

## From the environmental identity to the behavior: The status of pre-service science teachers

Esra Kızılay<sup>1</sup>, Nagihan Tanık Önal<sup>2</sup>

<sup>1</sup> Department of Science Education, Erciyes University, Turkey

<sup>2</sup> Department of Preschool Education, Nigde Omer Halisdemir University, Turkey

---

### Article Info

#### Article history:

Received Mar 17, 2019

Revised Apr 26, 2019

Accepted May 12, 2019

---

#### Keywords:

Environmental behavior  
Environmental education  
Environmental identity  
Teacher

---

### ABSTRACT

In this research, the environmental identity of pre-service science teachers and their behaviors towards environmental problems were examined according to gender and grade. In the study, a path diagram is formed by evaluating the relationship between the variables. There were 215 pre-service science teachers of a university in Turkey participated in the study. The Environmental Identity Scale and the Environmental Problems Behaviour Scale were used as data collection tools. In the research, it was found that female students' averages environmental identity score was higher than males' average score. There was no significant difference between pre-service teachers' environmental identity according to grade. It was found that female students' average behavior score towards environmental problems was significantly higher than the average score of males. In the study, it was found that the average behavior scores towards environmental problems of the pre-service science teachers who are in the third and fourth grade were significantly higher than the average scores of the first and second-grade students. The research revealed a moderate relationship between pre-service science teachers' environmental identity and their behaviors towards environmental problems.

Copyright © 2019 Institute of Advanced Engineering and Science.  
All rights reserved.

---

### Corresponding Author:

Esra Kızılay,  
Department of Science Education,  
Erciyes University,  
Köşk Mahallesi, Talas Blv, 38030, Melikgazi/Kayseri, Turkey.  
Email: eguven@erciyes.edu.tr

---

## 1. INTRODUCTION

Today, factors such as technological developments, globalization and increasing population that reached unimaginable dimensions with industrialization, threaten the environment more and more [1]. For this reason, many countries are looking for solutions to environmental problems by signing treaties and conducting various projects. Many scientists support these efforts with scientific researches. The general opinion reached as a result of the researches is that many different dimensions exist in the relationship of individuals with the environment and examining the psychometric factors of individual behaviors is very important to find solution to environmental problems [2]. For this reason, the researches focused on providing environmental information to the individuals through environmental education and expected them to exhibit friendly behaviors towards environment and environmental problems. According to this behavior-based environmental education approach, it is assumed that as the person's knowledge of the environment increases, his/her awareness of environmental problems will also increase. Increased level of awareness will bring environment-friendly behaviors. In short, this understanding implies a positive and linear relationship between the environmental awareness and the behavior of individuals [3-10]. However, some other studies showed that there is not such a strong relationship between knowledge and behavior [7, 11-15]. In other words, the increasing the level of knowledge of the individuals does not guarantee a positive effect on their

behavior towards environment. So a gap exists between knowledge and behavior [7]. Therefore, in order for individuals to adopt an environmentally sensitive life, that is to change their behavior, other factors supporting environmental knowledge are needed. One of these factors is the environmental identity of the individuals.

Environmental identity is defined as a measure of individuals' commitment to nature or their self-perceptions related to nature [16]. It is thought that there may be a strong relationship between environmental identity and environment-friendly behaviors of individuals [17]. Because the relationships between individuals and the nature can provide insight about their environmental behaviors [18]. From this point of view, in order to be able to prompt individuals to environment-friendly behaviors and to realize behavior change it is suggested to question the behaviors that exist in individuals. In this context, it is possible first to determine the environmental identity and behaviors of pre-service teachers who will raise the citizens of the future, and then to shape their education according to these determinations. This study serves to determine the environmental identity and behavior of pre-service teachers. In this context, a lot of researches are carried out with pre-service teachers in the relevant literature. There are various studies in the literature in which environmental literacy status of pre-service teachers [19-21], their environment-friendly behaviors [1, 22, 23], and their attitudes towards the environment [23-27] were examined. In addition, researches in which these psychometric factors (such as attitude, environment-friendly behavior, knowledge) were investigated are also available in the literature [20, 28]. According to the results of these researches it was found that; pre-service teachers' environmental knowledge is insufficient, however they have environment-oriented way of thinking and positive environmental awareness [21]; the attitudes towards the environment and the high level of environmental knowledge are not enough for the people to exhibit behaviors that are beneficial for the environment [22]; the level of knowledge that middle and higher education students possess about environment is insufficient and they cannot fully understand the environmental problems [29].

Regarding these studies and other studies in the related literature, it can be stated that although there are studies related to the different dimensions of environmental education supporting each other, the factors underlying the inability of individuals to exhibit environment-friendly behaviors were not identified, hence, what kind of environmental education individuals should take was not clarified. However, according to the behavior-based environmental education approach; the nature of environment-friendly behaviors should be understood, the factors affecting behaviors should be identified and educational interventions based on the manipulation of these factors should be developed [6, 25].

According to this, it is thought that analyzing psychometric factors such as environmental identity, behaviors and environmental interests of the individuals with different and large samples, and using strong statistical techniques will provide important contributions to the literature. In this context, the purpose of this study was set as examining pre-service science teachers' environmental identity and their behaviors towards environmental problems according to gender and grade, determining the relationships between these variables and developing a Path diagram presenting the relationship between the variables.

## 2. RESEARCH METHOD

This research is structured based on the causal-comparative research and correlation research designs from the quantitative research designs. In the study, pre-service teachers' environmental identity and behavior towards environmental problems were examined according to gender and grade variables. This part of the research was carried out with causal-comparative research design, which examines the relationship between one or more categorical independent variables and one or more quantitative dependent variables to investigate the causes that have an impact on the phenomena [30]. In this study, the categorical independent variables whose effect are examined are gender and grade, whereas quantitative dependent variables are pre-service teachers' environmental identity and behaviors towards environmental problems.

The part of the research, where the relationship between pre-service teachers' environmental identity and their behaviors towards environmental problems is examined, was designed using correlational research design., which is conducted to examine the relationship between one or more quantitative independent variables and one or more quantitative dependent variables [30].

There were 215 pre-service teachers studying in science teaching department of a university located in Central Anatolia, who have been determined according to convenience sampling, participated in this study. Demographic characteristics of pre-service teachers are given in Table 1.

Table 1. Demographic characteristics of pre-service teachers in the sample

Demographic characteristics	Variable	Frequency (f)	Percentage (%)
Gender	Female	181	84.2
	Male	34	15.8
Grade	1 <sup>st</sup> Grade	62	28.8
	2 <sup>nd</sup> Grade	46	21.4
	3 <sup>rd</sup> Grade	56	26.0
	4 <sup>th</sup> Grade	51	23.7
Total		215	100

### 2.1. Data collection tools

The Environmental Identity Scale, which has been developed by Clayton [16] and adapted to Turkish by Clayton and Kilinc [31], and the Environmental Problems Behaviour Scale, which has been developed by Guven and Aydogdu [32], were used as data collection tools. Since the scales were not developed by the researchers, the literature was scanned, the scales that are thought to fulfill the sub-problems were identified, and two experts having various studies in the field of environmental education were consulted about whether the scales can answer the research problems or not. Then, the permission was granted from the researchers who have developed the scales for using them.

The Environmental Identity Scale developed by Clayton [16] was used to determine the environmental identity of pre-service science teachers in the study. The original form of the scale consisted of 24 items of 5-point Likert type. Responses to items varied between 1 (Strongly Disagree) and 5 (Strongly Agree). In the studies conducted by Clayton [16], Cronbach alpha reliability coefficient of the scale was determined as 0.90 or higher. The Turkish adaptation of this scale has been made by Clayton and Kilinc [31] and the answers were transformed into 7-point Likert-type, varying between 1 (Not true at all) and 7 (Completely true). The reliability study of the Turkish version of the scale was performed by Clayton and Kilinc [31] in a study conducted with 808 participants studying at Ahi Evran University. Cronbach Alpha reliability coefficient was found to be as 0.88. In our study, Cronbach Alpha reliability coefficient of the scale was calculated as 0.883. Accordingly, since the internal consistency coefficient of the scale is above 0.70, it can be said that the scale is reliable [33].

Another data collection tool used in the study is the Environmental Problems Behaviour Scale developed by Guven and Aydogdu [32]. The scale consists of 40 items of 3-point Likert type, ranging from "I don't agree", "I'm Neutral" and "I Agree", to determine whether the participants have carried out the behaviors towards environmental problems. Guven and Aydogdu [32] has developed this scale in the spring term of 2009-2010 academic year, working with 203 pre-service teachers studying at science teaching department. Cronbach Alpha reliability coefficient was found to be 0.85. In our study, Cronbach Alpha reliability coefficient of the scale was calculated as 0.794. Accordingly, since the internal consistency coefficient of the scale is above 0.70, it can be said that the scale is reliable [33].

### 2.2. Data collection

In the data collection process, scales were applied to pre-service teachers studying at science teaching department, in the 2015-2016 academic year. The scales were applied by the researchers. Before the applications, the participants were informed about the subject and the purpose of the research, and the content of the data collection tools and it was stated that the data collected in this study will not be used for any purpose other than the research and will not be shared with another people or institutions. In addition, participants were not forced to participate in the research. Participation in the study was realized on a voluntary basis. Participants completed the scales in an average of 30 minutes.

### 2.3. Data analysis

Before analyzing the data obtained from the study, the scales were numbered starting from 1. Then, after coding, the data in the scales were transferred to the computer environment through Microsoft Excel. The following codes were used while transferring the items of the scale to the computer environment: "male – 1", "female – 2", "1<sup>st</sup> grade – 1", "2<sup>nd</sup> grade – 2", "3<sup>rd</sup> grade – 3", and "4<sup>th</sup> grade – 4". The answers given to "Environmental Identity Scale" were coded as follows: "Not true at all – 1", "Neither true, nor false – 4" and "Completely True – 7". The answers given to "Environmental Problems Behaviour Scale" were coded as "I don't agree – 1", "I'm Neutral - 2" and "I Agree - 3". Inverse coding (recoding) was performed for some items during analysis.

The raw data forms prepared in Microsoft Excel program have been converted into data set by using SPSS program. Data cleaning process was performed on these data sets before statistical evaluation [34]. In this respect, the faulty codes observed in the data set through the frequency tables are cleared by checking raw data forms. After data preparation, SPSS 22.0 and AMOS 24 programs were used for data analysis.

In the analysis of the data collected in the study, firstly, the data were tested for normal distribution. For this purpose, skewness and kurtosis coefficients were calculated from the data as seen in Table 2. This table reveals that the skewness coefficients of the scales are between +1 and -1. Accordingly, it can be said that the scores confirm normal distribution [35].

Table 2. Skewness and kurtosis coefficients of the pre-service teachers' data

Scales	Skewness	Kurtosis	Mean ( $\bar{X}$ )	Median	Mod
Environmental Identity Scale	-.805	.915	130.41	133.0	31.0
Environmental Problems Behaviour Scale	-.488	.262	90.77	92.0	3.0

While testing the normality, the closeness of mean, median and mode is also considered to be important. If these values are close to each other, it can be said that the distribution of the data is not too far from normality [35]. Table 2 shows that these values are close to each other for both scales. Considering all the results, it was decided that the research data has normal distribution.

### 3. RESULTS AND DISCUSSION

#### 3.1. Findings related to environmental identities according to gender

In the research, it was planned to use independent groups t-test to test whether science teachers' environmental identity differed significantly according to gender, however t-test was not performed because even though normal distribution of the data assumption was met, the homogeneity of variances assumption was not satisfied. The average environmental identity scores of pre-service teachers according to gender is given in Table 3. Table 3 shows that female pre-service science teachers' environmental identity average score is higher than males, but this difference is not statistically significant.

Table 3. Pre-service teachers' environmental identity scores according to gender

Groups	N	$\bar{X}$
Male	34	125.59
Female	181	131.32

#### 3.2. Findings related to environmental identities according to grade

One-way ANOVA test was used to analyze whether there are significant differences among environmental identity scores of pre-service teachers according to grade. First of all, normality tests were conducted according to the grade level and it was found that the data has normal distribution. Then, within the one-way ANOVA test, Levene test was performed and "the equivalence of the variances of the groups" was tested [36]. The resultant p value was found to be  $>0.05$ . Accordingly, the group variances seem to be equal [36]. The results obtained from the LSD test are given in Table 4. Since  $p > 0.05$  in Table 4, it was concluded that there is no significant difference among the environmental identity of pre-service teachers according to grade.

Table 4. ANOVA results of pre-service teachers' environmental identity according to grade

Source of the variance	Sum of squares	SD	Mean of Squares	F	p
Between-group	1055.369	3	351.790	0.997	0.395
Within-group	74430.612	211	352.752		
Total	75485.981	214			

#### 3.3. Findings related to the behavior towards environment according to gender

In the research, the differentiation of science teachers' behavior towards environment according to gender was analyzed by independent group t-test. First of all, normality tests were conducted according to gender and it was found that the data is normally distributed. Then the performed Levene test showed that the group variances of male and female students are equal. The results are given in Table 5.

Table 5. T-test results of pre-service teachers' behavior towards environment according to gender

Groups	N	$\bar{X}$	t	p
Male	34	87.82	-2.025	0.044
Female	181	91.33		

Table 5 shows that, female students' average behavior towards environment score ( $\bar{X}$ =91.33) is significantly higher than male students ( $\bar{X}$ =87.82). The effect size was calculated as  $d=0.14$ , indicating that the impact of gender on the behavior towards environment is low (Green and Salkind, 2005; cited in [36]).

### 3.4. Findings related to the behavior towards environment according to grade

One-way ANOVA test was used to analyze if there are significant differences among the behaviors of pre-service teachers towards environmental problems according to grade. First of all, normality tests were conducted according to the grade level and it was found that the data has normal distribution. Then, within the one-way ANOVA test, Levene test was performed and "the equivalence of the variances of the groups" was tested [36]. The resultant p value was found to be  $> 0.05$ . Accordingly, the group variances seem to be equal [36]. The results obtained by LSD test are given in Table 6.

The critical value in the F distribution table [37] used to interpret the value of F in Table 6 is approximately 2.65. The F value calculated in the study was found to be significant because it was greater than this critical value. In addition, p value was also significant, thus at least two of the grade levels have a significant difference in terms of behavior towards environmental problems. LSD test was used to determine the grade levels whose difference were significant in terms of behavior towards environmental problems. According to this test; It was found that there were significant differences between freshman pre-service teachers' average score of behavior towards environmental problems ( $\bar{X}$ =88.45) and the third grade ( $\bar{X}$ =93.73) and fourth grade ( $\bar{X}$ =92.33) pre-service teachers' behavior score. The same situation was observed among the second grade pre-service teachers ( $\bar{X}$ =88.57) and third and fourth grade pre-service teachers. The results showed that the behavioral scores for environmental problems were higher in the upper grades.

The effect of the grade on the behaviors of pre-service teachers towards environmental problems was calculated with the eta-squared coefficient ( $\eta^2$ ) [37], which was found to be  $\eta^2=0.06$ . According to this result, it can be said that the effect of the grade level is moderate (Green and Salkind, 2005; cited in [36]).

Table 6. ANOVA results of pre-service teachers' behavior towards environmental problems according to grade

Source of the variance	Sum of squares	SD	Mean of Squares	F	P	Grades having significant differences
Between-group	1172.858	3	390.953	4.735	0.003	1-3
Within-group	17420.975	211	82.564			1-4
Total	18593.833	214				2-3
						2-4

### 3.5. The relationship between environmental identities and behavior towards environmental problems

In the study, Pearson moment product correlation coefficient was calculated in order to examine the relationship between pre-service science teachers' environmental identity and their behaviors towards environmental problems. The correlation coefficient was found as 0.420, which indicates a moderate relationship between the variables [38].

### 3.6. Regression related to environmental identity and the behavior towards environmental problems

In the study, simple linear regression analysis was performed in order to see whether the environmental identity of pre-service science teachers was a significant predictor of their behaviors towards environmental problems. Firstly, the normality of the data was tested and normal distribution was confirmed. Then, regression analysis was performed. The results are given in Table 7.

Table 7. Regression analysis related to environmental identity and behavior towards environmental problems

Variable	B	Standard error	$\beta$	t	p
Constant	63.583	4.066	-	15.638	0.000
Environmental Identity	.208	.031	0.420	6.756	0.000
$R=0.420$	$R^2=0.176$	$F_{(1,213)}=45.642$	$p=0.000$		

As a result of simple linear regression analysis performed to determine how the environmental identity predicts the behavior of pre-service science teachers towards environmental problems, a significant relationship was found between these two variables ( $R=0.420$ ;  $R^2=0.176$ ). It was found that environmental identity is a significant predictor of pre-service science teachers' behavior towards environmental problems ( $F_{(1-213)}=45.642$ ;  $p<0.005$ ).  $R^2$  value showed that 18% of the change in the behavior of pre-service teachers towards environmental problems can be explained by environmental identity. The significance test for the environmental identity showed that this variable was a significant predictor. According to the results of regression analysis, the regression equation is given below. Behavior towards environmental problems =  $(0.208 \times \text{Environmental identity}) + 63.583$

### 3.7. Path analysis for the variables of the research

Previous analysis in the study was reviewed before proposing a path diagram based on the relationship between variables. Then, the diagram was prepared and tested as seen in Figure 1.

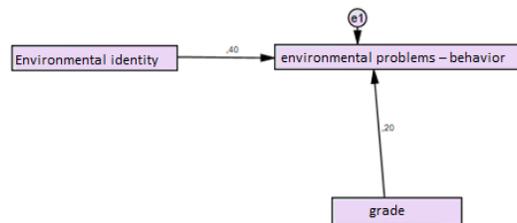


Figure 1. Path diagram of the study

The path diagram prepared and tested in the study is given in Figure 1. In the path analysis, the grade of pre-service teachers was transformed into a two-category representative variable. The coefficients of concordance for the path diagram developed in the study are given in Table 8.

Table 8. Coefficients of concordance for the path diagram

Coefficients of concordance	Predicted Values	Limit Values ([39], s. 185)
$\chi^2$ /sd	2.814	$\leq 5$
CFI	0.965	$\geq 0.90$
GFI	0.991	$\geq 0.90$
RMSEA	0.092	$\leq 0.10$

According to the path diagram and the coefficients of concordance, it was found that the path presented diagram has high adaptability. The total and direct effect values between the variables are given in Table 9.

Table 9. The total and direct effect values for the diagram

Variables	Grade	Environmental Identity
Behavior towards environmental problems	0.202	0.401

Table 9 shows that being in 3<sup>rd</sup> and 4<sup>th</sup> grade ( $\beta = 0.202$ ,  $p < 0.05$ ) and environmental identity ( $\beta = 0.41$ ,  $p < 0.05$ ) predict the behavior towards environmental problems. In addition, it was found that the effect of grade and environmental identity on the behavior towards environmental problems is direct.

In this research, environmental identity of pre-service science teachers and their behaviors towards environmental problems were examined according to gender and grade. A path diagram was developed by evaluating the relationship between the variables.

In the study, it was found that female students' average environmental identity score was higher than the average score of males. This gender difference is consistent with previous studies on the subject

[11, 31, 40]. There was no significant difference between pre-service teachers' environmental identity according to grade.

It was found that female students' average score of behavior towards environmental problems was significantly higher than the average score of males. In a study conducted by Alniacik [41], environment-friendly behaviors of university students were examined. In the study, it was concluded that the female students' environment-friendly behaviors were significantly higher. In a study conducted by Kısoglu, Yildirim, Salman and Sulun [42], it was found that female pre-service teachers' average score for environmental problems was higher than the average score of males. In a study in which pre-service teachers' behaviors towards the environment were examined, it was concluded that the average score of the female students was higher [43]. In the study of Sahin and Dogu [44], it was found that female pre-service preschool teachers' behavior scores related to environmental problems were significantly higher than the scores of males. Similar results were obtained for secondary school students. Female students' environmental behavior scores were found to be higher [45]. Female students are likely to have higher scores on environmental problems than male students, because women are more sensitive to the environment and give more importance to environmental cleanliness [46]. Unlike all these results, Ari [47] found that male university students' environmental behavior scores were significantly higher than female students'.

In the study, it was found that the average behavior scores of pre-service science teachers who attend third and fourth grade were significantly higher than the average scores of the first and second grade students. A similar result was revealed in the study of Kısoglu et al. [42], in which it was found that the average behavior scores of the fourth-grade pre-service teachers were significantly higher than those of the first-grade. The probable cause of this situation may be the environmental science course included in the third year curriculum of the science education undergraduate program. Students who take environmental courses at the university exhibit more positive behaviors related to the environment than students who do not attend such courses [48].

In the research, a moderate relationship was revealed between pre-service science teachers' environmental identity and their behaviors towards environmental problems. It was found that pre-service teachers' environmental identity is a significant predictor of their behavior towards environmental problems. It was determined that 18% of the change in pre-service teachers' behaviors towards environmental problems can be explained by their environmental identity. This fact indicates that environmental identity has a significant effect in shaping the behaviors related to environmental problems and it is probably due to the fact that the environment has a different importance in the Turkish culture and the beliefs of the Turks. Indeed, in the studies conducted by Tanik [49] and Clayton and Kilinc [31], it was found that the environmental identity of pre-service teachers was an important predictor of environment-friendly behaviors. In the research, it was found environmental identity and attending 3<sup>rd</sup> and 4<sup>th</sup> grade of science education program predicted the behavior towards environmental problems.

#### 4. CONCLUSION

The research revealed a moderate relationship between pre-service science teachers' environmental identity and their behaviors towards environmental problems. There are 18% of the change in the behaviors of pre-service teachers towards environmental problems can be explained by their environmental identity.

#### REFERENCES

- [1] Kilinc, A., "Can project-based learning close the gap? Turkish student teachers and proenvironmental behaviours," *International Journal of Environmental & Science Education*, vol. 5(4), pp. 495-509, 2010.
- [2] Naess, A., "The deep ecological movement. deep ecology for the 21st century," Boston: Shambhala Publications, 1995.
- [3] Burgess, J., Harrison, C., & Filius, P., "Environmental communication and the cultural politics of environmental citizenship," *Environment and Planning*, vol. 30, pp. 1445-1460, 1998.
- [4] Courtenay-Hall, P., & Rogers, L., "Gaps in mind: Problems in environmental education knowledge/behaviour modelling research," *Environmental Education Research*, vol. 8(3), pp. 283-297, 2002.
- [5] Cottrell, S.P., "Influence of sociodemographics and environmental attitudes on general responsible environmental behavior among recreational boaters," *Environment and Behavior*, vol. 35(3), pp. 347-375, 2003.
- [6] Hungerford, H.R. and Volk, T.L., "Changing learner behavior through environmental education," *The Journal of Environmental Education*, vol. 21(3), pp. 8-21, 1990.
- [7] Kollmuss, A., & Agyeman, J., "Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior?," *Environmental Education Research*, vol. (3), pp. 239-260, 2002.
- [8] Mogensen, F., & Nielsen, K., "Students' knowledge about environmental matters and their belief in their own action possibilities - a Danish study," *Journal of Environmental Education*, vol. 33(1), pp. 33-35, 2001.

- [9] D.Yencken, J.Fien, ve H. Sykes (Ed.), "Young people and the environment: The implications for environmentalism," *Environment, education and society in the Asia-Pacific* (ss. 212-250). London: Routledge, 2000.
- [10] Wilke, R., "Literacy model development and framework," R. Wilke (Ed.), *Environmental Education Literacy/Needs Assessment Project: Assessing Environmental Literacy of Students and Environmental Education Needs of Teachers; Final Report for 1993-1995* (ss. 5-6). Stevens Point, WI: University of Wisconsin – Stevens Point, 1995.
- [11] Alp, E., Ertepinar, H., Tekkaya, C., & Yilmaz, A., "A survey on Turkish elementary school students' environmental friendly behaviours and associated variables", *Environmental Education Research*, vol. 14(2), pp. 129-143, 2008.
- [12] Fisher, J. D., Fisher, W. A., & Shuper, P., "The information-motivation-behavioral skills model of HIV preventive behavior," R. DeClemente, R. Crosby, and M. Kegler (Ed.), *Emerging theories in health promotion practice and research* (ss.21-65). San Francisco: Wiley ve Sons, 2009.
- [13] Jensen, B., "Knowledge, action and pro-environmental behaviour," *Environmental Education Research*, vol. 8(3), pp. 325-334, 2002.
- [14] Kempton, W., Boster, J.S., & Hartley, J.A., *Environmental values in American culture*. Cambridge: MA, MIT Press, 1995.
- [15] Schultz, P. W., "Inclusion with nature: Understanding human-nature interactions," P. Schmuck ve P. W. Schultz (Ed.), *The psychology of sustainable development* (ss. 61–78). New York: Kluwer, 2002.
- [16] Clayton, S., "Environmental identity: A conceptual and an operational definition," S. Clayton & S. Opatow (Ed.), *Identity and the Natural Environment* (ss. 45-65). Cambridge, MA: MIT Press, 2003.
- [17] Clayton, S., & Opatow, S., *Identity and the natural environment*, London: The MIT Press, 2003.
- [18] Nisbet, E. K., Zelenski, J. M., & Murphy, S. A., "The nature relatedness scale: linking individuals' connection with nature to environmental concern and behavior," *Environment and Behavior*, vol. 41(5), 715-740, 2009.
- [19] Negev, M., Sagy, G., Garb, Y., Salzberg, A., & Tal, A., "Evaluating the environmental literacy of Israeli elementary and high school students," *The Journal of Environmental Education*, 39(2), 3-20, 2008.
- [20] Ozturk, G., Tuzun, Ö., & Teksoz, G., "Exploring environmental literacy through demographic variables", *Elementary Education Online*. vol. 12(4), pp. 926-937, 2013.
- [21] Teksoz, G., Sahin, E., & Ertepinar, H., "Çevre okuryazarlığı, öğretmen adayları ve sürdürülebilir bir gelecek," *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, vol. 39, pp. 307-320, 2010.
- [22] Erten, S., "Okul öncesi öğretmen adaylarında çevre dostu davranışların araştırılması," *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, vol. 28, pp. 91-100, 2005.
- [23] Tikka, P. M., Kuitunen, M. T., & Tynys, S. M., "Effect of educational background on students' attitude, activity levels, and knowledge concerning the environment," *The Journal of Environmental Education*, vol. 31(3), pp. 12-19, 2000.
- [24] Berberoglu, G., & Tosunoglu C., "Exploratory and confirmatory factor analyses of an environmental attitude scale (EAS) for Turkish university students," *Journal of Environmental Education*, vol. 26(3), 40-44, 1995.
- [25] Kaiser, F.G., Wölfling, S., & Fuhrer, U., "Environmental attitude and ecological behavior," *Journal of Environmental Psychology*, vol. 19, pp. 1-19, 1999.
- [26] Newhouse, N., "Implications of attitude and behavior research for environmental conservation," *The Journal of Environmental Education*, vol. 22(1), pp. 26–32, 1991.
- [27] Sama, E., "Öğretmen adaylarının çevre sorunlarına yönelik tutumları," *G.Ü. Gazi Eğitim Fakültesi Dergisi*, vol. 23(2), pp. 99-110, 2003.
- [28] Kahyaoglu, M., & Ozgen, N., "An investigation of pre-service teachers' attitudes towards environmental problems in terms of several variables," *Journal of Theoretical Educational Science*, vol. 5(2), pp. 171-185, 2012.
- [29] Yilmaz, A., Morgil, I., Aktug, P., & Gobekli, İ., "Knowledge of the secondary school and university students on the environment, environmental concepts and problems and suggestions," *Hacettepe University Journal of Education*, vol. 22, pp. 156-162, 2002.
- [30] Johnson, B. & Christensen, L., *Nicel, Nitel ve Karma Yaklaşımlar* (A. Türkdoğan, Çev.). Ankara: Eğiten Kitap, 2014.
- [31] Clayton, S., & Kilinc, A., "Proenvironmental concern and behavior in Turkey: The role of national and environmental identity," *Psychology*, vol. 4(3), pp. 311-330, 2013.
- [32] Guven, E., & Aydogdu, M., "Development of environmental problems behaviour scale and determination of teacher candidates' behaviour levels," *Uludağ Üniversitesi Eğitim Fakültesi Dergisi*, vol. 25(2), 2012, pp. 573-589, 2012.
- [33] Fraenkel, J. R., & Wallen, N. E. "How to design and evaluate research in education," *Mc Graw Hill*, 2006.
- [34] Tabachnick, B. G., & Fidell, L. S., *Using multivariate statistics*. Boston: Allyn and Bacon, 2007.
- [35] Buyukozturk, S., *Sosyal bilimler için veri analizi el kitabı (12. Baskı)*. Ankara: Pegem Akademi, 2010.
- [36] Can, A., *SPSS ile bilimsel araştırma sürecinde nicel veri analizi (2. Baskı)*. Ankara: Pegem Akademi, 2014.
- [37] Buyukozturk, S., Cokluk, O. & Koklu, N., *Sosyal bilimler için istatistik (14. Baskı)*. Ankara: Pegem Akademi, 2014.
- [38] Sencan, H., *Sosyal ve davranışsal ölçümlerde güvenilirlik ve geçerlilik*. Ankara: Seçkin Yayıncılık, 2005.
- [39] Ozdamar, K., *Eğitim, sağlık ve davranış bilimlerinde ölçek ve test geliştirme/yapısal eşitlik modellemesi*. Eskişehir: Nisan Kitabevi, 2016.
- [40] Tuncer, G., Ertepinar, H., Tekkaya, C., & Sungur, S., "Environmental attitudes of young people in Turkey: Effects of school type and gender," *Environmental Education Research*, vol. 11, pp. 215-233, 2005.

- [41] Alniacik, U., "Çevreci yönelim, çevre dostu davranış ve demografik özellikler: üniversite öğrencileri üzerinde bir araştırma," *SÜ İİBF Sosyal ve Ekonomik Araştırmalar Dergisi*, 2010.
- [42] Kisoglu, M., Yildirim, T., Salman, M., & Sulun, A., "Investigation of behaviors towards environmental problems in teacher candidates who will give environmental education at primary and secondary schools," *Erzincan Üniversitesi Eğitim Fakültesi Dergisi*, vol.18(1), pp. 299-318, 2016.
- [43] Timur, S., Yılmaz, S. & Timur, B., "Examining the environmental behaviors of pre-service teachers," *YYU Journal Of Education Faculty*, vol. 10 (1), pp. 125-141, 2013.
- [44] Sahin, H. G., & Dogu, S., "Pre-Service preschool teachers' attitudes and behaviors related to environmental problems," *Elementary Education Online*, vol. 17(3), 2018.
- [45] Demirel, R., "Determining secondary students' behavior towards the environment," *Journal of Theory and Practice in Education*, vol. 12(4), pp. 863-878, 2016.
- [46] Unlu, I. & Metin, O., "Elementary student's levels of reaching the values in terms of gender variable," *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi (KEFAD)*, vol. 17(2), pp. 697-713, 2016.
- [47] Ari, E., "To investigate the structural equation model of environmental thought and behavior of university students," *International Journal of Social Science*, vol. 40, pp. 167-181, 2015.
- [48] Gultekin, M. C., "An investigation into university students' environmental sensitivity: The sample of Mardin Artuklu University," *Selcuk University Journal of Social and Technical Researches*, vol. 14, pp. 172-185, 2017.
- [49] Tanik, N., *Determining the environmental identity and proenvironmental behaviours of student science teachers*. Unpublished Master theses. Erciyes University, 2012.