ASSESSMENT OF UNIVERSITY STUDENTS' ACADEMIC ACHIEVEMENTS AND ATTITUDES TOWARDS GLOBAL WARMING[1]

ÜNİVERSİTE ÖĞRENCİLERİNİN KÜRESEL ISINMAYA YÖNELİK AKADEMİK BAŞARILARININ VE TUTUMLARININ DEĞERLENDİRİLMESİ

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Makalenin Alanı: Fen Eğitimi

Abstract

In recent years, the most prominent environmental problem in the world has been global warming. Scientific studies have revealed the fact that global warming causes numerous negatife effects on the naturel environment and living beings. In order to remove or reduce these negative effects, individuals should be made conscious of this threat by providing them with the necessary education and training. The aim of this study is to investigate the relationship between university students' socioeconomic levels and their environmental attitudes and academic achievements in the subject of global warming. Descriptive method was used in the study and the research was conducted with 320 university students enrolled in different universities in Ankara and selected through random sampling. The Demographic Information Questionnaire was employed in order to determine students' demographic levels, The Environmental Attitudes Questionnaire was used to determine their attitudes towards the environment, and The Global Warming Achievement Test was used to determine their academic achievements in the subject of global warming. Students' socioeconomic levels were grouped as "low (group 1)", "medium (group 2)", and "high (group 3)" by assessing the relationship between four different factors (the mother's educational background, the father's educational background, the family's monthly net income, the number of family members). Significance and correlation between groups were analyzed by considering students' environmental attitude scores and academic achievement scores in the subject of global warming. The findings suggest that a significant difference exists between the environmental attitude scores in favor of the student group at the "medium (group 2)" level, and a significant difference exists between the academic achievement scores in favor of the student group at the "high (group 3)" level. In addition, a linear correlation was found between students' environmental attitudes and their academic achievements in the subject of global warming.

Özet

Son yıllarda dünyanın en belirgin çevre sorunu küresel ısınma olmuştur. Bilimsel çalışmalar, küresel ısınmanın doğal çevre ve canlılar üzerinde sayısız olumsuz etkilere neden olduğunu ortaya koymuştur. Bu olumsuz etkilerin ortadan kaldırılması veya azaltılması için bireylere gerekli eğitim ve öğretim verilerek bu tehdide karşı bilinçlendirilmelidir. Bu çalışmanın amacı, üniversite öğrencilerinin sosyoekonomik düzeyleri ile küresel ısınma konusundaki çevresel tutumları ve akademik başarıları arasındaki ilişkiyi araştırmaktır. Araştırmada betimsel araştırma yöntemi kullanılmıştır. Araştırma, Ankara'da farklı üniversitelerde öğrenim gören ve tesadüfi örnekleme yoluyla seçilen 320 üniversite öğrencisi ile gerçekleştirilmiştir. Öğrencilerin demografik

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öğrencileri, akademik başarı, tutum

düzeylerini belirlemek için Demografik Bilgi Anketi, çevreye yönelik tutumlarını belirlemek için Çevresel Tutum Anketi ve küresel ısınma konusundaki akademik başarılarını belirlemek için Küresel Isınma Başarı Testi kullanılmıştır. Öğrencilerin sosyoekonomik düzeyleri, dört farklı faktör (annenin eğitim durumu, babanın eğitim durumu, ailenin aylık net geliri, aile üyelerinin sayısı) dikkate alınarak düşük, orta ve yüksek şeklinde gruplandırılmıştır. Öğrencilerin küresel ısınma konusundaki çevresel tutum puanları ve akademik başarı puanları dikkate alınarak gruplar arasındaki anlamlılık ve korelasyon incelenmiştir. Araştırma sonunda, çevresel tutum puanı açısından sosyoekonomik olarak orta düzeydeki öğrenciler lehinde anlamlı bir farklılık tespit edilirken, küresel ısınmaya yönelik akademik başarıları açısından yüksek düzeydeki öğrenciler lehinde anlamlı bir farklılık tespit edilmiştir.

1. INTRODUCTION

Today, an increase in population which constrains environmental conditions is being experienced in most of the places on earth. The pressure of this increasing population on sources and ecological system has provoked important environmental problems such as nutrition, accommodation, education, constrained medical services, decreasing species, increasing pollution, changing of climate, rapid urbanization, and unplanned industrialization. Therefore, the world is faced with a global problem apart from all the environmental problems that were encountered up to now which pretty much occupy both national and international agenda especially for the last 20-30 years. These global environmental problems are global warming and changing of climate. This matter which arose the awareness of society is accepted as a social problem since it also caught the attention of social sciences. The reason behind the fact that this problem is considered to be a social one is because it affects or will affect all species living on earth and it is necessary to solve it internationally (Fason, 1996:16; Ürey, Çolak, Bozdemir & Kaymakcı, 2020).

Since the industrial revolution; burning of fossil fuels, deforestation, alteration in land use and accumulation of greenhouse gas which is emitted into atmosphere in addition to industrialization process are rapidly increasing. This caused an increase in surface temperature of the world strengthening natural greenhouse affect with the aid of urbanization (Türkeş, Sümer & Çetiner, 2000:7). According to measurements, surface temperature of the earth has increased at a rate of 0.5 to 0.7 centigrade degrees since 1860 (Abrahamson, 1989:10). This warming in surface temperature has become hotter and hotter almost each year compared to the previous year becoming more evident after 1980s. The year 1998 became the hottest year since 1860 both in terms of global average and averages of north and south hemispheres (Türkeş et all, 2000:7). Although some scientific groups claim that this increase in climate

temperature is a natural process, National Academy of Science and United Nations concluded that this increase which is being observed in temperature is strictly interrelated with human actions (Bozdoğan, 2011; Clark, 2006:1013).

Human beings are under the heavy responsibility of the solution to this global environmental problem whose influence and impacts are increasing day by day. Therefore, education of society on this matter is important because of its potential cruciality as a global environmental problem on (Boyes & Stanisstreet, 1992:289; Erdoğan & Cerrah Özsevgeç, 2012). As it was mentioned above, this is an education problem basically since human actions are the reason behind this global environmental problem. Education can be utilized in terms of raising awareness of individuals about environmental problems. Environmental education plays an important role in taking precautions for problems, raising awareness, and acquiring positive attitudes and behaviours towards environment (Dalhgren & Öberg, 2001; Ural, Ercan & Bilen, 2017). Environmental education should be considered as a permanent process which can acquire information, awareness, value and skills about environment in addition to determination for the solution of environmental problems. The most important components of environmental education are awareness, information and attitude (Lavega, 2004:3; Ürey & Güler, 2018; Özer, Teke, Görümlü & Kılınç, 2021). Therefore, main purpose of the environmental sciences and learning is to become aware of different point o views of students and to make them develop the skill to evaluate them critically.

Teachers who work in each phase of education should be sensitive and knowledgeable towards environment. Taking the fact that cognitive sensibility concerning environment develops during the primary school into consideration, environmental education which will be given to instructors who will educate children of this age is of importance. It is necessary for those individuals who received environmental education during the university period to be interested in environment and environmental problems, to learn the ways to protect environment and to teach these to other people, and to sustain the quality of life they need in their daily life without damaging environment (İleri, 1998; Şenel & Güngör, 2009). Since it is certain that individuals who have negative attitudes and behaviours will not be interested in their environment's problems and will be indifferent towards environment, it is really important for them to have positive attitudes and behaviours towards environment. It is to be

remembered that positive behavioural alterations depend upon the success of education (Uzun & Sağlam, 2006).

Taking this point as a base, the purpose of this research is to examine the relation between socio-economic structures of students and environmental attitudes along with their academic achievements in terms of global warming. Answers to the questions below were searched within the scope of this purpose:

1. Do environmental attitudes of university students demonstrate significant difference according to their socio-economic levels?

2. Do academic achievements of university students on global warming demonstrate a significant difference according to their socio-economic levels?

3. What kind of a relation exists between environmental attitudes of university students and their academic achievements on global warming?

2. METHODS

In this section, the model of the research, the sample, the data collection tool used in the research, the data collection process and the analysis of the data are explained.

2.1. Research Design

Survey model was used in the research. Present condition was tried to be determined without making any alteration in the environment by means of survey studies. The event, individual or the object which constitutes purpose of the research is defined as it is within its conditions and present condition is demonstrated (Karasar, 2007; Çepni, 2009).

2.2. Participants

The research is conducted with 320 university students who are having education in 4 different universities of Ankara. Percentages of the students who participated in the research according to their universities are given in Table 1.

Table 1. Percentages of Students Who Participated in the Study According to Their University

Universities	f	%
METU	73	23
Ankara University	87	27
Gazi University	96	30
Hacettepe University	64	20
Total	320	100

73 participants (23 %) of the students are from METU, 87 (27 %) participants of the students are from Ankara University, 96 (30 %) participants of the students are from Gazi University, and 64 (20 %) participants of the students are from Hacettepe University according to Table 1.

In order to classify students according to socio-economic aspect, it is necessary to examine factors such as education of their parents, their monthly income and the number of the individuals in their household which affect students' lives. Within the direction of this aim, students were tried to be classified socio-economically examining the relations between the factors in Table 2.

Table 2. The Relation between the Factors Which Affect the Socio-Economic Structure of the Family

	Pearson corelation (r), significance (p), numbers of preservice teacher (N)	Education of mother	Education of father	Income of Family	Family members
Education of mother	r	-	0.72*	0.51*	-0.48*
	p	-	0.00	0.00	0.00
	N	-	320	320	320
Education of father	r	0.72*	-	0.44*	-0.31*
	p	0.00	-	0.00	0.00
	N	320	-	320	320
Income of Family	r	0.51*	0.44*	-	-0.57*
	p	0.00	0.00	-	0.00
	N	320	320	-	320
Family members	r	-0.48*	-0.31*	-0.57*	-
	p	0.00	0.00	0.00	-
	N	320	320	320	-

When Table 2 is examined, it is obvious that there is a direct relation between monthly income of the family and education of the parents. There is an indirect relation between monthly income of the family and the number of the family members. In other words, the higher the education of mother (r=0.51) and father (0.44) is the higher the monthly income of the family. On the other hand, the more the number of family members (r=-0.57) means monthly income of the family becomes lower. These relations which were discovered are significant at a rate of 0.01. When these results are taken into consideration it is possible to classify the students socio-economically according to their incomes. Within this sense, students were classified as low, medium and high in terms of their incomes.

2.3. Data Collection Tools

3 different data collection tools were used in the research. Demographic Information Survey (DIS) was utilized in order to reveal socio-economic structures of the students. Information of 4 different variables which were thought to have an effect on socio-economic structure (education of the mother, education of the father, the number of the household, net monthly income of the family) was collected by means of DIS.

The Environmental Attitude Questionnaire (EAQ) developed by the researchers was used to determine the students' attitudes towards environmental problems. The EAQ is a 5-point Likert scale. For the content and face validity of this scale, the opinions of 3 academic members who are experts in the field of environmental education were consulted. In line with expert opinions, some items were removed from the scale and some items were corrected. The final version of the scale was applied to 203 university students studying at Karadeniz Technical University to ensure construct validity. Factor analysis and item-total correlations were examined for the construct validity of the scale. The data obtained from the students were transferred to the SPSS program and the KMO and Barlett's Tests were applied. As a result of the test, it was concluded that the KMO value was at an acceptable value (0.921), and the chi-square (x^2) result obtained as a result of the Barlett's Test was significant (x^2= 5007.622; p<0.00). After the content, face and construct validity, a 37-item scale emerged. It was determined that the scale consisted of a 4-factor structure under the headings of Awareness (8 items), Participation (12 items), Sustainability (8 items) and Responsiveness (9 items). In order to determine the consistency of the items in the scale with each other, the Cronbach Alpha internal consistency coefficient was calculated. The Cronbach Alpha internal consistency coefficient of the scale was calculated as 0.83.

The Global Warming Achievement Test (GWAT) developed by the researchers was used to determine their academic achievements on global warming. 36 questions were created for GWAT. GWAT was presented to the opinions of 3 faculty members who are experts in the field of environmental education. After expert opinions, 2 questions were removed from the test and 7 questions were corrected. After the expert review, item statistical analysis was carried out. 3 questions with an item difficulty index less than 0.3 and 1 question with an item discrimination less than 0.20 were excluded from the test. Reliability coefficient was

calculated for GWAT consisting of 30 questions and Kuder Richardson-21 reliability coefficient was calculated as 0.78.

2.4. Data Analyses

We utilized from SPSS 20 package software in the analysis of the obtained data. Pearson Correlation Coefficient technique was used while examining the relations between 4 different variables which were thought to have an effect on socio-economic structures of the students in the analysis of DIS which was used in order to classify socio-economic structures of the students. After the examination during which the strength and direction of the relations between variables were taken into consideration, the students were classified as low (group 1), medium (group 2), and high (group 3) in accordance with their socio-economic structures. As for the analysis of EAQ, students were graded from 1 to 5 according to their answers which they gave to each item of the survey. Afterwards, these points were added and attitude points of the students were tried to be determined. The highest point which the students can get from EAS is 185 while the lowest point is 37. In the analysis of GWAT, students got 1 point for each correct answer and their academic successes were determined. The highest point which students can get from GWAT is 30.

3. RESULTS

Findings relating to research questions to which answers were tried to be found within the scope of purpose of the research are given in this section.

3.1. Findings related to the first problem

It is necessary to examine variance homogeneity before examining differences between environmental attitude points of university students socio-economically. Levene test was consulted in order to calculate variance homogeneity of groups and the results are presented in Table 3.

Table 3. Homogeneity Test of Group Variances According to Their Environmental Attitude Points

Levene	df1	df2	p
2.004	2	317	0.136*

As it is seen from Table 3, variance homogeneity of groups were examined by means of Levene Test according to their environmental attitude points and it was revealed that variances are homogenous (p=0.136 > 0.05).

Socio-economic differences between the environmental attitude points of university students were examined by means of ANOVA test and the results are presented in Table 4.

Table 4. ANOVA Results relating to the Significance of the Difference between Environmental Attitude Averages of the Students According to Their Socio-economic Conditions

	Sum of Squares	df	Mean Squares	F	p
Among The Groups	7788.358	2	3894.179		
Within The Groups	116128.739	317	366.337	10.630*	0.000
Total	1239.17	319			

With respect to Table 4, there is a statistically significant difference between groups in terms of their environmental attitude points (p=0.000 < 0.01).

Scheffe test was applied in order to determine for which group this difference was favourable. The results are presented in Table 5.

Table 5. Scheffe Test Results Relating to Significance of the Difference between Environmental Attitude Averages of the Students According to Their Socio-economic Conditions

(I)	(J)	Mean Difference (I-J)	Std.Error	p
Group1	Group2	-11.00515*	2.61754	0.000
	Group3	-1.91343	2.73656	0.783
Group2	Group1	11.00515*	2.61754	0.000
	Group3	9.09171*	2.55849	0.002
Group3	Group1	1.91343	2.73656	0.783
	Group2	-9.09171*	2.55894	0.002

In accordance with Table 5, when socio-economic level is taken into consideration it is obvious that students with medium socio-economic levels have a more positive environmental attitude compared to the students with low and high levels of socio-economic structures. This was considered statistically significant (p=0.000<0.05; p=0.002<0.05). When students with low and high levels are compared socio-economically, students with high levels

of socio-economic structure have a more positive environmental attitude on the average. However, this difference is not statistically significant (p=0.783>0.05).

3.2. Findings related to the second problem

It is necessary to examine variance homogeneity before examining the differences between university students' academic successes in terms of global warming socio-economically. Levene Test was consulted for the variance homogeneity of the groups and the results are presented in Table 6.

Table 6. Homogeneity Test of Group Variances According to Academic Success of Global Warming

Levene	df1	df2	p
0.516	2	317	0.597*

(* p > 0.05 variances are homogeneous.)

As it is seen in Table 6, variance homogeneity of groups according to academic success was examined with Levene Test and the conclusion was that variances are homogeneous (p=0.597>0.05).

The difference between academic successes of university students in terms of global warming socio-economically was examined with ANOVA test and the results are presented in Table 7.

Table 7. ANOVA Results Relating to the Significance of Differences Between Academic Successes of the Students on Global Warming According to Their Socio-economic Conditions

	Sum of Squares	df	Mean Squares	F	p
Among The Groups	634.794	2	317.397		
Within The Groups	85.503	317	0.270	1176.742*	0.000
Total	720.297	319			

According to Table 7, there is a statistically significant difference between groups in terms of their academic successes of global warming (p=0.000<0.05).

Scheffe test was applied in order to determine for which group this difference was favourable and the results are presented in Table 8.

Table 8. Scheffe Test Results Relating to Significance of Difference Between Academic Successes of the Students in Terms of Global Warming According to Their Socio-economic Conditions

(I)	(J)	Mean Difference (I-J)	Std.Error	p
Group1	Group2	0.16575	0.07103	0.067
	Group3	-2.92470*	0.07425	0.000
Group2	Group1	-0.16575	0.07103	0.067
	Group3	-3.09045*	0.06942	0.000
Group3	Group1	2.92470*	0.07425	0.000
	Group2	3.090045*	0.06942	0.000

According to Table 8, when socio-economic level is taken into consideration it is seen that students with high levels of socio-economic structure are more successful in terms of global warming than the students with medium and low levels of socio-economic structures. This is statistically significant (p=0.000<0.05; p=0.000<0.05). When students with medium levels of socio-economic structure and students with low levels of socio-economic structure are compared, students with low levels of socio-economic structures are more successful on the average. However, this difference is not statistically significant (p=0.067>0.05).

3.3. Findings related to the third problem

The relation between environmental attitude points of students and academic successes of students in terms of global warming was examined with Pearson Correlation Coefficient test and the results are presented in Table 9.

Table 9. The Relation between Environmental Attitudes of Students and Their Academic Successes in Terms of Global Warming

	Pearson corelation (r), significance (p), numbers of preservice teacher (N)	Environmental Attitude
Academic Success	r	0.28*
	p	0.00
	N	320

According to Table 9, there is a direct but weak relation between environmental attitudes and academic successes in terms of global warming of the students (r=0.28, p<0.01).

4. DISCUSSION

The purpose of this research is to examine the relation between socio-economic structures of students and environmental attitudes along with their academic achievements in terms of global warming.

When the environmental attitude scores of university students in terms of socioeconomic status were examined, it was determined that the environmental attitude scores of students with medium level of socio-economic structures were much higher. it is seen that students with high levels of socio-economic structures have lower environmental attitude points compared to students with medium levels of socio-economic structures and this can only be explained with the inadequacy of environmental education given to them. Besides, it is thought that family and environmental factors have also an important effect on environmental attitude points (Ürey et al., 2020). As for the reason behind the fact that students with low levels of socio-economic structure have lower points, it is thought that this may be related to the inadequacy of education in addition to the indifference towards environment as a result of economic deficiency. It is thought that high points of students with medium levels of socio-economic structures are related to their families' level of environmental awareness.

When the academic achievements of university students on global warming are examined in terms of socioeconomics, it has been determined that students with high level of socioeconomic structure have much higher global warming academic achievement points. The results may stem from the facts that environmental education given in universities are inadequate or inefficient, additionally, these matters are not emphasized neither in family circle nor in visual or written media (Clark, 2006).

There is a direct but weak relation between environmental attitudes and academic successes in terms of global warming of the students. In other words, even though environmental attitude and academic success concerning environment set off each other, the power of this effect is weak. In a similar study conducted by Bradley (1999), they revealed a direct and significant relation between environmental attitudes and achievement levels.

5. CONCLUSIONS

Findings which were obtained as a result of research are shortly summarized below:

- According to their socio-economic structures, students with medium levels of socio-economic structures have higher environmental attitudes. As for the students with low levels of socio-economic structures, they have the lowest environmental attitude. Although students with high levels of socio-economic structure have more positive environmental attitude compared to the students with low levels of socio-economic structure, this difference is not statistically significant.

- According to their socio-economic structures, students with high levels of socio-economic structures have higher academic success in terms of global warming. As for the students with medium levels of socio-economic structure, they have the lowest academic achievement. Despite the fact that students with low levels of socio-economic structures have higher academic successes compared to students with medium levels of socio-economic structures, this is not statistically significant.

- There is a direct however weak relation between environmental attitude and global warming. In other words, in spite of the fact that attitude and information set off each other, the level of the effect is low.

6. SUGGESTIONS

In the consideration of results, suggestions which will be stated below may be put forward in order to increase environmental awareness and academic successes of the students.

- It is important to give a qualified environmental education to students of all levels for the creation of a healthy and habitable environment. University students should develop their information, awareness and attitudes concerning environment in order for them to be individuals' sensitive towards environment. Therefore, education applications which will positively change attitudes of students towards environment should be given to all higher education students. However, environmental education and applications should be conducted taking both environmental conditions and socio-economic levels of students into consideration.

• When it is thought that university students do not take part actively enough in organizations concerning environment, they should be encouraged to be members of non-governmental organizations which are interested in environment and undertake active roles so as to make them to take responsibility in terms of environment and environmental problems individually.

• When curriculums of institutions which educate teachers are examined it is obvious that courses mentioned in the programme are not extensive enough to give environmental education. Additionally, there is not much practice in the courses concerning environment. Increasing both the depth and quality of the courses related to environment of higher education programme will be efficient for the solution of the mentioned problem.

• Taking the relation between increase of academic successes and environmental attitudes of students into consideration, precautions which will increase the achievement should be taken. Among these precautions, the emphasis should be on the ones which will increase both the interest and motivation of the students. School-Nature camps which will be carried out within this context may be beneficial.

• Conducted researches have proved that parental factors have an effect on students' attitudes and successes related to environment. Thus, environmental education studies should be conducted cooperatively with the families and families also should be included in these studies.

REFERENCES

Abrahamson, D, E. (1989). Global Warming: The Issue, Impacts, Responses, The Challenge of Global Warming, Edited by Dean Edwin Abrahamson, Island Press, Washington, USA.

Boyes, E. & Stanisstreet, M. (1992). Students' perceptions of global warming. *International Journal of Environmental Studies*. 42, 287-300.

Bozdoğan, A. E. (2011). Küresel ısınma sorunu hakkında eğitim alanında yapılan çalışmalardan bir derleme, *Kuram ve Uygulamada Eğitim Bilimleri,* 11(3), 1609-1624.

Bradley, J.C., Walıczek, T.M., Zajıcek, J.M. (1999). Relationship between environmental knowledge and environmental attitude of high school students. *Journal ofEnvironmental Education,* 30, 17-21.

Clark, M. (2006). Taking Action on Global Warming. *Human and Ecological Risk Assessment: An International Journal*, 12(6), 1013-1017.

Çepni, S. (2009). *Araştırma ve Proje Çalışmalarına Giriş*, Genişletilmiş 5.Baskı: Üçyol Kültür Merkezi, Trabzon.

Dalhgren, M. A. & Öberg, G. (2001). Questioning to learn and learning to question: Structure and function of problem-based learning scenarios in environmental science education. *Higher Education,* 41, 263-282.

Erdoğan, A. & Cerrah Özsevgeç, L. (2012). Kavram karikatürlerinin öğrencilerin kavram yanılgılarının giderilmesi üzerindeki etkisi: Sera etkisi ve küresel ısınma örneği, *Turkish Journal of Education (TURJE)*, 1(2), 1-13.

Fason, J, E. (1996). An Assessment Of Attitudes, Knowledge And Beliefs Og Global Warming A Comparison Between Twelfth Grade Students In Lansing, Michigan And Valdosta, Georgia, Michigan State University, USA.

İleri, R. (1998). *Çevre Eğitimi ve Katılımın Sağlanması*, Çevre Koruma ve Araştırma Vakfı, Cilt:7, Sayı:28 s:3-9.

Karasar, N. (2007). *Bilimsel Araştırma Yöntemi*, Genişletilmiş 17. Baskı: Nobel Yayın Dağıtım, Ankara.

Lavega E. L. D. (2004). Awareness, Knowledge, And Attıtude About Envıronmental Educatıon: Responses From Envıronmental Specıalısts, High School Instructors, Students, and Parents, Curriculum and Instruction in the College of Education, Florida, USA.

Özer, Z., Teke, N., Görümlü, N. & Kılınç, Z. (2021). Sağlık bilimleri fakültesi öğrencilerinin küresel ısınma hakkında bilgi düzeylerinin belirlenmesi, *Sağlık Akademisyenleri Dergisi,* 8(3), 199-205.

Şenel, H. & Güngör, B. (2009). Üniversite öğrencilerinin küresel ısınma hakkındaki bilgilerinin ve kavram yanılgılarının tespiti, *e-Journal of New World Sciences Academy,* 4(4), 1207-1225.

Türkeş, M., Sümer, U. M. & Çetiner, G. (2000). Küresel İklim Değişikliği ve Olası Etkileri, Çevre Bakanlığı, Birleşmiş Milletler İklim Değişikliği Çerçeve Sözleşmesi Seminer Notları (13 Nisan 2000, İstanbul Sanayi Odası), 7-24, ÇKÖK Gn. Md. Ankara.

Ural, E., Ercan, O. & Bilen, K. (2017). Pre-service science teachers' misconceptions of carboncycle and global warming. *Scientific Educational Studies*, 1(1), 1-17.

Uzun. N. & Sağlam, N. (2006). Ortaöğretim öğrencileri için çevresel tutum ölçeği geliştirme ve geçerliliği, *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi,* 30, 240-250.

Ürey, M. & Güler, M. (2018). A qualitative study on how students with visual impairments perceive environmental issues, *Journal of Science Education for Students with Disabilities*. 21(1), 15-28.

Ürey, M., Colak, K., Bozdemir Yüzbasıoğlu, H., & Kaymakcı, S. (2020). Comparison of knowledge levels and misconceptions of science and social studies prospective teachers about atmospheric environmental problems. *International Electronic Journal of Environmental Education*, 10(2), 216-236.