant data (Morse and Field, 1998).

In this study, constant comparative method is used to illustrate the different branches of teachers' vision of environmental education. The answers of each teacher were compared with others and analyzed. According to their ideas, some answers were coded and categorized. The coding was done not by separating the teachers based on their branches. However, some interesting answers were being discussed by separating branches afterwards as a general perspective.

The Statistical Package for the Social Sciences (SPSS, version 19.0) was used to analyze the data of questionnaires. Cross tabulation was used to analyze the distribution of the answers and independent samples t-test analysis was used to evaluate gender differences in environmental knowledge, if any.

While doing the teacher interviews and applying the student questionnaires, general observations were made in the schools to obtain information about their environmental attitude.

4. RESULTS AND DISCUSSION

The present study focuses on environmental education in the high school curriculum in Turkey. Environmental education in high school is not taught as a separate subject area, but it is taught as integrated into other subjects which are mainly geography, chemistry, physics, and biology.

The results of the interviews of the teachers and the analysis of the questionnaires applied to the 12^{th} grade students can be found below, subsequently the results are discussed. Consequently, there is a final comparison between the teachers' ideas and the students' knowledge levels.

4.1. Results Related to Teacher Interviews

In this study geography, chemistry, physics, and biology branches were selected due to their appropriate content of environmental objectives. Five teachers from each branch were interviewed, so there were a total of twenty teacher interviews analyzed in this study. The ideas of these twenty teachers about the curriculum revisions, their adaptation to the new curricula and their adequateness to environmental objectives were analyzed.

There have been numerous studies performed on environmental education in Turkey and throughout the world. However, studies in Turkey have mainly focused on primary school level. The reason being Turkish primary school science and technology curricula were revised in 2005, which provided numerous opportunities to research its effectiveness. Since revisions made in the high school curricula are so new, there is simply no adequate literature reviews available.

Seven themes which emerged as the results of the interview analysis are:

i. Inclusion of environmental concepts in lectures
ii. Adequateness to talk about environmental concepts in lectures

iii. Having the opportunity of taking an environmental science lesson during university years
iv. Improve oneself by participating in conferences, seminars etc.
v. Having the opportunity to lead environmental projects at school
vi. Following the media about environmental issues
vii. The idea of having an environmental education lesson in teaching programs of educational faculties

The answers to interview questions are summarized in detail below, based on twenty teachers with verbatim quotes from the original transcripts.

4.1.1. Are You Talking about Environmental Issues in Your Lessons? If Yes, How Often?

The majority of the interviewees answered this question as "it depends on the topic I teach". 75% of the teachers said that they sometimes talked about environmental issues in their lessons especially if the topic is related to the environment. 10% of the interviewees said that they rarely talked about environment whereas 15% of the interviewees said that they always talked about environmental issues in the classroom. Table 4.1 shows the answers of the interviewees as percentages.

Table 4.1. Percentage of the answers to interview question 1

RARELY	SOMETIMES	ALWAYS
10%	75%	15%

20% of the interviewees explained that they could mention environmental issues when they can relate the lecture to daily life. The remaining 80% stated that they talked about such topics because they should do that according to the curriculum.

As it was mentioned in 2.5.1, each high school year, from 9 to 12, there exists a chapter called "Environment and Community" in high school geography curricula. The five geography teachers all indicated that they talked and lectured about environmental

issues in last quarter of the second terms. In the 9th grade, they start with introducing natural systems, ecosystems, and climate. In the 10th level, the focus is on vegetation, forests, and water resources. In the 11th grade, there is a chapter which analyzes the effects of natural resources on environment, mistakes on the consumption of the resources, and the effects of accidents on the environment. In the 12th grade, there exists a relatively big chapter on "extremes in nature" including global warming, natural heritage, and global environmental pollution. Based on the answers, the general time spent on these topics is nearly two months at each grade.

Two of the interviewees indicated that they always talk about environmental issues in the classroom whether it is related to that day's lesson plan or not. One of them stated that:

> "There always need to be a connection between my lesson and the environment. The topics are distributed to the four years program according to that. The frequency depends on the relatedness of the topic. I usually ask my students "Did you watch the news yesterday?", "Did you read the newspaper?" whether it is related or not with the topic."

The other stated that:

> "I am very much interested in environmental issues. For example, we deal with consumption and humanity. That is not included in the national curriculum but I want my students to acquire skills about this. A few teachers indicate these issues. The last chapter of each grade is "Environment and Community". I lecture about environmental issues before coming to this part every year."

Two of the interviewees mentioned about interdisciplinary of the topics. One of the teachers claimed that:

> "I lecture about global warming in the 11th grade, but first I pay attention to the chemistry and biology parts of the topic. While explaining the matter cycles, especially carbon cycle, we talk about environmental pollution and global warming."

Another teacher stated that:

> "We lecture about environmental community problems in all grades. We prepare environmental projects for international programs. But one of the most important things we do is the integration with other disciplines especially physics, chemistry,

> and biology. That is because when you say ecology, you mean biology. Students should be aware of the fact that these disciplines are interconnected."

The chemistry teachers listed the related topics of environment to chemistry curriculum while answering this question. It was generally stated that there exists a chapter called "Chemistry in Daily Life" including environmental chemistry as a last chapter of the 9th grade chemistry curriculum. All of the chemistry teacher interviewees mentioned that they try to talk about environmental issues in detail while lecturing this chapter. One of the interviewees stated that chemistry had lots of topics related to environment such as "The States of Matter" and "Mixtures" in the 10th grade. Also she added that the first chapter is totally related to environmental concerns in the 12th grade which is a new chapter called "The Chemistry of the Elements". Another one indicated that organic chemistry can be a very good resource to discuss many environmental problems.

One of the interviewees mentioned the necessity of talking about environmental issues:

> "There are topics in the national curriculum about daily life and environment so I am forced to talk about them in the classroom."

Another interviewee specified the fact of preparation to university entrance exams:

> "We lecture about environmental issues in depth in the 9th grade due to the proper chapter content, but we do not generally touch on environmental concerns in the 11th and 12th grades because we should prepare the students to the university entrance exams and we do not have enough time."

Two of the interviewees indicated that they not only stick with the curriculum, but also educate their students about environmental awareness as much as possible:

> "… Besides the curriculum, I usually try to discuss with my students about what we do wrongly, what we should give attention to and the idea of not thinking selfishly."

> "While in the laboratory sessions, I talk about the disposal of the chemicals and the harms that they cause in case of carelessness. I generally talk about the regularity and cleanliness of the classroom before I start to the lesson and warn my students about the consumption of paper and its recycling."

The answers for the frequency of talking about environmental issues vary. One of the interviewees mentioned that she spoke of these topics once in nearly two months. Two others pointed out that they deal with those whenever the curriculum let them. One interviewee said that he had not measured the frequency. The other interviewee answered that she spends two or three hours for environmental issues in each chapter.

The physics teachers were the ones who answered this question as "rarely". They generally said that the environmental related topics were limited. As it was mentioned in 2.5.3, the only topic that they can talk environmental issues in the classroom is "energy" in the 9th grade. They stated that they spent three or four weeks to explain the concept of energy, renewable and nonrenewable energy sources and energy consumption. The reason of the "rarely" answers can be according to the limited content in a 4 year curriculum. One of the physics teachers indicated that they related the topic to the environment because the curriculum says so:

> "I do not talk about environmental issues so much in my lessons. There is only the chapter "Energy" at 9th grade that I can relate with topics. I spend nearly a month on this topic due to the content of the curriculum."

The five biology teachers all indicated that they have the chapter "Ecology" at the end of each grade as a final topic. Those take nearly two months to cover and it is completely related to environment. One of the interviewees shares her idea as below:

> "…There is a chapter about environmental pollution at 9th grade but I do not think that we can go over the topic in depth. We usually use PowerPoint presentations while lecturing this topic and I do not think that it was effective. If it had benefits, there would not be so much pollution."

4.1.2. Do You Have any Difficulty in Teaching about Environmental Issues in the Classroom such as Lack of Knowledge? Do You Feel Adequate/Inadequate Yourself while Doing This?

70% of the interviewees said that they felt inadequate themselves while teaching environmental issues in the classrooms whereas the remaining 30% thought that they do not have difficulty in such topics. Table 4.2 shows the answers of the interviewees as percentage:

Table 4.2. Percentage of the answers to interview question 2

FEEL INADEQUATE	FEEL ADEQUATE
70%	30%

The reason for this claim is that they took related environmental courses in their university years and they continue to read and research about daily environmental issues. The ones who have difficulties, mentioned the changes in the national curricula and they confessed about their inadequacy in new acquisitions. They said that they do not have difficulty in conceptual facts but in technical details. One of the geography teachers claimed that:

> "I haven't learnt anything about matter cycles in university. When they added the topic to the new curriculum, I had to improve myself about this topic. I know that there are some geography teachers who catch this innovation and who do not. The new topics are being taught by some PowerPoint presentations which are prepared by someone, the other teachers download them and lecture on them. I face this normally because the ones who are above a specific age range cannot predominate the innovations; they are not open for it. Young teachers should prepare new learning activities about the new topics. At this point, interdisciplinary studies are very important. We studied with physics department and made experiments last year. We haven't seen these topics at university either."

Some of the answers of interviewees who feel anxious are quoted:

> "I sometimes feel myself competent and sometimes incompetent. Students have curiosity in environmental topics but sometimes their questions can be above my level. I feel incompetent at these points and try to research the topic and learn it."

> "I do not feel competent myself in such topics. I speak of a thing related to environment when I watch or read it before the lesson. I can transfer just the main idea and cannot answer any further questions if a student asks about it during the lesson."

> "I sometimes feel myself incompetent, because I have no special education for that. I share my latest readings and news in the classroom but am not absolutely adequate for a proper environmental education. I discuss the things in the classroom that I follow up with the help of media."

In a study which was done in Israel by Tal and Alkaher (2010), it was stated that the teachers had little pre-service exposure to environmental education. In a comparison between pre-service science and geography teachers, Summers et al. (2004) found that although the geography pre-service teachers indicated more aspects of education for sustainable development than the science teachers, the understanding of both groups was not sufficient. According to the answers of the interviewed teachers, it can be stated that not taking a relevant course and special education in environmental education, the present in-service teachers feel inadequate and nervous in the classrooms. Since it seems that geography is much related and the closest branch to the environmental sciences, the physics, chemistry, and biology lessons share the importance with the revised 4-year curricula. Some of the teachers try to improve themselves by reading and investigating, but teacher training in this field should be proper and fundamental.

4.1.3. Did You Take any Environmental Science Course while You were Studying Your Undergraduate Program at University?

50% of the interviewees took environmental related courses at university. The majority of the interviewees who took such courses are biology courses because they have elective ecology course at universities. Two of the chemistry teachers took an elective course on "environmental chemistry" and a geography teacher stated that she took a "geo-ecology"" course at her master's program. Table 4.3 shows the answers of the interviewees as percentage:

Table 4.3. Percentage of the answers to interview question 3

YES	NO
50%	50%

It is obvious that the teachers, who have not taken any environmentally related course in university, should improve themselves in this field to be successful in acquiring the skills given in the curricula. According to a study by Yurttaş and Sülün (2010) in Turkey, the sources where the pre-service science teachers obtain information about environmental problems are as follows: 20% of them from radio and television, 22% from the Internet, 17% from newspapers and magazines, 13% from textbooks, 11% from conferences and 15% from the people in their close circle.

4.1.4. Did You Participate in any Environmental Seminars/Educational Programs? If Yes, which Ones? If No, What is the Reason?

70% of the interviewees participated environmental seminars or conferences and the remaining 30% did not. The general reason for not participating in such organizations is being not interested in these topics, not having enough time and not having heard about an event. Table 4.4 shows the answers of the interviewees as percentage.

Table 4.4. Percentage of the answers to interview question 4

YES	NO
70%	30%

The five geography teachers all answered this question yes. They said that geography workshops are generally organized in the field of environmental concerns. The participated seminars were organized by Ministry of Education and private universities.

Besides those, some interviewees listed their participation to International Eco-school seminar, SEMEP (South-Eastern Mediterranean Environment Project), Young Reporters and TURMEPA (Turkish Marine Environment Protection Association).

4.1.5. Have You ever Lead Any Environmental Project in Your School? If Yes, Which Ones? If No, What is the Reason?

60% of the interviewees said that they lead to several environmental projects and campaigns in their school. 25% of the interviewees never studied on such topics and 15% of them said that they did not directly lead to a project but helped another leader whenever it was needed. Table 4.5 shows the answers of the interviewees as percentage.

Table 4.5. Percentage of the answers to interview question 5

BEING A LEADER	HAVING A SMALL CONTRIBUTION	NEVER BEING A PART OF IT
60%	15%	25%

The general participation and leadership of a project is based on National Eco-schools program. Two of the schools in which the teachers were interviewed were members to Eco-Schools Program. Two of the teachers indicated that they were the coordinator of the Eco-Schools Program in their schools and three of them said that they were working indirectly in the program, just for helping to the coordinator. There are also many teachers who led to international project competitions in private schools. The project topics they generally listed are carbon emission, global warming, waste management, energy production, and air pollution. All of these topics include the listed learning acquisitions mentioned in part 2.5.

According to the answers of the interviewees in this study, there are two main reasons for not studying on environmental topics as a project. One of the interviewees indicated that he had been teaching in a private institution for years and had no opportunity to lead to such projects. The other reason was presented from physics teachers. Generally, the

physics teachers indicated that their branch is not so much related with environment. One of the answers is quoted below:

> "The physicists are only interested in energy in relation to the environment; they are not totally engaged in it like biologists, so we are inadequate in such topics."

4.1.6. Do You Follow Environmental News and Development from Media? If Yes, What is the Last Thing You Heard/Read/Watched about Environment?

75% of the interviewees answered "yes" to this question and 20% of them said that "as much as possible". Table 4.6 shows the answers of the interviewees as percentage.

Table 4.6. Percentage of the answers to interview question 6

YES	AS MUCH AS POSSIBLE	NO
75%	20%	5%

The last things they informed about environment are developments on energy sources, hybrid cars, global warming, climate change, environmental consciousness, tsunami in Japan, thermal plants, immigration and nuclear leakage.

Only one interviewee said that he did not specially try to follow but he reads and watches when he meets a pickup.

4.1.7. Do You Think an Environmental Science Course Should Be Given to Teacher Candidates in Education Faculties of Universities?

All of the interviewees answered as yes to this question. All of them agreed to the fact that a teacher should be educated in this topic so that s/he can educate the youth. They generally accepted the need of an environmental education in university years. Some answers of various interviewees are quoted below:

> "It should absolutely be given to the teacher candidates but not in a theoretical way. I can say that I have not gained awareness from the course I took at university. I

memorized so many things which were extremely scientific. They load you with knowledge and then try to evaluate it. The course should be related to daily life and real life applications. This would be more meaningful."

"Absolutely. The environmental concepts are in a global platform right now. The teacher should be informed so that s/he can transfer them to students."

"I think it should be given, actually it is a good idea. Since they put such environmental related topics into new curricula, they should do something to make the teachers more effective."

4.2.Discussion Related to Teacher Interviews

There are fourteen education faculties in the universities all over Turkey which include physics, chemistry, biology, and geography teaching departments. Current instruction schedules examined in all of these faculties from their official websites, reveals that all the biology and geography teaching departments' instruction schedule contain a course related with ecology. However, for physics and chemistry teaching departments, there is a suggested environmental science course in only one university which is Boğaziçi University. Possibility of taking a course related to environment in university years was assessed among the interviewees. Although the suggested lesson hours for each course comprises significant portion of the total lesson hours according to the revised curricula and additionally, teachers have more responsibilities like leading to environmental projects in many schools only 50% of them had taken environmental science courses. 80% of the biology teacher interviewees took the ecology course, while 40% of the geography teachers took an environmental pollution course. On the other hand, 20% of the physics teachers and 60% of the chemistry teachers took an environmental science course. The teachers who have teaching experience more than 20 years, did not have the opportunity to take any environmental science course in pre-service years. According to the results of the interviews 60% of the total participants lead to environmental projects. However, the courses that the teachers took during their university years did not contain any teaching strategies for environmental education.

Due to the revised curricula and additional responsibilities, teachers have to improve themselves. This requires the in-service training for teachers but there is not any proper

program organized by Ministry of Education. In 1983, in-service teacher training was suggested by UNESCO-UNEP to provide the learners' affective, cognitive and psychomotor development that will ensure appropriate environment action through their and pupils' lifetime. The content of UNESCO-UNEP international environmental education program includes the lecture, outdoor education methods, field studies, follow-up works after the trip, preparation of a permanent report and community display. The suggested teacher training programs should contain the knowledge and alternative teaching styles of environmental topics. Due to the lack of in-service teacher training programs the majority of the teachers participate to environmental seminars, conferences, and workshops. Properly and effectively planned organizations can increase the teaching performance of a teacher. Recent studies clearly indicated that workshops and being a member of environmental organizations significantly affected the teachers' teaching efficiency (Moseley et al., 2010; Çimen et al., 2011). According to the results of the interviews, 70% of the teachers attended professional development activities such as conferences, seminars, and workshops and 95% of the teachers try to improve themselves by reading and watching news in media.

The interviewees, who said that they took an environmental science course in the university, also had the anxiety feeling and inadequacy. Although a significant portion of the biology teachers took a course related with environment, all of them confessed that they felt themselves inadequate and anxious while talking about environmental issues in the classroom. Same result come up with chemistry and physics teachers, the ones who took a related course said that they felt inadequate. However, the geography teachers who took a course related with environment said that they do not feel so much anxiety due to the courses they took. The reason for feeling of anxiety and inadequacy, which the teachers have, is the taken course was not an educational practical course but a theoretical one. The teachers have the need to get educated about environmental teaching strategies.

Another discussion can be made between the feeling of anxiety and the frequency of talking about environmental topics in the classroom. All chemistry teacher interviewees said that they felt inadequate in talking about environmental issues in the classroom. 60% of them said that they talked about environmental issues parallel to the suggested time in the curriculum program by Ministry of Education whereas 40% of them said that they

spent a little time for environmental issues. 80% of the biology teachers said that they felt inadequate however 60% of them mentioned that they tried to give environmental education as much as possible in each grade. Only 20% of the geography teachers confessed the inadequacy but he indicated that he spent time as much as possible to the environmental issues. 80% of the physics teachers confessed the inadequacy and all of them said that they spent the proper time for environmental issues in the "energy" unit in each grade.

4.3. Results of Student Questionnaires

4.3.1. Crosstabulation Results of the Questionnaires and True-False Statements

In this part of the research, the comparison of the students' answers to the true-false statements and rating themselves are analyzed by cross tabulation. The rating lists and answers of these students for each true-false statement are listed in Appendix E.

Only four of the cross tabulation results of item-statement couples were significant which means the students rated themselves high and answered the related true-false question incorrectly or vice versa. The item number-objective-significance values are given in the Table 4.7.

Table 4.7. The objectives which gave significant correlation with related true-false statements

ITEM NUMBER	OBJECTIVE	SIGNIFICANCE VALUE
5	TO EXEMPLIFY THE ENVIRONMENTAL EFFECTS OF MINING ACTIVITIES	.035
7	TO COMPARE THE ADVANTAGES AND DISADVANTAGES OF RENEWABLE AND NONRENEWABLE ENERGY SOURCES	.005
13	TO STATE THE REASONS OF SPECIES BEING ENDANGERED	.023
19	TO EXAMINE THE ENVIRONMENTAL EFFECTS OF THE PRODUCTION AND USAGE OF SULFUR COMPOUNDS	.003

As it can be seen, each significant result comes from a different subject area. The first objective in the table is related to geography lesson, the second is related to physics, the third is related to biology and the last one is related to chemistry lesson. So it can be stated that students have lack of knowledge in each subject area which support the inadequacy feeling of teachers.

4.3.2. Frequency of the Total Correct Answers to the True-False Statements

Table 4.8 states the distribution of the number of correct answers that students give to true-false statements:

Table 4.8. Distribution of the correct answers to true-false statements

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
4.00	1	.6	.6	.6
7.00	4	2.5	2.5	3.1
8.00	5	3.1	3.1	6.2
9.00	4	2.5	2.5	8.7
10.00	8	5.0	5.0	13.7
11.00	9	5.6	5.6	19.3
12.00	12	7.5	7.5	26.7
13.00	15	9.3	9.3	36.0
14.00	19	11.8	11.8	47.8
15.00	20	12.4	12.4	60.2
16.00	22	13.7	13.7	73.9
17.00	19	11.8	11.8	85.7
18.00	18	11.2	11.2	96.9
19.00	3	1.9	1.9	98.8
20.00	2	1.2	1.2	100.0
Total	161	100.0	100.0	

As it is seen, the majority of the students who gave correct answers are in the range of total 12-18 correct answers. There are only two students who answered all of the questions correctly and the students who answered correctly the least, had only four correct answers.

4.3.3. The Results of the t-tests

The rating mean values of some objectives according to the gender difference were analyzed by independent samples t-test. All of the items were analyzed according to the gender difference. The result of the t-test of gender difference and the last objective in the

questionnaire which was about the effects of nuclear energy was significant (t=2.169, df=159, p<0.05). There were no significant relations among other item-statement couples.

The mean values of the correct answers for each branch separately according to the gender difference are given in table 4.9.

Table 4.9. Correct Mean Values of Each Branch Questions Analyzed As Gender Difference

	GENDER	N	MEAN	STD. DEVIATION	STD. ERROR MEAN
GEOGRAPHY CORRECT TOTAL	MALE	76	3.4605	1.07630	.12346
	FEMALE	85	3.4353	.95677	.10378
PHYSICS CORRECT TOTAL	MALE	76	2.7105	.84563	.09700
	FEMALE	85	2.8235	.95340	.10341
CHEMISTRY CORRECT TOTAL	MALE	76	5.2105	1.33981	.15369
	FEMALE	85	4.9059	1.46079	.15844
BIOLOGY CORRECT TOTAL	MALE	76	2.9342	1.02418	.11748
	FEMALE	85	2.9529	1.12235	.12174

According to the table 4.9, it can be concluded that there are not any gender differences in the means of the correct answers for each branch questions. Only there is a little difference in chemistry questions, in which male students had a bit higher mean value than the females.

4.3.4. Crosstabulation Results of the Correctness of the True-False Statements

The 20 objectives contained five in geography, four in physics, seven in chemistry and four in biology. The means of the correct answers for each branch are given in Table 4.10.

Table 4.10. The means of the correct answers for each branch

		Correct total	Geography correct total	Physics correct total	Chemistry correct total	Biology correct total
N	Valid	161	161	161	161	161
	Missing	0	0	0	0	0
	Mean	14.2112	3.4472	2.7702	5.0497	2.9441
	Std. Deviation	3.11731	1.01181	.90311	1.40891	1.07383

The correctness of the answers of true-false statements was analyzed for gender differences. The only significant result came from true-false statement 6 which is about the usage of solar panels as a renewable energy source (chi square value=22.006, df=8, $p<0.05$).

4.4. Discussion of Student Questionnaires

The interviews with teachers were done before applying the student questionnaires. According to the comments of the teachers, the expected results from the questionnaires would not be high. However, the applied results show that the majority of the students have high environmental knowledge level whereas they do not rate themselves high. The mean value of the correctness of the questions was 14.2 over 20.

For example, item 7 examines the comparison of advantages and disadvantages of renewable and nonrenewable energy sources. The majority of the students, who rated themselves between 1 and 5, gave the correct answer to the true-false statement of this

objective. Item 4, 8, 15, 16, 19 and 20 are the other examples. This result can indicate the contribution of other factors for students' environmental knowledge. Since the students participated in this study are the ones who studied the revised primary school science and technology curricula, they have environmental knowledge.

Students' environmental attitudes were also observed in the schools where the teachers' interviews and the students' knowledge questionnaires have been performed. Although students have high knowledge scores, their environmental attitudes were not favorable as opposed to the findings of Alp et al. (2006) who observed the desired attitudes of Turkish students that were not having the required knowledge to sustain the environment. According to the observations in this study, some of the students still do not switch off the lights while leaving the classrooms or do not throw the wastes to proper recycling bins.

Another discussion can be made between the teachers' feeling of inadequacy and students' correct mean scores in each separate branch. 80% of the physics teachers confessed that they sometimes feel inadequate in the classroom whereas the mean score of the physics questions was 2.7 over 4. All of the chemistry teachers claimed that they were inadequate but the mean score of the correctness of chemistry questions was 5 over 7. 80% of the biology teachers confessed that they sometimes feel inadequate in the classroom whereas the mean score of the biology questions was 2.9 over 4. Geography teachers indicated the least inadequacy feeling in the interviews. 20% of the geography teachers felt inadequate and the mean score of the geography questions was 3.4 over 5. According to this study, it can be said that while the majority of the teachers feel inadequate and anxious about teaching environmental issues, the students have high scores of environmental knowledge.

4.5. Gender Difference in Student Questionnaires

If the environmental knowledge of the 161 students is totally analyzed, the mean of the total correct answers is 14.2 and there is no significant difference between genders. In this study, the gender difference significance was investigated because a lot of research was done on this issue. Generally, it was found that females, who are generally more

sensitive, were more caregiving to environmental issues than males. The reason of analyzing the answers according to the gender difference was to see if the same result may occur in this study too. If the four branches are analyzed separately, the mean values of correct answers to the statements do not differ in genders significantly.

An interesting significance occurred in the objective about nuclear energy. The t-test results of the answers of the relevant true-false statement (statement 7) of female students were significantly different than male students (p=.032). Female students both think that the item highly defines them and answer the statement correctly more than male students.

5. CONCLUSION

This study was conducted to investigate the opinions of high school teachers on the revised curricula of physics, chemistry, biology and geography lessons and self-criticisms of their adequateness for environmental education. The need of teacher training programs was examined and students' high school environmental knowledge was analyzed. Teacher interviews and student questionnaires are used as data.

One conclusion of this study is that in-service teachers feel inadequate while talking about environmental issues in the classroom. 70% of the teachers mentioned the continuous anxiety in their interviews. They are anxious to get a further question from a student and afraid of not being able to answer it. On the other hand, questionnaires showed a high mean result. While the teachers thought that they could not teach properly, the students answered the true-false questions more than expected. One reason for getting a higher result than expected can be the help of media on awareness. Also, another reason can be the prior knowledge of students which they had during the primary school years. They could easily answer some of the questions from their foreknowledge and had incorrect comments on the ones at the high school level. The students do not necessarily have the proper environmental attitudes although they had a high score knowledge. In this study, there is no relation between teachers' feeling of adequacy and the students' performance for the questions.

Another conclusion in this study shows that there is no statistically significant correlation between environmental knowledge and gender. The mean scores of female and male students were nearly same.

The teachers take their teaching licenses without the skills of teaching environmental issues. There is a fact that the number of courses with environmental content is inadequate and sufficient attention is not paid to the environmental issues in teacher training programs of the Faculties of Education in Turkey. The suggested hours to spend for environmental topics for each subject lesson are generally more than 20% of the total lesson hours. This study concludes the need of both pre-service and in-service

environmental education competency. If the opportunities of having those skills are improved, both the teachers would feel adequate and comfortable themselves in the classroom and the students would perform higher in the questionnaires.

5.1. Limitations of the Study

There are some limitations for this study. The teacher interviews and student questionnaires are all done in three different high schools. One limitation of this study can be that all three schools were private schools which have more educational opportunities for students. Another limitation can be to apply the study in Istanbul, different results could occur if it is done in another city. Another limitation of the study can be the student questionnaires. Environmental learning objectives were randomly selected. The results might not be the same with a different question sample and different participants.

5.2. Suggestions for Further Research

The results of this study show that the teachers feel inadequate and anxious while teaching topics related to environment and there occurred the need of organizing both pre-service and in-service teacher training programs in environmental education. Some developed countries have mandates requiring nearly all pre-service students to achieve environmental education competencies before being licensed to teach (EPA Report, 1996). A similar program can be suggested to Turkish Education Faculties. The courses should not only contain theoretical information, but also practical ones such as hands-on activities, experiments and field trips.

Besides the pre-service teachers' training another suggestion for the in-service teachers can be developing a training program which includes the revisions of the curricula and the desired teaching approaches of the added environmental learning objectives.

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APPENDIX A:
LIST OF THE EDUCATION FACULTIES IN TURKEY INCLUDING SECONDARY EDUCATION DEPARTMENTS

APPENDIX B:
THE ORIGINAL TURKISH INTERVIEW QUESTIONS

APPENDIX C:
THE ORIGINAL TURKISH STUDENT QUESTIONNAIRE

APPENDIX D:
ANSWER KEY FOR TRUE-FALSE STATEMENTS

APPENDIX E:
THE LIST OF STUDENT SELF-RATING AND CORRECT ANSWER DISTRIBUTION FOR EACH ITEM

APPENDIX A

LIST OF THE EDUCATION FACULTIES IN TURKEY INCLUDING SECONDARY EDUCATION DEPARTMENTS

NAME OF THE UNIVERSITY	CITY	SECONDARY SCHOOL EDUCATION DEPARTMENTS
ATATÜRK UNIVERSITY	ERZURUM	TEACHING GEOGRAPY TEACHING CHEMISTRY TEACHING PHYSICS TEACHING BIOLOGY
BALIKESİR UNİVERSİTY	BALIKESİR	TEACHİNG CHEMİSTRY TEACHİNG PHYSİCS TEACHİNG BİOLOGY
BOĞAZİÇİ UNİVERSİTY	ISTANBUL	TEACHİNG CHEMİSTRY TEACHİNG PHYSİCS
ONSEKİZ MART UNİVERSİTY	ÇANAKKALE	TEACHİNG GEOGRAPY
DİCLE UNİVERSİTY	DİYARBAKIR	TEACHİNG GEOGRAPY TEACHİNG CHEMİSTRY TEACHİNG PHYSİCS TEACHİNG BİOLOGY
DOKUZ EYLÜL UNİVERSİTY	IZMİR	TEACHİNG GEOGRAPY TEACHİNG CHEMİSTRY TEACHİNG PHYSİCS TEACHİNG BİOLOGY
GAZİ UNİVERSİTY	ANKARA	TEACHİNG GEOGRAPY TEACHİNG CHEMİSTRY TEACHİNG PHYSİCS TEACHİNG BİOLOGY
HACETTEPE UNİVERSİTY	ANKARA	TEACHİNG CHEMİSTRY TEACHİNG PHYSİCS TEACHİNG BİOLOGY
KARADENİZ TECHNİCAL UNİVERSİTY	TRABZON	TEACHİNG GEOGRAPY TEACHİNG CHEMİSTRY TEACHİNG PHYSİCS TEACHİNG BİOLOGY
MARMARA UNİVERSİTY	ISTANBUL	TEACHİNG GEOGRAPY TEACHİNG CHEMİSTRY TEACHİNG PHYSİCS TEACHİNG BİOLOGY
ONDOKUZ MAYIS UNİVERSİTY	SAMSUN	TEACHİNG CHEMİSTRY TEACHİNG PHYSİCS TEACHİNG BİOLOGY
ORTA DOĞU TECHNİCAL UNİVERSİTY	ANKARA	TEACHİNG CHEMİSTRY TEACHİNG PHYSİCS
SELÇUK UNİVERSİTY	KONYA	TEACHİNG GEOGRAPY TEACHİNG CHEMİSTRY TEACHİNG PHYSİCS TEACHİNG BİOLOGY
YÜZÜNCÜ YIL UNİVERSİTY	VAN	TEACHİNG CHEMİSTRY TEACHİNG PHYSİCS TEACHİNG BİOLOGY

APPENDIX B

THE ORIGINAL TURKISH INTERVIEW QUESTIONS

1) Cinsiyet? Kaç yaşındasınız?
2) Hangi üniversiteden hangi bölümden kaç yılında mezun oldunuz?
3) Kaç yıldır öğretmenlik yapıyorsunuz?
4) Branşınız nedir?
5) Hangi sınıflara derse giriyorsunuz?
6) Haftalık ders saati?
7) Derslerinizde çevre konularına yer veriyor musunuz?
   Evet ise → Ne sıklıkta?
8) Sınıfta çevre ile ilgili konuları konuşurken kendinizi yeterli buluyor musunuz? Bilgi yetersizliği gibi sıkıntılarınız oluyor mu?
9) Üniversitede lisans döneminizde çevre eğitimi üzerine hiçbir ders aldınız mı?
10) Daha önce çevre veya çevre eğitimi ile ilgili konferans veya çalıştaylara katıldınız mı?
    Evet ise → Hangileri?
    Hayır ise → Katılmamanızın sebebi nedir?
11) Okulunuzda hiç çevre projesi yürüttünüz mü?
    Evet ise →Bu tarz çalışmaların öğrencilerde çevre bilincini etkilediğini düşünüyor musunuz?
    Hayır ise→ Bu tarz çalışmalar yapmayı düşünür müsünüz? Yapamamanızın sebebi imkanlar mı?
12) Çevre ile ilgili gelişmeleri medyadan takip ediyor musunuz?
13) Sizce Eğitim Fakültelerinde öğretmen adaylarına çevre eğitimi verilmeli mi?

APPENDIX C

THE ORIGINAL TURKISH STUDENT QUESTIONNAIRE

Bu ölçek, bilimsel bir çalışmada kullanılmak üzere hazırlanmıştır. Çalışma sırasında kimliğiniz gizli tutulacaktır.

Aşağıda vereceğiniz cevaplar, sadece belirli farkları tespit etmek için kullanılacaktır.
İş birliğiniz için şimdiden teşekkür ederim.

Ankette verilen cümleleri dikkatle okuduktan sonra cümlenin sizin durumunuzu ne ölçüde tanımladığını, ne derece yansıttığını aşağıdaki ölçeğe 1 ile 9 arasında derecelendiriniz ve maddenin sağındaki kutucuğa yazınız.

Cinsiyetiniz : Bay ☐ Bayan ☐

Beni hiç tanımlamıyor	**1**	2	3	4	**5**	6	7	8	**9**	**Beni tam olarak tanımlıyor**
					Kararsızım					

1	Çevre bilincine sahibim.	
2	Çevre sorunlarının önlenmesine yönelik stratejiler geliştiririm.	
3	Çevre ile ilgili rehabilitasyon çalışmalarına gönüllü olarak katılırım.	
4	Çevre etiği, çevrenin korunması ve sürdürülebilir kalkınma ilişkisini örneklerle açıklarım.	
5	Madenlerin ve enerji kaynaklarının üretim, dağıtım ve tüketiminin çevreye olumsuz etkilerini örneklendiririm.	
6	Enerji kaynaklarını tasarruflu kullanırım.	
7	Yenilenebilir ve yenilenemez enerji kaynaklarının avantaj ve dezavantajlarını karşılaştırırım.	
8	Yenilenebilir enerji kaynaklarını kullanmanın öneminin farkındayım.	
9	Yenilenemeyen kaynakların sürdürülebilir kullanımı açısından geri dönüşüm stratejilerini değerlendiririm.	
10	İkincil enerji kaynağı olarak hidrojenin önemini, maliyet ve sağlıklı çevre bakımından irdelerim.	
11	Farklı atık türlerini çevre ve insan sağlığına etkileri açısından değerlendiririm.	
12	Biyolojik çeşitliliğin oluşumunda ve azalmasında etkili olan faktörleri sorgularım.	
13	Bazı canlı türlerinin neslinin tehlikede olmasını nedenleriyle ortaya koyarım.	
14	Popülasyonlarda meydana gelen aşırı büyümenin olası sonuçlarını örneklendiririm.	
15	Biyolojik çeşitliliğin sürdürülebilirliğine yönelik alınması gereken önlemleri belirtirim.	
16	Çeşitli kimyasal maddelerin fayda ve zararlarını karşılaştırırım.	
17	Zararlı kimyasal maddeleri, kirlettikleri ortam ve verdikleri zarar bakımından sınıflandırırım.	
18	Atmosferdeki ozonun oluşumunu ve çevre açısından önemini açıklarım.	
19	Başlıca kükürt bileşiklerinin üretimini ve kullanımını çevre kirliliği ile de ilişkilendirerek irdelerim.	
20	Nükleer enerjiyi sosyal, ekonomik ve çevre yönüyle sorgularım.	

Aşağıdaki ifadeleri “Doğru” veya “Yanlış” olarak sınıflandırınız. (Cümlelerin yanındaki boşluklara Doğru için “D”, Yanlış için “Y” harflerini kullanınız.)

1) Enerji tasarrufu için televizyon seyredilmediği zaman “stand-by” konumunda tutulmalıdır. __

2) Nüfus artışı ve sanayileşme sonucu ortaya çıkan kentleşme, biyolojik çeşitliliği artıran faktörlerden biridir. _____

3) Hidrojen gelecek için desteklenemeyecek bir yakıttır. _____

4) Endüstride kullanılan kloroflorokarbon gazı ozon tabakasının delinmesine neden olur. _____

5) Akkor ampul atığı çevreye floresan ampul atığından daha az zarar verir. _____

6) Sıcak bölgelerde su ısıtmak için güneş paneli kullanımı çevreye dost bir uygulamadır. _____

7) Nükleer enerji kurulum maliyeti az olan bir enerji çeşididir. _____

8) Ozon atmosferin alt tabakasında çevreye zararsız üst tabakasında ise kirleticidir. _____

9) Nehirlere arıtılmadan dökülen evsel atık sular ötrofikasyona neden olur .

10) Çevreye dost yakıtların içinde kükürt elementi bulunmalıdır. _____

11) Kağıt poşetler zararlı evsel atık kategorisine girer. _____

12) Rüzgar, güneş ve su kaynaklarından üretilen enerji dünyanın geleceğini güvenceye alır._____

13) Deterjanların konsantre şekilde satışa sunulması çevre kirliliğinin azaltılmasına yönelik bir stratejidir. _____

14) Çevre sivil toplum kuruluşlarında çalışmak gönüllülük işidir. _____

15) Sürdürülebilir kalkınma, doğal kaynakların dengesini bozmadan, gelecek nesillerin ihtiyaçlarının karşılanmasına imkan vermeyi amaçlar. _____

16) Madencilik faaliyetlerinin çevreye verdiği zararlardan biri biyolojik çeşitliliği azaltmasıdır.____

17) Elektronik atıklar içerdikleri metaller dolayısıyla geri dönüşüm sürecinde gömülmelidirler.___

18) Popülasyonların aşırı büyümesi ile artan popülasyon yoğunluğu birçok canlı türünde bireylerin üretkenliğini büyük ölçüde artırır. _____

19) Çekirge salgınına karşı yapılan ilaçlamalar kelaynak kuşlarının neslinin devamını tehlikeye atmıştır. _____

20) İklim değişikliği, dünyanın sıcaklığını değiştirerek, biyolojik çeşitlilik üzerinde olumlu etkiler oluşturur. _____

APPENDIX D

ANSWER KEY FOR THE TRUE-FALSE STATEMENTS

1) Enerji tasarrufu için televizyon seyredilmediği zaman "stand-by" konumunda tutulmalıdır. Y

2) Nüfus artışı ve sanayileşme sonucu ortaya çıkan kentleşme, biyolojik çeşitliliği artıran faktörlerden biridir. Y

3) Hidrojen gelecek için desteklenemeyecek bir yakıttır. Y

4) Endüstride kullanılan kloroflorokarbon gazı ozon tabakasının delinmesine neden olur. D

5) Akkor ampul atığı çevreye floresan ampul atığından daha az zarar verir. D

6) Sıcak bölgelerde su ısıtmak için güneş paneli kullanımı çevreye dost bir uygulamadır. D

7) Nükleer enerji kurulum maliyeti az olan bir enerji çeşididir. Y

8) Ozon atmosferin alt tabakasında çevreye zararsız üst tabakasında ise kirleticidir. Y

9) Nehirlere arıtılmadan dökülen evsel atık sular ötrofikasyona neden olur. D

10) Çevreye dost yakıtların içinde kükürt elementi bulunmalıdır. Y

11) Kağıt poşetler zararlı evsel atık kategorisine girer. Y

12) Rüzgar, güneş ve su kaynaklarından üretilen enerji dünyanın geleceğini güvenceye alır. D

13) Deterjanların konsantre şekilde satışa sunulması çevre kirliliğinin azaltılmasına yönelik bir stratejidir. D

14) Çevre sivil toplum kuruluşlarında çalışmak gönüllülük işidir. D

15) Sürdürülebilir kalkınma, doğal kaynakların dengesini bozmadan, gelecek nesillerin ihtiyaçlarının karşılanmasına imkan vermeyi amaçlar. D

16) Madencilik faaliyetlerinin çevreye verdiği zararlardan biri biyolojik çeşitliliği azaltmasıdır. D

17) Elektronik atıklar içerdikleri metaller dolayısıyla geri dönüşüm sürecinde gömülmelidirler. Y

18) Popülasyonların aşırı büyümesi ile artan popülasyon yoğunluğu birçok canlı türünde bireylerin üretkenliğini büyük ölçüde artırır. Y

19) Çekirge salgınına karşı yapılan ilaçlamalar kelaynak kuşlarının neslinin devamını tehlikeye atmıştır. D

20) İklim değişikliği, dünyanın sıcaklığını değiştirerek, biyolojik çeşitlilik üzerinde olumlu etkiler oluşturur. Y

APPENDIX E

THE LIST OF STUDENT SELF-RATING AND CORRECT ANSWER DISTRIBUTION FOR EACH ITEM

Item 1 * TF Q 5 Crosstabulation

		TF Q 5		
		True	False	Total
Item 1	does not define me at all	**2**	0	2
		100,0%	,0%	100,0%
	2	**0**	1	1
		,0%	100,0%	100,0%
	3	**1**	0	1
		100,0%	,0%	100,0%
	4	**2**	5	7
		28,6%	71,4%	100,0%
	Undecided	**6**	6	12
		50,0%	50,0%	100,0%
	6	**9**	11	20
		45,0%	55,0%	100,0%
	7	**20**	24	44
		45,5%	54,5%	100,0%
	8	**23**	15	38
		60,5%	39,5%	100,0%
	defines me completely	**15**	21	36
		41,7%	58,3%	100,0%
Total		**78**	83	161
		48,4%	51,6%	100,0%

Item 2 * TF Q 13 Crosstabulation

		TF Q 13		
		True	false	Total
Item 2	does not define me at all	**3**	8	11
		27,3%	72,7%	100,0%
	2	**7**	5	12
		58,3%	41,7%	100,0%
	3	**8**	2	10
		80,0%	20,0%	100,0%
	4	**12**	6	18
		66,7%	33,3%	100,0%
	Undecided	**25**	9	34
		73,5%	26,5%	100,0%
	6	**20**	13	33
		60,6%	39,4%	100,0%
	7	**9**	5	14
		64,3%	35,7%	100,0%
	8	**12**	11	23
		52,2%	47,8%	100,0%
	defines me completely	**6**	0	6
		100,0%	,0%	100,0%
Total		**102**	59	161
		63,4%	36,6%	100,0%

Item 3 * TF Q 14 Crosstabulation

		TF Q 14		
		True	false	Total
Item 3	does not define me at all	**22**	7	29
		75,9%	24,1%	100,0%
	2	**17**	6	23
		73,9%	26,1%	100,0%
	3	**16**	1	17
		94,1%	5,9%	100,0%
	4	**10**	4	14
		71,4%	28,6%	100,0%
	Undecided	**26**	5	31
		83,9%	16,1%	100,0%
	6	**17**	3	20
		85,0%	15,0%	100,0%
	7	**8**	4	12
		66,7%	33,3%	100,0%
	8	**13**	0	13
		100,0%	,0%	100,0%
	defines me completely	**2**	0	2
		100,0%	,0%	100,0%
Total		**131**	30	161
		81,4%	18,6%	100,0%

Item 4 * TF Q 15 Crosstabulation

		TF Q 15		
		True	false	Total
Item 4	does not define me at all	**12**	3	15
		80,0%	20,0%	100,0%
	2	**8**	4	12
		66,7%	33,3%	100,0%
	3	**7**	4	11
		63,6%	36,4%	100,0%
	4	**4**	4	8
		50,0%	50,0%	100,0%
	Undecided	**30**	9	39
		76,9%	23,1%	100,0%
	6	**13**	4	17
		76,5%	23,5%	100,0%
	7	**24**	4	28
		85,7%	14,3%	100,0%
	8	**20**	1	21
		95,2%	4,8%	100,0%
	defines me completely	**9**	1	10
		90,0%	10,0%	100,0%
Total		**127**	34	161
		78,9%	21,1%	100,0%

Item 5 * TF Q 16 Crosstabulation

		TF Q 16		
		True	false	Total
Item 5	does not define me at all	**7**	4	11
		63,6%	36,4%	100,0%
	2	**1**	5	6
		16,7%	83,3%	100,0%
	3	**3**	4	7
		42,9%	57,1%	100,0%
	4	**7**	3	10
		70,0%	30,0%	100,0%
	Undecided	**29**	8	37
		78,4%	21,6%	100,0%
	6	**15**	7	22
		68,2%	31,8%	100,0%
	7	**22**	4	26
		84,6%	15,4%	100,0%
	8	**17**	5	22
		77,3%	22,7%	100,0%
	defines me completely	**16**	4	20
		80,0%	20,0%	100,0%
Total		**117**	44	161
		72,7%	27,3%	100,0%

Item 6 * TF Q 1 Crosstabulation

		TF Q 1		
		True	**False**	Total
Item 6	does not define me at all	4	**0**	4
		100,0%	**,0%**	100,0%
	2	1	**2**	3
		33,3%	**66,7%**	100,0%
	3	1	**0**	1
		100,0%	**,0%**	100,0%
	4	1	**5**	6
		16,7%	**83,3%**	100,0%
	Undecided	9	**7**	16
		56,3%	**43,8%**	100,0%
	6	4	**9**	13
		30,8%	**69,2%**	100,0%
	7	21	**27**	48
		43,8%	**56,3%**	100,0%
	8	15	**19**	34
		44,1%	**55,9%**	100,0%
	defines me completely	10	**26**	36
		27,8%	**72,2%**	100,0%
Total		66	**95**	161
		41,0%	**59,0%**	100,0%

Item 7 * TF Q 6 Crosstabulation

		TF Q 6		
		True	false	Total
Item 7	does not define me at all	**7**	2	9
		77,8%	22,2%	100,0%
	2	**3**	0	3
		100,0%	,0%	100,0%
	3	**3**	4	7
		42,9%	57,1%	100,0%
	4	**4**	0	4
		100,0%	,0%	100,0%
	Undecided	**22**	6	28
		78,6%	21,4%	100,0%
	6	**15**	5	20
		75,0%	25,0%	100,0%
	7	**31**	3	34
		91,2%	8,8%	100,0%
	8	**29**	1	30
		96,7%	3,3%	100,0%
	defines me completely	**25**	1	26
		96,2%	3,8%	100,0%
Total		**139**	22	161
		86,3%	13,7%	100,0%

Item 8 * TF Q 12 Crosstabulation

		TF Q 12		
		True	false	Total
Item 8	does not define me at all	**5**	1	6
		83,3%	16,7%	100,0%
	2	**2**	2	4
		50,0%	50,0%	100,0%
	4	**2**	1	3
		66,7%	33,3%	100,0%
	Undecided	**8**	4	12
		66,7%	33,3%	100,0%
	6	**19**	2	21
		90,5%	9,5%	100,0%
	7	**23**	3	26
		88,5%	11,5%	100,0%
	8	**25**	3	28
		89,3%	10,7%	100,0%
	defines me completely	**53**	8	61
		86,9%	13,1%	100,0%
Total		**137**	24	161
		85,1%	14,9%	100,0%

Item 9 * TF Q 17 Crosstabulation

		TF Q 17		
		True	**False**	Total
Item 9	does not define me at all	5	**3**	8
		62,5%	**37,5%**	100,0%
	2	8	**2**	10
		80,0%	**20,0%**	100,0%
	3	2	**3**	5
		40,0%	**60,0%**	100,0%
	4	5	**5**	10
		50,0%	**50,0%**	100,0%
	Undecided	14	**18**	32
		43,8%	**56,3%**	100,0%
	6	18	**9**	27
		66,7%	**33,3%**	100,0%
	7	15	**16**	31
		48,4%	**51,6%**	100,0%
	8	12	**13**	25
		48,0%	**52,0%**	100,0%
	defines me completely	7	**6**	13
		53,8%	**46,2%**	100,0%
Total		86	**75**	161
		53,4%	**46,6%**	100,0%

Item 10 * TF Q 3 Crosstabulation

		TF Q 3		
		true	**False**	Total
Item 10	does not define me at all	7	**13**	20
		35,0%	**65,0%**	100,0%
	2	4	**1**	5
		80,0%	**20,0%**	100,0%
	3	2	**5**	7
		28,6%	**71,4%**	100,0%
	4	0	**10**	10
		,0%	**100,0%**	100,0%
	Undecided	7	**34**	41
		17,1%	**82,9%**	100,0%
	6	6	**16**	22
		27,3%	**72,7%**	100,0%
	7	5	**21**	26
		19,2%	**80,8%**	100,0%
	8	4	**13**	17
		23,5%	**76,5%**	100,0%
	defines me completely	4	**9**	13
		30,8%	**69,2%**	100,0%
Total		39	**122**	161
		24,2%	**75,8%**	100,0%

Item 11 * TF Q 11 Crosstabulation

		TF Q 11		
		True	**False**	Total
Item 11	does not define me at all	2	**2**	4
		50,0%	**50,0%**	100,0%
	2	3	**2**	5
		60,0%	**40,0%**	100,0%
	3	5	**4**	9
		55,6%	**44,4%**	100,0%
	4	3	**4**	7
		42,9%	**57,1%**	100,0%
	Undecided	13	**14**	27
		48,1%	**51,9%**	100,0%
	6	15	**25**	40
		37,5%	**62,5%**	100,0%
	7	11	**21**	32
		34,4%	**65,6%**	100,0%
	8	12	**10**	22
		54,5%	**45,5%**	100,0%
	defines me completely	6	**9**	15
		40,0%	**60,0%**	100,0%
Total		70	**91**	161
		43,5%	**56,5%**	100,0%

Item 12 * TF Q 20 Crosstabulation

		TF Q 20		Total
		true	**False**	
Item 12	does not define me at all	1	**3**	4
		25,0%	**75,0%**	100,0%
	2	1	**5**	6
		16,7%	**83,3%**	100,0%
	3	1	**10**	11
		9,1%	**90,9%**	100,0%
	4	2	**7**	9
		22,2%	**77,8%**	100,0%
	Undecided	5	**25**	30
		16,7%	**83,3%**	100,0%
	6	4	**15**	19
		21,1%	**78,9%**	100,0%
	7	15	**28**	43
		34,9%	**65,1%**	100,0%
	8	5	**21**	26
		19,2%	**80,8%**	100,0%
	defines me completely	5	**8**	13
		38,5%	**61,5%**	100,0%
Total		39	**122**	161
		24,2%	**75,8%**	100,0%

Item 13 * TF Q 19 Crosstabulation

		TF Q 19		
		True	false	Total
Item 13	does not define me at all	**2**	2	4
		50,0%	50,0%	100,0%
	2	**1**	2	3
		33,3%	66,7%	100,0%
	3	**6**	3	9
		66,7%	33,3%	100,0%
	4	**10**	1	11
		90,9%	9,1%	100,0%
	Undecided	**19**	3	22
		86,4%	13,6%	100,0%
	6	**22**	5	27
		81,5%	18,5%	100,0%
	7	**37**	3	40
		92,5%	7,5%	100,0%
	8	**11**	6	17
		64,7%	35,3%	100,0%
	defines me completely	**25**	3	28
		89,3%	10,7%	100,0%
Total		**133**	28	161
		82,6%	17,4%	100,0%

Item 14 * TF Q 18 Crosstabulation

		TF Q 18		
		true	**False**	Total
Item 14	does not define me at all	3	**2**	5
		60,0%	**40,0%**	100,0%
	2	4	**4**	8
		50,0%	**50,0%**	100,0%
	3	3	**5**	8
		37,5%	**62,5%**	100,0%
	4	4	**9**	13
		30,8%	**69,2%**	100,0%
	Undecided	15	**17**	32
		46,9%	**53,1%**	100,0%
	6	10	**12**	22
		45,5%	**54,5%**	100,0%
	7	9	**23**	32
		28,1%	**71,9%**	100,0%
	8	3	**16**	19
		15,8%	**84,2%**	100,0%
	defines me completely	7	**15**	22
		31,8%	**68,2%**	100,0%
Total		58	**103**	161
		36,0%	**64,0%**	100,0%

Item 15 * TF Q 2 Crosstabulation

		TF Q 2		
		true	**False**	Total
Item 15	does not define me at all	1	**5**	6
		16,7%	**83,3%**	100,0%
	2	3	**2**	5
		60,0%	**40,0%**	100,0%
	3	6	**8**	14
		42,9%	**57,1%**	100,0%
	4	4	**5**	9
		44,4%	**55,6%**	100,0%
	Undecided	7	**21**	28
		25,0%	**75,0%**	100,0%
	6	4	**27**	31
		12,9%	**87,1%**	100,0%
	7	10	**26**	36
		27,8%	**72,2%**	100,0%
	8	8	**12**	20
		40,0%	**60,0%**	100,0%
	defines me completely	2	**10**	12
		16,7%	**83,3%**	100,0%
Total		45	**116**	161
		28,0%	**72,0%**	100,0%

Item 16 * TF Q 4 Crosstabulation

		TF Q 4		
		True	false	Total
Item 16	does not define me at all	**7**	0	7
		100,0%	,0%	100,0%
	2	**4**	3	7
		57,1%	42,9%	100,0%
	3	**8**	0	8
		100,0%	,0%	100,0%
	4	**9**	2	11
		81,8%	18,2%	100,0%
	Undecided	**22**	1	23
		95,7%	4,3%	100,0%
	6	**23**	2	25
		92,0%	8,0%	100,0%
	7	**39**	4	43
		90,7%	9,3%	100,0%
	8	**21**	5	26
		80,8%	19,2%	100,0%
	defines me completely	**11**	0	11
		100,0%	,0%	100,0%
Total		**144**	17	161
		89,4%	10,6%	100,0%

Item 17 * TF Q 9 Crosstabulation

		TF Q 9		
		True	false	Total
Item 17	does not define me at all	**6**	4	10
		60,0%	40,0%	100,0%
	2	**3**	5	8
		37,5%	62,5%	100,0%
	3	**6**	9	15
		40,0%	60,0%	100,0%
	4	**6**	4	10
		60,0%	40,0%	100,0%
	Undecided	**23**	9	32
		71,9%	28,1%	100,0%
	6	**14**	7	21
		66,7%	33,3%	100,0%
	7	**23**	16	39
		59,0%	41,0%	100,0%
	8	**13**	7	20
		65,0%	35,0%	100,0%
	defines me completely	**2**	4	6
		33,3%	66,7%	100,0%
Total		**96**	65	161
		59,6%	40,4%	100,0%

Item 18 * TF Q 8 Crosstabulation

		TF Q 8		
		true	**False**	Total
Item 18	does not define me at all	4	**6**	10
		40,0%	**60,0%**	100,0%
	2	1	**2**	3
		33,3%	**66,7%**	100,0%
	3	5	**5**	10
		50,0%	**50,0%**	100,0%
	4	3	**8**	11
		27,3%	**72,7%**	100,0%
	Undecided	13	**14**	27
		48,1%	**51,9%**	100,0%
	6	14	**12**	26
		53,8%	**46,2%**	100,0%
	7	11	**18**	29
		37,9%	**62,1%**	100,0%
	8	8	**19**	27
		29,6%	**70,4%**	100,0%
	defines me completely	5	**13**	18
		27,8%	**72,2%**	100,0%
Total		64	**97**	161
		39,8%	**60,2%**	100,0%

Item 19 * TF Q 10 Crosstabulation

		TF Q 10		
		true	**false**	Total
Item 19	does not define me at all	9	**21**	30
		30,0%	**70,0%**	100,0%
	2	1	**3**	4
		25,0%	**75,0%**	100,0%
	3	2	**11**	13
		15,4%	**84,6%**	100,0%
	4	8	**7**	15
		53,3%	**46,7%**	100,0%
	Undecided	5	**35**	40
		12,5%	**87,5%**	100,0%
	6	1	**19**	20
		5,0%	**95,0%**	100,0%
	7	4	**24**	28
		14,3%	**85,7%**	100,0%
	8	4	**4**	8
		50,0%	**50,0%**	100,0%
	defines me completely	2	**1**	3
		66,7%	**33,3%**	100,0%
Total		36	**125**	161
		22,4%	**77,6%**	100,0%

Item 20 * TF Q 7 Crosstabulation

		TF Q 7		
		True	**false**	Total
Item 20	does not define me at all	1	**8**	9
		11,1%	**88,9%**	100,0%
	2	1	**2**	3
		33,3%	**66,7%**	100,0%
	3	1	**6**	7
		14,3%	**85,7%**	100,0%
	4	1	**7**	8
		12,5%	**87,5%**	100,0%
	Undecided	6	**33**	39
		15,4%	**84,6%**	100,0%
	6	3	**19**	22
		13,6%	**86,4%**	100,0%
	7	9	**26**	35
		25,7%	**74,3%**	100,0%
	8	0	**12**	12
		,0%	**100,0%**	100,0%
	defines me completely	1	**25**	26
		3,8%	**96,2%**	100,0%
Total		23	**138**	161
		14,3%	**85,7%**	100,0%