

The views of the classroom teacher candidates related to the environmental science course and the environmental sensibility

Nilgün YENICE

Adnan Menderes University, Education Faculty, Department of Primary Science Education, Aydin, TURKEY

A. Seda SARACALOĞLU

Adnan Menderes University, Education Faculty, Department of Educational Programs, Aydin, TURKEY

Ö. Cem KARACAOĞLU

Ankara University, Education Faculty, Department of Educational Programs, Ankara, TURKEY

Email: nvenice@gmail.com, sedasaracal@gmail.com

Received 9 Jul., 2007

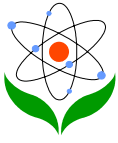
Revised 2 Feb., 2008

Contents

- [Abstract](#)
 - [Introduction](#)
 - [Method of this research](#)
 - [Results](#)
 - [Discussion](#)
 - [Suggestions](#)
 - [References](#)
-

Abstract

This research has been performed to determine the effects of the “Environmental Science Course” within the curriculum of Classroom Teacher Program in Education Faculty on the environmental sensibilities of the students, and the ideas of the students related to the effectiveness of their environmental education. The research has been performed on subjects of a 100-person group, who are sophomore students in Classroom Teacher Program, Education Faculty in Adnan Menderes University, Turkey and enrolled in the “Environmental Science Course”. As data collection tool, the scale developed by Çabuk and Karacaoglu



(2003), having a Cronbach's Alpha reliability coefficient of 0.81 has been used. The research has a semi-experimental model since "the before-and-after-design" existing within the experimental method has been used in the study so as to assess the target accomplishment level of "the Environmental Science Course". The scale has been applied at the beginning and at the end of the course in order to appraise the sufficiency of the "Environmental Science Course".

In order to examine whether some certain personal characteristics of the students lead to any difference in their environmental sensibilities, the independent t-test has been applied. In order to pinpoint the behaviors of the students related to environmental sensibility, and whether their environmental (air, soil, water pollution, population increase and ecological balance) education was sufficient, dependent t-test has been applied to the data at the beginning and at the end of the "Environmental Science Course" in the light of students' ideas.

The environmental sensibilities of the students differ according to their follow-up status for the programs and articles about environment on media (TV, radio, newspaper, magazine etc.); however, do not differ meaningfully regarding the following variables such as gender, age, having a membership in an institution related to environment, having relatives interested in environment, or participating in activities / meetings related to environment. In addition, it has been stated that the students having "the Environmental Science Course" are more sensitive to environment, and develop positive ideas about the sufficiency of the environmental education which they have at the faculty.

Key words: Environment, Environmental Sensibility, Environmental Science Course, University Students.

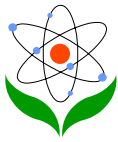
Introduction

The mankind has both affected the environment and has been affected by the events in the environment since its existence. As the technology developed, most of the countries have assumed and used the environment as an infinite resource, and could not realize that the renewal capacity of the environment is limited. Consequently, the systems and livings which are hard or even impossible to be revived have become extinct from the environment that is the common asset of mankind.

Subsequent to the rapidly increasing population, unplanned urbanization, decreasing and disappearing natural resources, limited energy, and environmental pollution, the environment in which the humans can live has been limited. Nowadays, the significance of the environment has become familiar to everyone, and has begun to direct all kinds of processes.

Rapidly rising population in the world and the ensuing demand rise have formed a life style which now much produces and much consumes the variety. This swift development increases the life standards of the individuals whereas it also causes many elements in the environment to disappear or change.

This problem has also gradually reached an undesirable extent in Turkey. Natural balance has been steadily destroyed. As a result of the economic improvement efforts in the world, as well as in Turkey at the last two decades, pessimistic outcomes such as the rise in the consumption of natural resources, the destruction of the nature, the pollution and disappearing of soil, air,

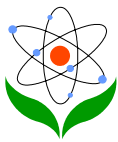


and water which constitute the base of the living beings, and the increase in diseases have been explicitly witnessed.

When the environment-related literature was investigated, especially it was understood that the gaining of the environmental conscious was on the front. Especially developed countries have conducted many of the studies related to the pollution of air and water, acid rains, chemical wastes, energy sources and global warming which were proved the hazardous to the environment and consequently to the human health in order to make the people conscious. But, these kinds of studies are not enough to inform the public, especially students and formal education is necessary for this information. So, school curriculum should be designed to make it easier. This kind of conscious could be achieved with well-designed curricula that include environment-based concepts because studies in the literature state that schools play an important role in the formation of children's positive attitudes towards to environment and the formal education system is the most convenient for incorporating EE (Environmental Education) programmes (Smyth, 1987; Spiropoulou, Roussos and Voutirakis, 2005). Especially, applying this kind of studies in the lack of environmental education and realizing the facilities done by the combined study of both ministry of environment and ministry of education, it is believed that the educational programs in Turkey must be improved again to arise the environmental conscious through subjects. In parallel to development in the educational systems and government policies, textbooks have been prepared and distributed by the government to the primary school students for the last two years. In the current textbooks, it is seen that chapters or units about environment and daily knowledge are widely placed. It is thought that these textbooks can partially prevent this lack of knowledge (Özmen & Karamustafaoglu, 2006).

Along with the legal measures taken to make the people be aware of the environment, environmental education turns out to have immense importance so as to enhance the thoughtfulness of the people (Fegebank, 1990; Asmaz, 1988; Dogan, 1988). The aim of the environmental education has been determined as "to help the individuals who have training and education to gain the knowledge, skills, and value judgments which provides them to behave as responsible individuals in environmental subjects". The environmental education which has an interdisciplinary notion, should not only be limited to only formal education; but should also sustain as a lifelong activity, meanwhile should provide the individuals with sensitive and ethical values to environment, and should protect the productive potential and aesthetical values of the environment. The most important factor in this effort is unquestionably the teachers who have high self-perfections and environmental sensibilities (Ünal et al., 2001; Altin et al., 2002; Tabak et al., 2003).

Spreading the environmental sensibility and awareness all over the society can only be achieved by conscious environmental educators. The environmental education given by cognizant educators initiated at the preschool period should not be intended to load encyclopedic information into the minds of individuals, instead it should guide them to recognize the environmental threats, think and find solutions, and adopt the idea and consciousness as "For a high quality life, a clean, balanced, and healthy environment is required" (Çelen et al., 2005). Nevertheless, researches in Turkey point out that sufficient and rigorous environmental education could not be offered for the citizens (Dogan, 1998; Ünal, 1998; Dastan, 1999; Bahar, 2000; Yilmaz et al., 2002). Before summarizing the reachable sources about environmental education, it's seen helpful to inform about Turkish education system. According to this, Turkish education system includes four main periods; preschool, primary, secondary and higher education levels



(<http://www.meb.gov.tr/english/indexeng.htm>). The numbers of teachers, students, and schools belonging in Turkey are given in Table 1.

Table 1. Current Situation in Education in 2006-2007 Periods

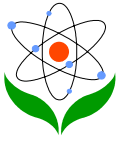
Levels of Education	Number of Students	Number of Teachers	Number of Schools
Pre-school	640.849	24.775	20.675
Primary school	10.846.930	402.829	34.654
Secondary school	3.386.717	187.665	7.934
Higher education*	1.969.086	79.555	1.243
Total	16.843.582	694.824	64.506

* 2005-2006 academic year

Preschool education: Preschool education involves the education of children in the age group of 3 to 5 who have not reached the age of compulsory primary education, on an optional basis. Preschool education institutions may be established as independent infant schools or, where considered necessary, as nursery classes within a primary education school or as practice classes affiliated to other related education institutions. Preschool education institutions, independent nurseries are opened as nursery classes and practical classes within formal and nonformal education institutions with suitable physical capacity.

Primary education: Primary education involves the education and training of children in the age group of 6 to 14. Primary education is compulsory for all male and female citizens and is free at State schools. The objective of primary education is to ensure that every Turkish child acquires the necessary knowledge, skills, behavior and habits to become a good citizen and is raised in accordance with the concept of national morals and that he/she is prepared for life and for the next level of education in accordance with his/her interests, talents and capabilities. Primary education institutions consist of eight-year schools where continuous education is provided and primary education diplomas are awarded to the graduating students (<http://www.meb.gov.tr/english/indexeng.htm>). Science lessons are given between 4th and 8th level at the program.

Secondary education (lycees): This is at least a 3-year program following the primary school education. It covers for ages of 14-17. This education is noncompulsory and free of charge. Secondary education includes all education institutions of a general or vocational and technical character of at least three years following primary education. The objectives of secondary education are to give students a common minimum overall knowledge, to familiarize them with problems of the individual and society and to seek solutions, to ensure that they gain the awareness that shall contribute to the socio-economic and cultural development of the country and to prepare them for higher education, for both higher education and a profession or for life and employment, in line with their interests and aptitudes.



Higher education: Higher education comprises of the education institutions at every stage based on secondary education with the term of at least two years. The purpose of higher education is to raise the students in line with their interests, capabilities and skills according to the human force necessity of the society at higher level and various stages and science policy of the country, to conduct research in scientific areas, to make publications illustrating the research and investigation results and promoting science and technology, to provide opinion on researches and investigations requested by the Government, to disclose the scientific data that shall raise the general level of Turkish society and enlighten the public opinion and to provide nonformal education services. Higher education institutions; are universities, faculties, institutes, higher schools, vocational higher schools, conservatories, research and application centers. The total rate of schooling for higher education is 38.6% and the formal education schooling rate is 25.0% in Turkey.

(http://www.yok.gov.tr/egitim/raporlar/kasim_2005/kasim_2005.doc)

Situation of environmental education in Turkish education system can be explained in two steps;

1. Primary level: Environmental education issues are presented in lesson of *science and nature knowledge* in nature conservation chapter.
2. Secondary level: Environmental education lesson is called *Environment and Human* at secondary level in Turkey and it is optional. In addition to environmental education issues to be found in content of biology lesson at K9 level.

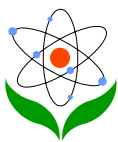
There are some difficulties to effective environment education in Turkey. These can be summarized as follows,

1. Explanation inconsistency of goals and principles in preparing education programs,
2. Because of the need for equipments, environmental activities are not practiced,
3. Lack of expert teachers in environmental education.

Government and citizenships have various responsibilities for conservation of environment and prevention of pollution. A reason of current environment problem is lack of consciousness and information about environment. A person who has not had environmental consciousness might not perceive people lives in the future (Gökdere, 2005).

Many researches have been done regarding environmental education. Short synopses of some of these studies are as follows:

Benton (1994) applied pre-test and post-test to 88 students registered to environmental management program and discovered that there has been noticeable amelioration in students' attitudes towards the environment. The author utilized an attitude scale towards the environment in the study and found out that "the students having technical education had the knowledge about the environment; however were not interested in environment sufficiently, acted less voluntarily in the activities related to environmental friendship, and had less directing behaviors related to environment".



In the research related to “Environmental Education and its Place within the High School Curriculum”, Örnek (1994) investigated the interests of the students to environmental subjects and the intensity of the environmental know-how given in the biology and environment-human chapter. It has been spotted that the students were deeply interested in the environmental subjects, especially the subject of “The Effects of the Environmental Pollution on the Human Health”.

In their study of MacDonald & Hara (1994), based on a random sample of college students at a medium-sized midwestern university, tested the impact of gender on environmental concern while controlling for class standing and family income. The sample used in the final analysis consisted of 340 white students and 25 nonwhite students. Males were found to be slightly more likely than females to express environmental concern.

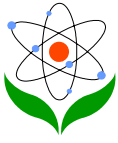
In the research that was conducted on all the students who attended to Hacettepe university education faculty of chemistry department; their level of readiness to concepts related to environment was investigated. According to this, it was observed that the majority of the students did not know the main concepts and they didn't form environmental consciousness, they had misconceptions. (Yücel & Morgil, 1998).

Seçken et al. (1998) investigated the correlations between the chemical events and the environment/life perceived by the high school students and found that the chemical event-environment and the chemical event-life connections could not be developed thoroughly in students' minds at high schools. The answers given by the students revealed that the students established more clear and close correlations between chemistry and environment. It has been stated that especially the actual environmental and environmental protection events (such as acid rains' being a chemical event, photosynthesis, ozone layer's becoming thinner, etc.) have been often emphasized by the students.

In Dastan's (1999) study, it has been determined that sufficient environmental education has not been given in Turkey, and the most effective solution in the environmental problems would be making the society be knowledgeable and conscious about the environment.

Ridener (1999) aimed at determining environmental attitudes of various college students. For this purpose, a pretest-posttest experimental design was used to compare the ecological worldviews of college students among different academic majors. Social science, science, and business majors and undecided students (n=168) received environmental-sociology instruction based on constructivism. The results indicated that students responded differently, according to their academic majors, to an environmental education program that was designed with a critical analysis and a constructivist orientation. Both science and social science majors showed the most increases in ecological attitudes from pretest to posttest measurements, whereas business and undecided majors showed the least change. In short, science majors had higher scores on the Ecological Worldview Scale, indicating a more pro-environmental attitude, than did business majors.

In the research done by Topaloglu (1999), it has been pointed out that the attitudes of the individuals related to environment, and their consciousness level about environment are important factors in preventing the environmental pollution. Besides, as a result of the discussion of the point of views of the individuals about the environmental pollution and attitudes of them about this subject, the significance of the education in constituting the environmental consciousness has appeared.



Ünal & Dimiski (1999) compared the environmental education given in Turkey with the program practiced by UNESCO-IEEP (International Environmental Education Program) in aspects of purpose, principal, and content. By this research, they aimed to gain an international perspective to the new studies about the environmental education at and before the universities in Turkey. After Rio meeting, in the framework of Local Agenda 21 prepared at Turkey, certain assessments have been done regarding the purposes and applications of the environmental education (Dogan & Akaydin, 2000).

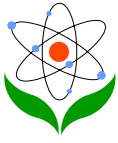
In the research by Soran (2000) a questionnaire to assess students' knowledge related to environment was conducted on the 222 students attending to Hacettepe University Faculty of Education Biology Department. The research results pointed out that biology teacher candidates didn't have enough knowledge about environment and prep school students had less knowledge than the ones in other classes.

Bahar (2000) asserted that most of the university students (N=200) either did not have any information or had incorrect information about the mostly interested subjects in public such as ozone layer's getting thinner, and greenhouse effect before taking the "Environmental Science Course". Getting such results among the students who had already taken the "Environment and Human" course at high school put forth the severity of the situation.

Pooley & O'Connor (2000) applied the environment attitude scale they developed on 92 individuals having various educational levels between 18-55 ages who had taken their courses before. They compared the obtained findings with the course curriculum. At the end of the research, they found that the attitude and behavior aspects were ignored, and environmental information was mostly discussed in the course curriculum. The research has been focused on the beliefs, feelings, and attitudes of the target group with regard to environment. According to the obtained program data and research results, the weight during the environmental education should be payed mostly on the attitude and behavior aspects in order to educate people who are friendly to environment, instead of giving information which has been the main practice in current education system.

Uljas (2001) investigated the effects of the social identity and social values on the environmental attitudes and behaviors. The scale inwhich local and global environmental problems had taken place was applied on 416 people. In accordance with this, social acceptance of the individual, his/her interest in group norms could affect his/her perception about environmental problems. Adopting to the values of the group which the individual felt appertained to could affect his/her environmental perception, attitude, and behavior; however this situation would not be much influential on his/her global concern. The social identity might shape the attitudes of the individual related to his/her family, as well as his/her interests and attitudes vis-à-vis environment.

Kilbourne et al. (2001) performed an international research regarding "the relationship between the environmental attitudes of the university students and the dominant social paradigm". The research was performed on 386 students from USA, England, and Denmark universities. The research exhibited that there was a meaningful correlation between the environmental attitudes of the students and the economical, political, technological aspects of the social paradigm. Hence, the higher dominant social paradigm scores, the less the students had perceptions related to environmental problems. The environmental attitudes of the university students from USA were found much lower than the university students from Denmark and England. As England and Denmark were compared, it was found that the



environmental attitudes of the students from Denmark were more positive when compared with the students from England. This situation might be explained by the different socio-cultural structures of the countries.

In the light of the research which they have performed to investigate the effect of the ecological education based on the multiple intelligences theory on the ecological success and attitudes of the 9th grade students, Asci & Demircioglu (2002) alleged that applying a course curriculum based on multiple intelligences theory was more effective than the traditional instructional method in the students' ecological successes; however there was actually no difference between the experiment and control groups in the aspect of ecological attitudes.

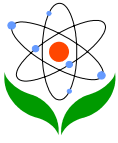
Yilmaz et al. (2002) intended to determine the knowledge level of the high school and university students related to the environment, environmental concepts and problems. At the end of the research, it has been found that the knowledge level of the students about environment was insufficient, they could not learn the environmental concepts adequately, and they did not exactly know the environmental problems. Also, it has been claimed that especially the students who take the chemistry course at high school obtained their environmental information mostly from written and visual media.

Subsequent to a research where the attitudes of the teacher candidates with regard to environmental problems have been investigated, Sama (2003) has contended that the environmental attitudes of the students differed regarding their genders, the programs they were enrolled, their living styles and settlement types, fathers' education and occupation, and their family incomes; however did not noticeably change in accordance with their classes and geographical region they lived.

Sahin et al. (2004) compared the environmental education approaches where the students were active versus where the traditional instructional methods were used. It has been highlighted that the student-oriented environmental education was more effectual in learning the concepts meaningfully.

In the research done by Ekici (2005), it has been specified that the attitudes of the high school students concerning the environmental education varied in accordance with their genders, classes, low and high socio-economical levels of their schools; however there was no evident difference vis-à-vis the type of their high schools.

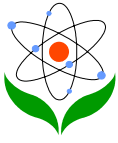
Çelen et al. (2005) performed a research on Ankara University Health Education Faculty Students, intended to examine the knowledge of the students related to environmental sensibility and the related factors. With regard to the research, it has been determined that the age, the education program, and having environmental courses at different levels of the education program did not make any statistically meaningful difference on the environmental sensibility; however, girls were more sensitive to environmental subjects than the boys. Most of the students thought that the environmental course should be a must course at primary and high school. The students considered air pollution, environmental pollution, and solid wastes as the most important environmental problems, they deemed the problems such as nuclear power station accidents, and the ozone layer's becoming thinner secondarily. Besides, they mostly trusted in volunteer institutions and universities in solving the environmental problems.



Gökdere (2005) stated that the existing lack of relevant research may limit the functionality of Environmental Education (EE) programs in Turkey. In this study, the goal was to develop an environmental conscious database that would allow effective planning of EE. Specifically, the study was conducted to provide information on the environmental knowledge of primary education in a city of Turkey. Standard of living and environmental knowledge of persons are more important factors that effected for occur of conscious of environment. Therefore, the research must investigate the level of environment knowledge of people according to their living environment and standard. The study purpose was to determine environmental knowledge level of primary students in Turkey and it was planned to help develop a baseline database that would allow effective planning of Environmental Education for primary education in Turkey. In this research, a case study approach was used, and data gathered with the help of survey method. The research surveyed 524 sixth, seventh and eight-grade students in six schools in the city center, town and village of Trabzon. The results showed that environmental factors are effect children's environmental knowledge level. It is understood that if children are provided with richer environmental and learning material in their live, it would enhance children's environmental knowledge. It must be added some issues as natural environment, basis of life, source of energy, structure of human, pollution of environment to the existing aspects developed in science curriculum at primary level.

Seçken (2005) aimed at examining the relationship between the attitude towards technology and global environmental awareness and whether computer aided education has an influence on the development of global environmental awareness. In the study, the technological attitudes scale used within the scope of the study was prepared by Yavuz (2005) and analyzed by Morgil and Yücel (2005). The sampling of the study is consisted of a total of 247 students studying at Hacettepe University Faculty of Education Chemistry Education Department. 173 of these students have participated in the study on “The Development of the Global Environment Awareness Scale” and 64 to internet based education applications. A 30-hour computer and internet practice was carried out with the students. Initial and final “global environment awareness” and “technology attitude” scale tests were applied on these students before and post the global environment education in the internet medium. Regression analysis and paired-sample t-test were carried out in the study in order to find out to what level technology awareness contributes to the creation of global environment awareness and the effects of the computer aided education to attitudes towards global environment awareness and the use of technology. It has been found that the researches of the students on the internet led to a statistically significant increase in their scores in attitudes towards technology, and again, as a consequence of the study that the students carried out on the internet medium about global environment, and the activities and homework they prepared, that there was a statistically significant increase in their scores on attitudes towards global environment.

The purpose of Tuncer et al's (2005) study is to investigate the effect of region (rural and urban) and gender on 6th grade students' attitudes toward the environment. A total of 135 students (n=65 girls; n=70 boys) participated in the study. A 45-item Likert type scale consisting of four dimensions was used to measure students' environmental attitude. These dimensions (awareness for environmental problems, general attitude about solutions, awareness of individual responsibility and awareness on national environmental problems) constitute the dependent variables of the study. A MANOVA was conducted for specified purpose. Results showed that there was a significant effect of region on the collective dependent variables. Univariate ANOVAs indicated that students in the urban area had greater awareness for environmental problems, individual responsibility and national environmental problems. On the other hand, no statistically significant effect of gender was found.



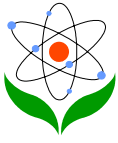
The research by Özmen, Çetinkaya Çakmakçi and Nehir (2005), which was made in order to determine university students' attitudes towards environment problems and the factors affecting those, was performed to the 410 students who attend to faculty of medication and vocational school of health services. 84.9 percent of the students says that they have never taken part in any facilities of environmental foundations as they are sensible to issues related to environment though.

According to this; the students taking part in the research has taken classes about environmental issues in their pre-university period. The great majority of the students (96.8 percent) isn't a member of a environmental foundation. The students state that a class about the environment 92.0% at primary school, 71.5% at high school, 44.9% is essential. Besides environmental views of girls, participants who are 20 and older, the young who has lived in urban areas for a long time, the participants who have university graduate parents and the ones who have less than three brothers or sisters are higher. On the other hand the students' environmental attitudes changes according to income of their families. Additionally environmental attitudes of the students sensible of environmental issues are higher.

In a research that studies environment friendly behaviours among preservice preschool teacher candidates (N=352); how conscious they are about protecting environment, their behaviours related to the environmental conservation and the variables affecting these behaviours was investigated. According to this, although attitudes of teacher candidates towards environmental consciousness and their knowledge of environment are high, it is concluded that this has no effect on behaviours related to the environmental conservation (Erten, 2005).

In the research by Uzun and Saglam that investigates the effect of socio-economic status on environmental awareness and environmental academic success, the study administered to scales called scale for environment awareness and scale for academic success to 258 students from high schools in Ankara. Students were grouped according to the level of income of their parents, the number of members in their families educational level of; which produced high, middle, and socio-economic statuses and it was investigated whether there were significant differences among the groups regarding environmental awareness and environmental academic success or not. According to results of the research, it was observed that middle socio-economics group of students' average environmental consciousness was higher. From the point of environmental academic success, it was observed that average academic success of the students with high socio-economic status was higher. Besides it was observed that there was a linear relation between environmental awareness that students were wanted to have and environmental academic success.

In the study by Erol and Gezer (2006) that was conducted on 225 sophomore students of Faculty of Elementary Education at Pamukkale University in Denizli, students' attitude towards environment and environmental issues were found low in general. Furthermore it was observed that environmental attitudes of girls was higher than that of boys' at a significant level. Although students' attitudes toward environmental issues differs regarding students' mothers' occupation, age and number of siblings, attitudes towards environmental issues didn't differ regarding fathers' occupation, parents' educational level, their house, families' economic status and whether the students took lesson about environment before or not. Yalçın and Dogan (2007) conducted the research, that was aimed to identify the effect of science and technology lessons over primary school students' attitudes towards environment, on the 4th and 5th grade primary school students in Çanakkale. The result of the research, students' attitudes toward environment was high. Although 4th and 5th grade primary school students'



attitude towards environment changed regarding to level of class, there was not a significant difference between schools they attended.

It has been seen that some of the studies abstracted above and carried out in Turkey (Seçken et al., 1998; Yücel & Morgil, 1998; Soran et al, 2000; Yilmaz et al., 2002; Sama, 2003; Sahin et al., 2004; Erten, 2005; Seçken, 2005; Erol ve Gezer, 2006) have been performed on teacher candidates. Only one of them (Sahin et al., 2004) has been performed on Biology and Classroom Teacher Program Students. Thus, the necessity of the investigation of the environmental sensibilities on Classroom Teacher Candidates who have a critical importance has become apparent, especially in developing and enhancing the environmental consciousness. The present research has arisen from this necessity to enlighten the environmental sensibilities of the teacher candidates. It is hoped that the present research will be useful for biologists and environmental scientists, program developers, educational institutions' staff in all levels, students, and the academicians studying in this area. Facing many environmental problems, Turkey lacks enough scientific research about the issue. In this context, this study aims to be illuminating so as to reflect the viewpoints of classroom teacher candidates regarding Environmental Science Course and environmental sensibility, which should be emphasized boldly.

The purpose of the research

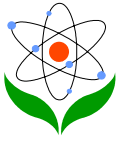
The general purpose of this research is to determine the effects of the “Environmental Science Course” within the curriculum of Education Faculty, Classroom Teacher Program on the environmental sensibilities of the students. Intended for this general purpose, the following questions have been tried to be clarified:

1. Do the students' environmental sensibilities differ vis-à-vis their
 - a) genders,
 - b) ages,
 - c) membership status in an institution related to environment,
 - d) having individuals interested in environment in the family,
 - e) participating in activities / meetings related to environment,
 - f) follow-up status for the programs and articles about environment on media (TV, radio, newspaper, magazine etc.)?

2. Do the students' ideas about the following subjects differ subsequent to the “Environmental Science Course”?
 - a) their ideas about their behaviors related to their environmental sensibilities,
 - b) air pollution,
 - c) water pollution,
 - d) soil pollution and green area problems,
 - e) population increase and ecological balance,
 - f) their ideas about the sufficiency of their education at the faculty.

Method of this research

According to Tekin (2000), “To understand whether the expectations were realized or not, or how much they were realized, if realized, direction and amount of the change in the students' behaviors must be known” so as to elucidate the success level, This research has a



semi-experimental model since “the before-and-after-design” existing within the experimental method has been used in order to evaluate “the Environmental Science Course” with regard to its level of attaining target. “The before-and-after-design” provides the chance of determining the target accomplishment level of the program in the present condition without interfering any experimental procedures or processes. Since there is no control or comparison group in “the before-and-after-design”, tests should be given to all groups at the same time period, and the variables which are thought to be effective in attaining target level should be examined meticulously, by preparing tests which will be applied to the subjects group at the beginning and at the end of the course, in order to achieve realistic results (Fitz-Gibbon & Morris, 1988; Erden, 1993; Balcı, 2001).

Population and subjects

The Education Faculties having students at Primary Education Classroom Teacher Program constitute the population of the research. As study population, Adnan Menderes University Education Faculty has been chosen. All of the 2nd grade students who had the “Environmental Science Course” have taken place in the subjects. Hence, the 100-person study population also constitutes the subjects.

Data collection instrument

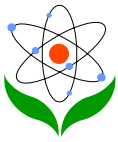
In order to explicate the effects of the “Environmental Science Course” within the curriculum of Classroom Teacher Program in Education Faculty on the environmental sensibilities of the students, a scale developed by Çabuk & Karacaoğlu (2003) has been utilized. The scale consists of 24 questions and two parts. Furthermore, questions related to personal characteristics of the students, and in the second part, the questions intended for learning the ideas of the students about whether the students are sensitive to environment or not, and whether the environmental education which they have in the scope of the courses at the faculty are sufficient or not have been accommodated. For the reliability of the scale, alpha internal consistency coefficient (α) is stated as 0.81. Factor analysis test has been used for the structure validity of the subfactors. At the end of the factor analysis, the researchers have declared that all of the 24 items determined for the test form are appropriate. The personal characteristics of the students have been obtained via the personal information forms.

The analysis of data

The data extracted from the results of the data collection tool have been analyzed by using the SPSS 11.0 statistical program in the computer media. In order to inspect whether some certain personal characteristics of the students lead to any difference in their environmental sensibilities, the independent t-test has been applied. In order to pinpoint the behaviors of the students related to environmental sensibility, and whether their environmental (air, soil, water pollution, population increase and ecological balance) education was sufficient, dependent t-test has been applied to the data at the beginning and at the end of the “Environmental Science Course” in the light of students’ ideas.

The findings and comments for the research

Findings related to first subproblem



The results of the unrelated t-test done to investigate the difference between the environmental sensibilities of the students in accordance with gender have been given in Table 2.

Table 2. Environmental Sensibility Scores of the Students in Accordance with Gender

Gender	N	\bar{X}	S	Sd	T	p
Female	54	36.43	3.09	98	0.24	0.81
Male	46	36.59	3.58			

As can be seen from Table 2, there is not a statistically meaningful difference on the environmental sensibilities of the students vis-à-vis their genders [$t(98)=0.24$, $p>0.05$]. The arithmetic average of the females ($x=36.43$) is very close to the arithmetic average of the males ($x=36.59$). Thus, it can be said that females and males have similar approaches related to their environmental sensibilities. This finding is controversial with the data gathered from the studies of other researchers (MacDonald & Hara, 1994; Şama, 2003; Çabuk & Karacaoğlu, 2004; Özmen et al., 2005; Çelen et al., 2005; Ekici, 2005; Tuncer et al., 2005; Erol & Gezer, 2006). This may be due to the differences in the sample groups, or/and varied instruments.

Generally, many studies (Şama, 2003; Çabuk & Karacaoğlu, 2004; Özmen et al., 2005; Çelen et al., 2005; Ekici, 2005) pinpoint that girls are more sensitive to environment and have more positive environmental attitudes. On the contrary, in MacDonald & Hara's (1994) research findings, environmental concern was found in the favour of males.

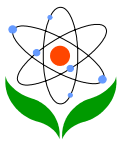
It is pleasing that the finding in this study -although controversial to other studies- indicates that boys are as sensitive as girls about the environment, which is gladsome for the male teacher candidates.

The outcomes of the unrelated t-test carried out to examine the disparity between the environmental sensibilities of the students according to age have been illustrated in Table 3.

Table 3. Environmental Sensibility Scores of the Students According to Age

Age	N	\bar{X}	S	Sd	T	p
20 and under	63	36.52	3.30	98	0.09	0.9
21 and above	37	36.46	3.35			

Table 3 demonstrates that there does not exist a statistically significant difference on the environmental sensibilities of the students according to the age groups [$t(98)=0.09$, $p>0.05$]. This manifests that the university students whose ages are between 18 and 22 have similar attitudes regarding the environment. Therefore, it can be said that the environmental sensibility is independent from the variable "age". This finding is parallel and supportive with the research findings of Çabuk & Karacaoğlu (2004), Özdemir et al. (2004), and Çelen et al. (2005). On the contrary of this result, the study made by Özmen (2005) and Erol & Gezer (2006) the students older than 21 years old, have more positive attitude toward environment.



This different result may result from using different measurement tool or working with different sample groups or both.

The results of the unrelated t-test pursued to analyze the difference between the environmental sensibilities of the students in accordance with their membership status in an institution related to environment have been provided in Table 4.

Table 4. Environmental Sensibility Scores of the Students in Accordance with Their Membership Status in an Institution Related to Environment

Membership	N	\bar{X}	S	Sd	T	p
Yes	37	37.11	2.76	98	1.41	0.16
No	63	36.14	3.56			

Table 4 clearly shows that there is no statistically meaningful difference between the environmental sensibilities of the students in accordance with their membership status in an institution related to environment [$t(98)=1.41$, $p>0.05$]. Although the environmental sensibility scores of the students who have a membership in an institution related to environment are relatively higher, it does not create a statistically meaningful change. Hence, it can be concluded that students' membership status in an institution related to environment do not affect their environmental sensibilities. Meanwhile, Özmen et al. (2005) asserted that the majority (96.8%) of the students are not members of an environmental institution.

The outcomes of the unrelated t-test done to expound the disparity between the environmental sensibilities of the students according to having individuals interested in environment in the family have been depicted in Table 5.

Table 5. Environmental Sensibility Scores of the Students According to Having Individuals Interested In Environment in the Family

Individuals interested in environment in the family	N	\bar{X}	S	Sd	T	p
Yes	26	37.00	3.17	98	0.89	0.37
No	74	36.32	3.35			

Evidently manifested in Table 5, there is not a statistically significant difference at 0.05 level between the environmental sensibilities of the students vis-à-vis having individuals interested in environment in the family [$t(98)=0.89$, $p>0.05$]. In this case, it can be concluded that the environmental sensibilities of the students were independent from having individuals interested in environment in the family.

The results of the unrelated t-test performed to look over the difference between the environmental sensibilities of the students in accordance with participating in activities / meetings related to environment have been supplied in Table 6.

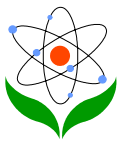


Table 6. Environmental Sensibility Scores of the Students Vis-à-vis Participating in Activities / Meetings Related to Environment

Participation	N	\bar{X}	S	Sd	T	p
Yes	21	37.29	3.58	98	1.22	0.22
No	79	36.29	3.22			

As obvious in Table 6, no statistically meaningful difference between the environmental sensibilities of the students regarding participating in activities / meetings related to environment can be determined [$t(98)=1.22$, $p>0.05$]. Thus, it can be thought that the students' participating in activities / meetings related to environment do not affect their environmental sensibilities.

Unrelated t-test has been applied to the data in order to inquire the discrepancy between the environmental sensibilities of the students vis-à-vis their follow-up status for the programs and articles about environment on media (TV, radio, newspaper, magazine etc.), and the findings have been presented in Table 7.

Table 7. Environmental Sensibility Scores of the Students Regarding Their Follow-Up Status for the Programs and Subjects about Environment

Follow-Up	N	\bar{X}	S	Sd	T	p
Yes	89	36.96	3.01	98	4.24	0.00
No	11	32.82	3.43			

Apparently shown at Table 7, there exists a statistically significant difference at 0.01 level concerning the environmental sensibilities of the students taking into account their follow-up status for the programs and articles about environment on media (TV, radio, newspaper, magazine etc.) [$t(98)=4.24$, $p<0.05$]. It can be averred that the students who have followed the programs and articles about environment on media (TV, radio, newspaper, magazine etc.) behave more sensitively to the environment than the students who have not followed the programs. Therefore, we can express that the students who follow the programs about environment have higher environmental sensibilities. Obtained research findings are consistent and supportive with the findings of the researches done by Topaloğlu (1999) and Yılmaz et al. (2002).

Findings related to second subproblem

The outcomes of the related t-test done to look for a statistically meaningful difference between the students' sensibilities at the beginning and at the end of the "Environmental Science Course" have been given in Table 8.

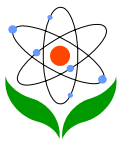


Table 8. “Environmental Science Course” Pre test-Post test Scores of the Students Related to Their Environmental Sensibilities

Ideas	Application	k	N	\bar{X}	S	Sd	t	p
Ideas Related to Environmental Sensibility	Pre-test	13	100	31.86	2.83	99	15.00	0.000
	Post-test	13	100	36.50	3.30			

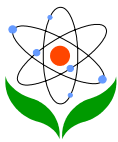
Noticeably seen in Table 8, there is a statistically meaningful difference between the students’ sensibilities before and after the “Environmental Science Course” ($p < 0.01$). This situation is in favor of the environmental sensibility scores at the end of the term. In this case, it can be noted that the “Environmental Science Course” is quite effective on students’ developing environmental sensibility. This research finding shows parallelism with the findings of Ekici (2005) taking the significantly positive attitudes of the students in environmental education into account.

Aimed to evaluate the behaviors of the students related to environmental sensibility with regard to their own ideas, related t-test was applied to the data obtained by means of the scale, before and after the “Environmental Science Course”. The students’ ideas about the air pollution, water pollution, soil pollution, ecological balance-birth control had been reviewed separately. The findings have been placed in Table 9.

Table 9. “Environmental Science Course” Pre test-Post test Scores Related to Air -Water - Soil Pollution, Ecological Balance-Birth Control, and the Sufficiency of The Environmental Education Given at the Faculty

Items	Test	\bar{X}	S	Sd	t	p
1. Air pollution	Pre application	6.79	0.93	99	5.553	0.000
	Post application	7.26	0.84			
2. Water pollution	Pre application	6.41	1.19	99	4.037	0.000
	Post application	7.03	1.22			
3. Soil pollution	Pre application	4.42	0.80	99	0.350	0.73
	Post application	4.45	0.84			
4. Ecological balance and birth control	Pre application	12.16	1.24	99	4.529	0.000
	Post application	12.74	1.28			

Conspicuously seen from Table 9 (in the light of to the students’ ideas), there is a statistically significant difference between the students’ behaviors related to air and water pollution, ecological balance and birth control at the end of the “Environmental Science Course”. However, it is spotted that the “Environmental Science Course” has not made any statistically meaningful difference on the students’ ideas a propos the soil pollution ($p > 0.05$). This situation makes us to think that the soil pollution subjects should have been discussed more within the content of the course. This result contradicts with the research findings of Yılmaz et al. (2002) about secondary school and university students vis-a-vis the insufficiency of their knowledge level on air and water pollution yet shows paralellism with the latter research and supports it in the sense that these students lacks enough knowledge on soil pollution.



The results of the related t-test about the investigation of the adequacy of the environmental education which the students have before and after the “Environmental Science Course” have been illustrated in Table 10.

Table 10. “Environmental Science Course” Pre test-Post test Scores With regard to Students’ Ideas Related to Environmental Education

Ideas	Application	k	N	\bar{X}	S	Sd	t	p
Ideas Related to Environmental Sensibility	Pre-test	4	100	6.86	2.24	99	6.94	0.000
	Post-test	4	100	8.59	2.27			

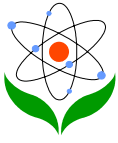
Markedly distinguished at Table 10, the difference between the students’ ideas before and after the “Environmental Science Course” is statistically significant ($p < 0.01$). The students have developed a positive idea about the sufficiency of the environmental education given at the faculty at the end of the course. Then, it can be avowed that, students get sufficient knowledge about the subjects, such as air, water, and soil pollution, and ecological balance and birth control at the end of the “Environmental Science Course”; i.e. “Environmental Science Course” positively affects the students’ ideas related to environmental education. This result supports the research findings of Topaloğlu (1999).

Conclusion

This research has been performed to determine the effects of the “Environmental Science Course” within the curriculum of Classroom Teacher Program in Education Faculty on the environmental sensibilities of the students, and the ideas of the students related to the effectiveness of their environmental education. Regarding the results of the research, it can be stressed that the environmental sensibilities of the Classroom Teacher Program students show discrepancies with regard to their follow-up status for the programs and articles about environment on media (TV, radio, newspaper, magazine etc.). However, no statistically significant alteration has been determined among the students’ environmental sensibilities taking into account their genders, ages, membership status in an institution related to environment, having individuals interested in environment in the family, and participating in activities / meetings related to environment.

The “Environmental Science Course” within the curriculum of Classroom Teacher Program positively affects the students’ sensibilities and ideas about environmental education related to air, water, soil pollution, ecological balance and birth control. Additionally, it can be declared that the students who take this course are more sensitive to the environment and have developed a positive idea about the sufficiency of the environmental education given at the faculty.

It is found out that the attitudes of the students who have taken the “Environmental Science Course” related to air and water pollution, ecological balance, and birth control had changed positively. However, no statistically meaningful difference is determined related to soil pollution.



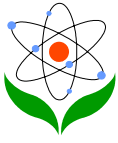
In conclusion, it can be expressed that “Environmental Science Course” helps the students to become conscious about the environment, and enhances the environmental sensibilities of the students.

Suggestions

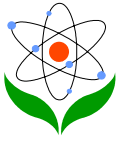
1. As the students’ follow-up status for the programs and articles about environment on media (TV, radio, newspaper, magazine etc.) positively affects their environmental sensibilities, it can be asserted that the programs and articles which make the individuals more sensitive by developing the environmental consciousness should be broadcasted and published on media more often.
2. Witnessing not much difference on the environmental sensibilities of the students although having a membership in an institution related to the environment makes us think that the related civil society institutions should work more vigorously. For instance, various activities and conferences about protection and significance of natural resources and the environment can be arranged by various campaigns, and the individuals can be encouraged to participate in these activities.
3. Certain chances should be provided for the young and they should be encouraged to benefit from these opportunities in order for them to take more active roles in environmental protection, to take place in the environmental education programs as instructors, to follow the new approaches and methods related to environmental protection, to partake in the activities and campaigns related to preventing the environmental pollution. Constituting opportunities where the students can perform certain activities such as conferences, seminars and so on is considered as a vital part in point of reflecting their experiences to other individuals.
4. “Environmental Science Course” positively affects the students’ sensibilities, and the ideas of the students related to environmental education which they have at the school in the aspects of air, water, soil pollution, ecological balance and birth control. Hence, in educational institutions of all levels, starting from the pre-school institutions, the environmental education should be given. Moreover, in order to enable individuals to acquire environmental education, projects that will aid environmental education should be developed in primary/secondary education institutions and universities and these projects should be assisted with supportive activities (panels, symposia etc.).
5. Clubs related to environment should become widespread at universities. Activities regarding national and international environmental problems should be announced, and new ideas and solutions should be demanded from the young via studying on these subjects.

References

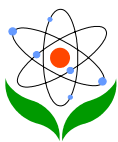
- Altın, M., Bacanlı, H. & Yıldız, K. (2002). Biology teacher candidates’ attitudes towards environment. *5th National Science and Mathematics Congress Bulletin Book*, Ankara.
- Asmaz, H. (1988). Education flaws in environmental problems in Turkey. *Symposium of Approach To Environment Problems In Biology Education*. Hacettepe University Press: E/1.
- Asci, Z. & Demircioglu, H. (2002). Effects of the ecology unit that developed according to multiple intelligence theory. *5th National Science and Mathematics Congress Bulletin Book*, Ankara.



- Bahar, M. (2000). University students' level of pre-knowledge about environment education issues, and misconceptions. *5th International Ecology and Environment Problems Symposium a Poster Study*, TUBITAK; Ankara.
- Balci, A. (2001). *Methods, Techniques and Principles in Social Sciences*. Pegema Publishing, 3rd Edition, Ankara.
- Benton, R. (1994). Environmental knowledge and attitudes of undergraduate students compared to non-business students. *Business and Society*, 33, 191–211.
- Çelen, Ü., Yildiz, A., Atak, N., Tabak, S. & Arisoy, M. (2005). Ankara University Medical Education Faculty students' environmental sensitivity and related factors. (Retrieved from <http://www.dicle.edu.tr>, 28.04.2005).
- Dastan, H. (1999). The status and importance for developing environmental awareness and sensitivity (*Turkish sample*) (Unpublished Doctoral Thesis) Gazi University, Ankara.
- Dogan, M. (1988). Human, environment and environmental education. *Symposium of Approaches to Environmental Problems in Biology Education*. Hacettepe University Press: E/1.
- Dogan, M. & Akaydin, G. (2000). National agenda 2: Science education programs in Turkey and environmental education. *4th Natural Science Congress, Hacettepe University*, 82-85.
- Ekici, G. (2005). Observation of high school students' attitudes towards environmental education. *Educational Researches*, 18, 71-83.
- Erden, M. (1993). *Program Evaluation In Education*. Pegem Publishing, 2nd Edition, Ankara.
- Erol, G. H. & Gezer, K. (2006). Prospective of elementary school teachers' attitudes toward environment and environmental problems. *International Journal of Environmental and Science Education*, 1(1), 65-77.
- Erten, S. (2005). Investigation of preservice preschool teachers' behaviours related to environmental awareness. *Hacettepe University The Journal of Faculty of Education* 28: [2005] 91-100.
- Fegebank, B. (1990). Environmental education. A task for home economist. *Journal of Consumer Studies and Home Economics*, 14, 185-191.
- Fitz-Gibbon, C.T. & Morris, L.L. (1988). *How to design a program evaluation*. Beverly Hills, California, Sage Publications Inc.
- Gökdere, M. (2005). A study on environmental knowledge level of primary students in Turkey. *Asia-Pacific Forum on Science Learning and Teaching*, 6 (2), Article 5.
<http://www.meb.gov.tr/english/indexeng.htm>. (Retrieved from 15.12.2007).
- http://www.yok.gov.tr/egitim/raporlar/kasim_2005/kasim_2005.doc (Retrieved from 18.12. 2007).
- Kilbourne, W. E., Beckman, S. C., Lewis, A. & Dam, Y. V. (2001). A multinational examination of the dominant social paradigm in environmental attitudes of university students. *Environment & Behavior*, 33 (2), 209–229.
- MacDonald, W.L. & Hara, N. (1994). Gender differences in environmental concern among college students. *Sex Roles*, 31(5-6), 369-374.
- Morgil, I. & Yücel, A.S. (2005). An analysis of awareness of students in the utilization of technology. *Conference CBLIS 2005*, University of Zilina, www.utc.sk
- Örnek, G. (1994). Environmental education and its role in high school education programs (Unpublished Doctoral Thesis) Hacettepe University, Ankara.



- Özdemir, O., Yildiz, A., Ocaktan, E. & Sarisen, Ö. (2004). Environmental awareness and sensitivity levels of medical students. *The Journal of Ankara University Faculty of Medicine*, 57(3), 117–127.
- Özmen, D., Çetinkaya, Çakmakçı, A. ve Nehir, S. (2005). University students' attitudes toward environmental problems. *Turkish Armed Forces Pretentive Medicine Bulletin*, 4 (6), 330-344.
- Özmen, H. & Karamustafaoglu, O. (2006). Environmental consciousness and education relationship: Determination of how environment-based concepts are placed in Turkish science curricula. *Asia-Pacific Forum on Science Learning and Teaching*, 7(2), Article 7. [Online] http://www.ied.edu.hk/apfslt/v7_issue2/ozmen/.
- Pooley, J. A. & O'Connor, M. (2000). Environmental education and attitudes. *Environment & Behavior*, 32(5), 711–724.
- Ridener, L. R. (1999). Effects of college major on ecological worldviews: A comparison of business, science, and other students. *Journal of Education for Business*, Sep/Oct 1999, Vol.75 Issue 1, p 15, 6p, 4 charts.
- Seçken, N., Yilmaz, A. & Morgil, I. (1998). The research of relations between chemical event with environment and life. *Hacettepe University Journal of Education Faculty*, 14, 37–44.
- Seçken, N. (2005). The relations between global environmental awareness and technology. *The Turkish Online Journal of Educational Technology- TOJET* January 2005, Volume 4, Issue 1, Article 8.
- Smyht, J. C. (1987). Key environmental issues and formal education. In A. V. Baez, G. W. Knamiller & J. C. Smyth (Eds). *The Evironmental and Science Technology Education*. Oxford: Pergamon Press.
- Spiropoulou, D., Roussos, G. & Voutirakis, J. (2005). The role of environmental education in compulsory education: The case of mathematics textbooks in Greece. *International Education Journal*, 6(3), 400-406.
- Soran, H., Morgil, I., Yücel, S., Atav E. & Isik, S. (2000). The research of biology students' interest about environmental issuesand comparison with those with chemistry students. *Hacettepe University Journal of Education Faculty*, 18, 128-139.
- Sahin, N., Cerrah, L., Saka, A. & Sahin, B. (2004). In higher education a practice for student centered environmental education course. *Gazi University Journal of Gazi Educational Faculty*, 24 (3), 113–128, Gazi University, Ankara.
- Sama, E. (2003). Teacher candidates' attitudes toward environmental problems. *Gazi University Journal of Gazi Educational Faculty*, 23 (2), 99–110, Gazi University, Ankara.
- Tabak, R. S., Akyildiz, N. & Yildiz, S. (2003). Teachers' efficacy level of perception and environmental sensitivity. *Educational Researches*, 10, 135- 145.
- Tekin, H. (2000). *Assessment and Evaluation in Education*. Yargi Publishing, 14th Edition, Ankara.
- Topaloglu, D. (1999). Attitudes towards environment and environmental education (Unpublished Doctoral Thesis) Ege University, *Institute Natural and Applied Sciences*, Izmir.
- Tuncer, G., Tekkaya, C., Sungur, S & Ertepinar, H. (2005). Effect of sex, rural- urban area differences on students' attitudes towards environment. *Education and Science*, 30 (136), 77-83.
- Uljas, J. (2001). Social identity influences on environmental attitudes and behaviors. *TRAMES: A Journal of the Humanities & Social Sciences*, 5(3), 255–269.



- Uzun, N. & Saglam, N. (2005). The effect of socio-economic status on environmental awareness and environmental academic success. *Hacettepe University Journal of Education Faculty*, 29, 194-202.
- Ünal, S. (1998). Fuels in primary and secondary school lesson topics and their environmental effects. *Hacettepe University Journal of Education Faculty*, 14, 62-73.
- Ünal, S. & Dimiski, E. (1999). With the support of UNESCO-UNEP development of environmental education and secondary level environmental education in Turkey. *Hacettepe University Journal of Education Faculty*, 16-17, 142-154.
- Ünal, S., Mançuhan, E. & Sayar, A.A. (2001). Environmental awareness, environmental knowledge and its education. *Marmara University Publications*, Istanbul.
- Yalçın, S. & Dogan, S. (2007). The effect of science and technology lesson on primary school students' attitudes towards environment. *Anatolian University Educational Faculty VI. National Classroom Teaching Symposium*. 27-29 April, Eskisehir.
- Yavuz, S., (2005). Developing a technology attitude scale for pre-service chemistry teachers. *The Turkish Online Journal of Educational Technology*, TOJET, 4(1), Art. 2.
- Yilmaz, A., Morgil, I., Aktug, P. & Göbekli, I. (2002). Secondary education and university students' knowledge about environment, environmental concepts and problems and suggestions. *Hacettepe University Journal of Education Faculty*, 22, 156-162.
- Yücel, A. S. & Morgil, F. I. (1998). Searching of environmental concepts in higher education. *Hacettepe University Journal of Education Faculty*, 84-91.