Full Length Research Paper

Environmental awareness of University Students in Ankara, Turkey

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This study aims to present environmental sensitivity and awareness of university students. The first and fourth year students of landscape architecture, town and regional planning and environmental engineering undergraduate programs at universities throughout Ankara, Turkey were selected as participants since these programs' curricula focus on environment. A questionnaire survey was applied to 212 students face to face. Research findings show that even though students take many courses on the environmental issues, their environmental awareness and environmentally responsible behaviors are lower than the expected and students' grades show no significance on the results. It is concluded that environmental knowledge do not always influence awareness and behavioral intentions, a national strategy is needed for environmental education in higher education, and current curricula should be reconsidered in terms of effectiveness.

Key words: Environmental awareness, environmental sensitivity, environmental education, higher education.

INTRODUCTION

Rising environmental concerns led to emergence of the concept of sustainability in the last half of twentieth century. The term sustainability focuses on mainly three concepts: Economy, ecology and equity. Therefore sustainable development requires policies and actions on both economical and ecological aspects of development, and for all classes of the society, also regarding future generations. The Stockholm Conference declaration (1972), where term of sustainability was officially empha-sized and recognized in global scale for the first time, pointed out the importance of environmental education to "broaden the basis for enlightened options and responsible conduct by individuals, enterprises and communities in protecting and improving the environment in its full human dimension" (UNESCO, 1972) on the way to achieving sustainability.

Environmental education is a life-long process and must be dealt carefully in order to create environmentally concerned and responsible societies. Higher education community is one of the major actors in environmental education and sustainable development. Higher educa-tion aims to raise responsible and competent individuals with knowledge, skills and values who will contribute to an improving world (Clugston, 2004). Therefore, as Corcoran and Wals (2004) say; higher education can play a pivotal role in turning society toward sustainability. Hence, the importance of scope and targets of environ-mental education in higher education curricula must be well recognized.

Environmental education aims to equip the individuals with knowledge, attitudes and skills in order to raise con-cern for the environment and to work towards solutions of environmental problems and the prevention of new ones (Stapp et al., 1969; UNESCO, 1977; Davis, 1998). So far, environmental education programmes have mainly focused on increasing environmental knowledge to change environmental behavior (Pooley and O'Connor, 2000). However it is still on the debate whether know-ledge leads to changes in attitude and behavior (Barraza and Walford, 2002). For example, Kuhlemeier et al. (1999) found out that the relationship between environ-mental knowledge, and environmental attitude were weak. Kraus (1995) believes that attitude is the most

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important determinant for behavior and Iozzi (1989), states that environmental education programmes should address the affective (attitude) domain, rather than just relying on cognition (knowledge) (both cited in Pooley and O'Connor, 2000). Therefore influence of environmental education on changing the lifestyles and attitudes of individuals is vital for altering future consumer behavior (Szerényi et al., 2009).

Environmental education might be considered relatively new for Turkey. Although, as a candidate member for European Union, Turkey has been undergoing many reforms and adapting new policies in education and environment, still neither a curriculum nor a policy for environmental education specifically exist for elementary, secondary or higher education. There also is not an existing strategic plan or policy adopted nationally, considering environmental education in higher education institutions. Thus, universities are mainly responsible for their environmental education policies.

Research on environmental education has grown rapidly in Turkey in the last decade. Most focus on investtigation of environmental knowledge and awrareness levels, especially of elementary and secondary level students (Cetin and Nisanci, 2010; Yurttaş and Sülün, 2009; Yılmaz et al., 2002; Şimşekli, 2004; Tuncer et al., 2005; Gökdere, 2005; Atasoy and Ertürk, 2008; Kılınç et al., 2008, Meydan and Doğu, 2008). For example, Yurttaş and Sülün (2009) found out that air pollution and global warming are considered as the most serious environmental problems by primary education students (8th grades) in Muğla, Turkey and media plays an important role in acquiring environmental information. However, there is a limited number of research on environmental knowledge and awareness levels of university students in Turkey. Some of them are summarized as following. Çabuk and Karacaoğlu (2003) found out that female students had more positive attitudes towards the environment in terms of environmental awareness and sensitivity, however they lacked of environmentally responsible behavior in their daily lifes.

Talay et al. (2004) carried out their study among the students who were from 14 different faculties of Ankara University. They concluded that students were reasonably aware of environmental issues and majority of those studying environmental subjects were from social sciences. Özdemir et al. (2004) concluded that the environmental awareness of medical school students was found out to be much more inadequate than the expected. Another research, by Uzunboylu et al. (2009), shows that mobile technologies such as SMS, MMS and electronic mail can be used as mobile learning tools in increasing environmental awareness of university students.

We believe that the university students are important actors for developing sustainable communities in all aspects. We also believe that environmental awareness and attitudes should also be addressed in environmental education research, besides the cognitive dimension.

This paper aims to determine the sensitivity towards environmental issues and environmental awareness and attitudes of university students, who have enrolled in undergraduate programs of landscape architecture, regional and town planning, and environmental engineering in Ankara. It also aims to find out whether there is a relationship between environmental awareness and environmentally responsible behavior.

MATERIAL AND METHODOLOGY

The target group of this research was the first and fourth year students from the departments of landscape architecture, town and regional planning and environmental engineering at the universities in Ankara. Curricula of these undergraduate programs mainly focus on environment and related subjects. We especially aimed to find out whether intense educations on environmental subjects make a difference on students' awareness levels and attitudes towards the environment. Therefore we carried out the study with the first and fourth year students in order to be able to compare the results.

A total of 213 students were interviewed face to face, using questionnaires. The questionnaire consisted of 20 questions. The questions were either open ended or in multiple choice format. First section of the questionnaire was about personal information such as age, place of birth, and parents' educational background. Second section included questions on necessity of environmental education, basic environmental concepts, and opinions on the roles of governmental and non-governmental organizations on the environment. Final section of the questionnaire was designed to find out the students' environmental attitudes and beliefs. The data gathered has been analyzed by Chi-square test, using SPSS software, in order to find whether there is a relationship between students' awareness levels and their grades.

RESEARCH FINDINGS

Demographics

There were a total of 213 participants whose ages vary between 18-26. 58% of the participants were first year students and 42% were fourth year students. 70% of the participants were female students. Most of the students (85%) were born and raised in urban settlements. The parents' educational background was given in Table 1.

Environmental knowledge and awareness

The students were given a list of popular environmental non-governmental organizations (NGOs) in Turkey and asked whether they had knowledge about them. The best known NGO (97.7%) is Turkish Foundation for Combating Soil Erosion (TEMA) which appears regularly in the media. Greenpeace is also well known (92%) among the students.

The students were asked to write down a definition for the term "environment". Later, according to the scope of the expressions, the written definitions were classified as "correct" and "incorrect/inadequate" by the researchers

Table 1. The parents' educational background.

Degree	Father's educational background (%)	Mother's educational background (%)
Literate	-	1.4
Elementary school	4.6	12.2
Secondary school	8.5	12.2
High school	36.2	43.2
Higher education	48.8	31
No answer	1.9	-
Total	100	100

Table 2. Students' definitions of the term "environment".

	1st year students (%)	4th year students (%)	Total
Correct definition	33.1	33.7	33.3
Incorrect or inadequate definition	66.9	66.3	66.7
Total	100	100	100

Table 3. Students' knowledge on Kyoto protocol and impacts of global warming.

		1st year students (%)	4th year students (%)	Total (%)
Kyoto protocol	Correct answer	57.3	53.9	100
	Incorrect answer	42.7	46.1	100
	Total	100	100	
Impacts of global warming	Correct answer	26.6	19.1	100
	Incorrect answer	73.4	80.9	100
	Total	100	100	

(Table 2). Neither grade of the students' (p>0.05, p=0.922) nor their parents' educational background (p=0.831 for fathers' educational background, and p=0,939 for mothers' educational background) has significant correlation with the correctness of the definitions.

The students were also asked about their knowledge on Kyoto Protocol and impacts of global warming since these issues were highly on the agenda of Turkey during the period in which the questionnaire survey was undertaken. Both were multiple choice questions. First, students were asked to mark the name of the protocol which covers the measures for global warming, and then they were asked to mark the impacts of global warming out of 7 options. 5 options were the impacts of the global warming, and only the students who marked all the right options were regarded informed on the subject. Table 3 shows the knowledge levels of the students on these subjects. A statistical significance was not found between the knowledge levels and the students' grades (p>0.05 p=0,630 for Kyoto Protocol question and p=0.202 for the impacts of global warming question).

Students were asked to write what they thought was the most important environmental problem in Ankara. Air pollution seems to be the most important environmental problem for the students. Figure 1 shows the distribution of the results. Then they were asked to write most important factor for the environmental problems in Ankara (Figure 2). Students think that lack of environmental awareness is the most important factor (28.4%) responsible for environmental problems.

Students were given a list of activities (such as establishment of solid waste landfills, construction of green areas and parks, and supplying drinking water), for which municipalities are responsible, and asked to identify the responsible authority. The options also included other local and national authorities such as Ministry of Environment and Forestry, and Ministry of Agriculture and Rural Affairs. The percentage of correct answers was given in Table 4. There is a statistically significant (p<0.05, p=0,002) correlation between students' grades and their answers.
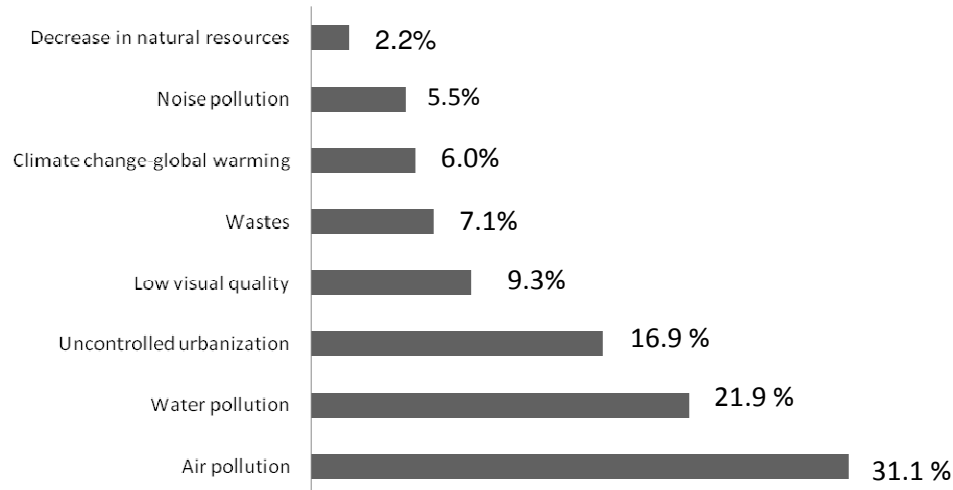
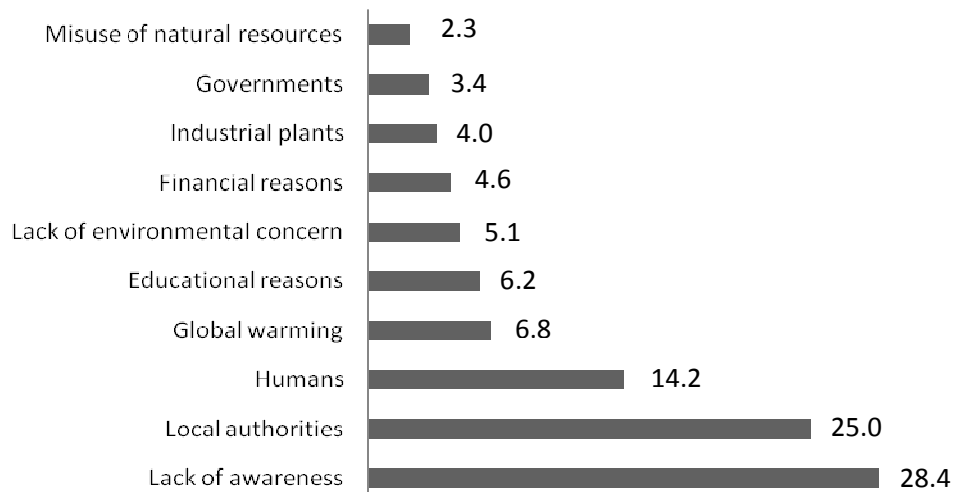**Figure 1.** Most important environmental problem in Ankara.

Figure 2. Most important factor responsible for environmental problems

Table 4. Knowledge of authorities' responsibilities.

	1st year students (%)	4th year students (%)	Total (%)
Correct answer	36.6	58.6	45.7
Incorrect answer	63.4	41.4	54.3
Total	100	100	100

Environmental attitudes and beliefs

Most of the students (93.4%) believe that environmental education is necessary and environmental related courses should be obligatory in curricula. 63.3% of the students think that environmental related courses should be obligatory during all educational stages. Table 5 shows the students' opinions on this subject. The students' opinions and their grades show a significant correlation ($p < 0.05$, $p = 0.048$).

Although most of the students believe environmental courses should be obligatory during all educational stages; 81.8% think obligatory courses do not help to develop environmental awareness.

Even though students were aware of many environmental NGO's (Table 6), as mentioned before,

Table 5. Students' opinions on in which educational level environmental courses should be obligatory.

	1st year students (%)	4th year students (%)	Total (%)
Elementary level (grades 1-8)	16.8	14	15.6
High school level (grades 9-12)	3.5	2.3	3
Undergraduate level	3.5	-	2
High school and undergraduate levels	0.9	1.2	1
Elementary and undergraduate levels	4.4	-	2.5
Elementary and high school levels	15.9	8.1	12.6
During all levels	54.9	74.4	63.3
Total	100	100	100

Table 6. Students' awareness of environmental NGO's.

Organization name	Familiar (%)	Never heard of (%)
TEMA	97.7	2.3
Association of Nature (Doğa Derneği)	23.9	76.1
Turkish Association for Protection of Natural Life (DHKD)	75.1	24.9
Turkish Foundation for Environmental Education (TÜRÇEV)	51.2	48.8
Turkish Environmental and Woodlands Protection Society(TÜRÇEK)	18.0	81.2
Greenpeace	92	8
The Foundation for the Promotion and Protection of the Environment and Cultural Heritage(ÇEKÜL)	39.4	60.6

Table 7. Attitudes towards the protection of the environment.

	1st year students (%)	4th year students (%)	Total (%)
I know what I should do and I pay attention	71.8	71.9	71.8
I know what to do but I do not always pay attention	26.6	23.6	25.4
I do not know what to do and I am not interested	1.6	4.5	2.8
Total	100	100	100

only 17.4% of them are members of any NGO. Among these students 61% of them are members of the Turkish Foundation for Combating Soil Erosion, for Reforestation, and the Protection of Natural Habitats (TEMA), and 27.8% of them of Greenpeace. The students were then asked about their attitudes towards the protection of the environment. Most of the students stated they are aware of what they should do to protect the environment and they pay attention in their daily lives (Table 7). There is not a significant correlation between the answers given and the students' grades ($p > 0.05$, $p = 0.425$).

In order to determine the environmentally responsible behavior patterns, students were given a list of activities and asked to mark the activities of which they do in their daily lives. Results were shown in Table 8. Correlation between the activities and students' grades were found to be insignificant.

Finally, the students were asked of their opinions on the sustainable use of natural resources, and environment-health relationship. They were asked to state whether they agree or not with the statements they were given (Table 9). Some statements were knowledge based. The first 8 statements were about natural resources and the rest was on the relationship between environment and human health.

DISCUSSION AND CONCLUSIONS

This study aims to find out the sensitivity towards environmental issues and attitudes of university students who study in landscape architecture, town and regional planning and environmental engineering undergraduate programs at various universities throughout Ankara. We also aim to present the relationship between students' awareness levels and behavioral intensions.

Table 8. Environmentally responsible behaviors of students in their daily lives.

	1st year students (%)	4th year students (%)
Preference for using recyclable materials	64.3	56.3
Reuse of plastic materials	61.8	65.5
Use of reusable bags for shopping	9.8	12.6
Reuse of glass materials	89.4	94.3
Recycling glass, plastic and paper wastes	47.2	50.6
Use of public transport	81.3	67.8
Attending environmental activities	29.3	36.7

In the beginning of this study, it is assumed that all the students were provided with basic environmental knowledge during previous educational stages. Therefore we did not specifically focus on determining students' knowledge on basic environmental issues. However, the results show that students are not able to define, even the basic term "environment", fully and correct. They rather perceive the environment as a physical setting; ignoring biological, chemical, social, and economic aspects. Even 66.3% of the fourth year students responded incorrect or inadequate. On the contrary, we had assumed that fourth year students who study previously mentioned disciplines would provide more accurate answers.

When students were asked about Kyoto Protocol and impacts of global warming, we found out that students' grades show insignificant correlation with correct answers. Only half of the students, from both grades, know about Kyoto Protocol. Moreover, surprisingly most of the students (73.4% of first year and 80.9% of fourth year students), are not able to recognize impacts of global warming adequately. Related information on these issues have been on the media for quite a while, besides their environmental courses curricula. However it is clear that students are having difficulties in comprehending the impacts of a well known environmental problem. This leads us to the fact that knowledge of an issue does not always develop an awareness towards it. Another fact is awareness also is not enough to develop behavioral intention. This can be seen in the findings that only a few (17.5%) students are members of environmental NGOs even though nearly all of the students know about them and their activities.

The results show that air pollution is the most important environmental problem in Ankara for the students. It is true that Ankara had serious polluted air problem before 1990s due to use of coal for heating. From the beginning of 1990s, Greater Municipality of Ankara started to construct natural gas infrastructure for heating. Today, natural gas is widely used in heating in the city center, except from low income districts in outer circle of the city. They continue to use coal because of its lower cost. These days, traffic seems to be the biggest pollutant for air. However, uncontrolled and disorderly urban development and lack of water supplies have been on the agenda in the last decade for Ankara much more than the air pollution. These issues were received less attention from the students. Despite, the students are aware that lack of awareness is the most important factor in preventing environmental problems and taking meaures.

Another surprising fact is the students do not really know about the roles of municipalities even though they study disciplines which require direct contact with local authorities in their working fields.

The findings show that a majority of the students think environmental education should be obligatory during all educational stages. This shows students are aware of the fact that education is needed to raise awareness in environmental issues. When sudents were asked to evaluate their attitudes towards the environment, most of the students (71.8%) said they know what they should do and they pay attention to protect their environment. However, less students seem to develop environmentally responsible behavior in their daily lives. The most common behavior is reuse of glass materials for both grades. This behavior might also be related to practical and economic use of glass. Glass containers and bottles can be used many times for purpose of storage of many things in daily life such as food. Other than that students do not show adequate behavioral intention for environmental responsibility in their daily lives. Only nearly half of the students pay attention to recycling and using recyclable materials. Use of public transport is another major environmentally responsible attitude that is popular among students; however this is probably due to the fact that most of them do not have any personal transportation vehicle. Another issue that should be addressed is the fact that only a few students attend to environmental related activities. Individuals' roles and public opinion on policy and decision making should not be neglected in sustainable development. Thus, nongovernmental activities and public participation play an important role on effective environmental management and policy making. Therefore environmental education should also promote organizing such activities and participation of public.

Finally, most of the students are aware of the negative impacts of environmental problems on living organisms

Table 9. Students' opinions and beliefs on sustainable use of natural resources and environment-health relationship.

Statements	Agree		Do not know/no comment		Disagree	
	1st year student (%)	4th year students (%)	1st year students (%)	4th year students (%)	1st year students (%)	4th year students (%)
Ecological balance has been disturbed	96.7	98.9	3.3	1.1	-	-
Misuse of agricultural chemistry leads to deterioration of biological balance	95	100		-	-	-
Water pollution has a direct negative impact on plant and animal communities and microorganisms	93.3	100	6.7	-	-	-
Wastes should be treated before being released into streams and seas	62.7	66.7	22.9	20.7	14.4	12.6
Waste management of industrial plants in Turkey is well-monitored by the authorities and those who do not obey the regulations are punished	25.9	21.8	29.3	20.7	44.8	57.5
Loss of soil as a result of erosion is a serious problem	95	93.1	5	4.6	-	2.3
Environmental impact assessment (EIA) is an effectively used tool in Turkey	44.9	40.2	50.8	41.4	4.3	18.4
Air, water and land are unlimited resources	24.2	15.7	10.5	11.2	65.3	73.1
Constructing industrial plants near settlement areas is not appropriate	94.2	89.7	1.6	6.9	4.2	3.4
I believe green spaces have a positive impact on human health	96.7	100	3.3	-	-	-
Air pollution causes respiratory diseases	96.7	98.9	3.3	1.1	-	-
Base stations have a negative impact on human health	98.3	96.6	1.7	3.4	-	-
Using natural gas for heating reduces air pollution	91.7	90.8	6.7	8	1.6	1.2
Landfills near human settlements have negative impact on human health	95.8	97.7	4.2	2.3	-	-
Water consumption decreases as a result of high water prices	39.2	50.6	29.2	23	31.6	26.4
I believe noise pollution has a negative impact on human health	94.1	94.3	3.3	3.4	2.6	2.3
Low visual quality of urban environments disturbs me	96.7	97.7	2.5	2.3	0.8	

and ecological balance has been disturbed. They also do not believe environmental legislations and tools, such as EIA and fines, are effectively implemented in Turkey. That is probably a widely belief also amongst the public. It is important societies believe in their authorities in order to maintain a democratic and sustainable development. Hence, both national and local authorities should realize their roles and importance of their reliability in environmental issues.

It is concluded that although participants study in undergraduate programs which focus on environment, in general students' environmental awareness and attitudes do not depend on their grades. Unfortunately, this means undergraduate curricula for these disciplines are not effective in context of environmental education.

There do not exist specific environmental education curricula for any educational stage in Turkey as mentioned before. However, many environmental issues and basic ecological principles are referred within science and social science courses in elementary (grades 1-8) and high school (grades 9-12) education. In higher education, the existing structure of environmental education is rather complicated. There is not a national strategy adopted for environmental education strategy nationally accepted. Universities are autonomous instutions in developing their own curricula for undergraduate and graduate programs. Therefore, each university and even each faculty differs in their approach to environmental education. Environmental related courses are mainly included within the curricula of disciplines which rely on physical and social environment. Thus, a national environmental education strategy gains much more importance in higher education institutions.

Research findings show that knowledge, awareness and responsible behavior are not always influential on each other. In higher education, educators have traditionally focused on the cognitive domain (Shephard, 2007), however the affective domain is usually ignored. Therefore developing environmental attitudes and behaviors need more attention in environmental education. To conclude, we need more research in effective learning and affective approach in environmental education. Environmental education is an important tool for creating sustainable communities. Higher education institutions are responsible for raising individuals equipped with skills, competence and responsibility for a sustainable community. Hence, the role of environmental education should be well-recognized, and effectiveness of current curricula must be revised.

REFERENCES

Atasoy E, Ertürk H (2008). İlköğretim öğrencilerinin çevresel tutum ve çevre bilgisi üzerine bir alan araştırması. Erzincan Eğitim Fakültesi Dergisi, Cilt:10, Sayi:1.

Barraza L, Walford RA (2002). Environmental education: a comparison between English and Mexican school children. Environ. Educ. Res., 8(2): 171-186.

Cetin G, Nisanci SH (2010). Enhancing students' environmental awareness. Procedia Soc. Behavioral Sci., 2: 1830-1834.

Clugston RM (2004). Foreword of "Higher Education and The Challenge of Sustainability: Problematics, Promise and Practice" (Eds: Corcoran, P.B. and Wals, A.E.J.). Kluwer Academic Publishers.

Corcoran PB, Wals AEJ (2004). The problematics of sustainability in higher education: an introduction. Higher Education and The Challenge of Sustainability: Problematics, Promise and Practice (Eds: Corcoran, P.B. and Wals, A.E.J.). Kluwer Academic Publishers.

Çabuk B, Karacaoğlu C (2003). Üniversite öğrencilerinin çevre duyarlılıklarının incelenmesi. Ankara Üniversitesi Eğitim Bilimleri Fakültesi Dergisi, cilt:36, sayi:1(2): 189-198.

Davis J (1998). Young children, environmental education and the future. In Graves, Norman (ed.) Education and Environment. World Education Fellowship, London.

Gökdere M (2005). A study on environmental knowledge level of primary students in Turkey. Asia-Pacific Forum Sci. Learning Teaching, 6: 2-5.

Kilinç A, Stanisstreet M, Boyes E (2008). Turkish students' ideas about global warming. Int. J. Environ.Sci. Educ., 3(2): 89-98.

Kuhlemeier H, Bergh H, van Den Lagerweij, N (1999). Environmental knowledge, attitudes, and behavior in Dutch secondary education. J. Environ. Educ., 30, Issue 2.

Meydan A, Doğu S (2008). İlköğretim ikinci kademe öğrencilerinin çevre sorunlari hakkındaki görüşlerinin bazı değişkenlere göre değerlendirilmesi. Selçuk Üniversitesi Ahmet Keleşoğlu Eğitim Fakültesi Dergisi, Sayı:26, 267-277.

Özdemir O, yildiz A, Ocaktan E, Sarışen Ö (2004). Tıp fakültesi öğrencilerinin çevre sorunları konusundaki farkındalık ve duyarlılıkları. Ankara Üniversitesi Tıp Fakültesi Mecmuası, Cilt: 57, Sayi, 3: 117-127.

Pooley JA, O'Connor M (2000). Environmental education and attitudes: Emotions and beliefs are what it is needed. Environ. Behavior, 32(5): 711-723.

Shephard K (2007). Higher education for sustainability: seeking affective learning outcomes. Int. J. Sustainability Higher Educ., 9(1): 87-98.

Stapp WB, Bennett D, Bryan W, Fulton J, MacGregor J, Nowak P, Swan J Wall R, Havlick S (1969). The concept of environmental education. J. Environ. Educ.,1(1): 30-31.

Szerényi ZM, Zsóka Á, Széchy A (2009). Environmental education and pro-environmental consumer behavior- results of a university survey. Joint Actions on Climate Change, 8-10 June, Denmark.

Şimşekli Y (2004). Çevre bilincinin geliştirilmesine yönelik çevre eğitimi etkinliklerine ilköğretim okullarının duyarlılığı. Eğitim Fakültesi Dergisi (Uludağ Üniversitesi), 17(1): 83-92.

Talay İ, Gündüz S, Akpınar N (2004). On the status of environmental education and awareness of undergraduate students at Ankara University, Turkey. Inter. J. Environ. Pollut., 21(3): 293-308.

Tuncer G, Ertepınar H, Tekkaya C, Sungur S (2005). Environmental attitudes of young people in Turkey: effects of school type and gender. Environ. Educ. Res., 11(2): 215-233.

UNESCO (1972). The Stockholm Declaration. The United Nations Conference on the Human Environment, 5-16 June, Stockholm.

UNESCO (1977). The Tblisi Declaration. Intergovernmental Conference on Environmental Education, 14-26 October, 1977, Tblisi.

Uzunboylu H, Cavus N, Ercag E (2009). Using mobile learning to increase environmental awareness. Comput. Educ., 52: 381-389.

Yilmaz A, Morgil İ, Aktuğ P, Göbekli İ (2002). Ortaöğretim ve üniversite öğrencilerinin çevre, çevre kavramları ve sorunları konusundaki bilgileri ve öneriler. Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 72: 156-162.

Yurttaş GF, Sülün Y (2010). What are the most important environmental problems according to the second grade primary school students? Procedia Soc. Behav. Sci., 2: 1605-1609.