



Investigation of gifted students' environmental awareness

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Abstract

The purpose of the current study is to investigate gifted students' environmental awareness. A total of 147 gifted students attending a Science and Arts Centre (BİLSEM) in the Central Anatolian Region in the spring term of the 2019-2020 school year participated in the current study. The data of the current study were collected by using the Environmental Awareness Scale and the collected data were analyzed with descriptive statistics and statistical methods based on the differences between means. As a result of the study, the participating students' environmental awareness was found to be at the level of "Strongly agree"; that is, considerably high. The participating students' environmental awareness was found to be varying significantly depending on gender in favour of female students. On the other hand, the participating students' environmental awareness was found to be not varying significantly depending on the BİLSEM program attended, whether having participated in an activity related to environment and whether being interested in environmental problems. In light of the findings of the current study, it can be suggested that peer-learning environments where gifted students can reflect their environmental awareness should be created and that different activities to foster the environmental awareness of male students should be developed.

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1. Introduction

Throughout human history, individual and nature have been in interaction. However, with industrialization, when societies began to use natural resources as if these resources were infinite to increase their quality of life, the natural balance began to suffer. Environmental problems have emerged when factors such as deterioration of the natural balance, overpopulation, food need, resource scarcity, land degradation, poverty and hunger, increasing water demand, decreasing water quality, increasing energy need and unsustainable development have been combined (Erdoğan and Özsoy, 2007). For this reason, individuals are faced with both global problems such as global warming and regional environmental problems such as water, air and soil pollution (Kılınc, 2010).

Environmental education is one of the most important ways to deal with environmental problems (Erdoğan, Kostova and Marcinkowski, 2009; Rodriguez, Boyes, Stanisstreet et al., 2011). A comprehensive and qualified environmental education is considered as a promising way to educate members of the community to seek solutions to environmental problems and to protect natural resources (Tuncer, Tekkaya, Sungur,

Çakıroğlu, Ertepinar and Kaptavitz, 2009; Palmer, 1998). The concept of environmental education first came to the agenda at the United Nations Human Environment Conference held in Stockholm in 1972, and the issue of environmental education gained a global dimension. The declaration emphasized that people should protect and improve the environment for both current and future generations. Then, Tbilisi Declaration was issued at the UNESCO Environmental Education Conference in 1977. In this declaration, the objectives of environmental education are classified as awareness, knowledge, attitude, skills and participation (Haktanır, 2007). In other words, for the continuity of life, every country is obliged to train individuals equipped with the necessary knowledge and skills, with positive attitude, awareness and values regarding the environment. It is clearly seen here that one of the important steps to be taken to train individuals who act environmentally friendly and actively participate in the solution of environmental problems is to create environmental awareness and awareness of environmental problems in individuals at an early age (Akbayrak and Kuru Turaşlı, 2017). Xuehua (2004) argues that the main purpose of environmental education is to create environmental awareness in individuals.

In order for individuals to be environmentally friendly and to participate in solution of environmental problems, they must first be aware of environmental problems. However, it is controversial how successful it has been in this regard. Research shows that environmental education applications are conducted in the form of themes and individuals are not enabled to gain awareness and consciousness in a holistic manner (Çukur and Özgüner, 2008). At this point, Ayaydın, Ün, Acar Şeşen, Usta Gezer and Camcı Erdoğan (2018) state that in order to be able to conduct effective studies to create environmental awareness and sensitivity in the society, individuals who will be leaders and take responsibility in these studies are needed and that these individuals can be gifted students. Gifted students' sensitivity to global problems, their knowledge of nature and science, their interest in the natural environment, their advanced problem solving and reasoning skills make them an important resource in solving environmental problems. In addition, it is claimed that gifted students are more sensitive to the environment compared to their peers and may be more likely to take actual responsibility in finding solutions to environmental problems (Sontay, Gökdere and Usta, 2014). In this context, it seems to be important to investigate psychometric factors such as the sensitivity, attitudes, awareness, knowledge and behaviour of gifted students about environmental issues. When the literature is reviewed, it is seen that there are studies investigating gifted students' attitudes towards environment (Aydın, Coşkun, Kaya and Erdönmez, 2011; Çeken, 2009; Esen, 2011; Saraç and Özarıslan, 2018; Uğulu, Akkaya and Erkol, 2013), environmental knowledge (Esen, 2011), attitudes towards recycling of plastic wastes (Bakar and Aydın, 2012), environment-oriented visual perception (Çal, 2019) and environmental awareness and sensitivity (Ayaydın et al., 2018). Moreover, there are studies comparing gifted and mainstream students in terms of environmental attitudes (Uğulu, 2013), environmentally friendly behaviour (Sontay, Gökdere and Usta, 2014), environmental perception (Karaya, Ünal, Çimen and Yılmaz, 2018) and recycling (Bakar, Avan and Aydın, 2018). As can be seen there is only one study investigating gifted students' environmental awareness (Ayaydın, Ün, Acar Şeşen, Usta Gezer, Camcı Erdoğan, 2018). However, this study is an intervention study investigating the effect of

nature education lasting for six days on the environmental awareness and sensitivity of gifted students ($f=50$). In the current study however a survey study was conducted on a relatively larger sample. Thus, it can be said that these two studies are different from each other in terms of their purposes, methods and results. Therefore, the current study is believed to make some contributions to the literature and to encourage researchers to conduct similar studies.

Called active minority, gifted students/children are thought to have an important potential in shaping the future. For this reason, these students' level of awareness of the environment is very important as it will affect both their own environmental behaviours and activities to set the social orientation (Sontay, Gökdere and Usta, 2014). In addition, it is possible to determine the environmental awareness levels of students and shape the environmental education to be given to them accordingly. The results of the current study are expected to contribute to the literature of two important fields that are environmental education and the education of gifted students and to the education policies of these two fields.

In this connection, the research question of the current study is worded as follows; "What is the environmental awareness level of the gifted students attending a BİLSEM in the Central Anatolian Region of Turkey?" The sub-problems of the study are given below:

- 1- Does the gifted students' environmental awareness vary significantly depending on gender?
- 2- Does the gifted students' environmental awareness vary significantly depending on the BİLSEM program they are attending?
- 3- Does the gifted students' environmental awareness vary significantly depending on whether having participated in an environmental activity?
- 4- Does the gifted students' environmental awareness vary significantly depending on whether being interested in environmental problems?

2. Method

2.1. Research design

The current study conducted to determine gifted students' environmental awareness is a survey study based on the quantitative paradigm. The survey method aims to determine an existing state (Fraenkel and Wallen, 2006). In survey studies, on the basis of the data obtained from a sample selected from a population, the general tendency across the whole population is numerically described (Creswell, 2014).

2.2. Population and sample

The population of the current study is comprised of 285 gifted students attending a BİLSEM in a city located in the Central Anatolian Region of Turkey in the 2019-2020 school year. When the instructional programs offered to students in the BİLSEM are examined, it is seen that gifted students are placed in one of the following programs: Support, Recognizing Individual Talents (RIT), Developing Special Talents (DST) and Project groups. In the selection of the sample, the stratified sampling method, one of the

probabilistic sampling methods, was used and great care was taken to include at least 20 students from each program of BİLSEM in the sample. Participation in the study was on a volunteer basis (Fraenkel and Wallen, 2006). As a result, a total of 146 gifted students participated in the study. Demographic features of these students are given in Table 1.

Table 1. Demographic Features of the Participants of the Study

Demographic Features		Frequency	%
Gender	Female	75	51.4
	Male	71	48.6
BİLSEM program	RIT	51	34.9
	SUPPORT	40	27.4
	DST	35	24.0
	PROJECT	20	13.7
Have you participated in any activity related to environment?	Yes, planting a tree	52	35.6
	Yes, sorting out wastes	26	17.8
	Yes, cleaning environment	33	22.6
	No, I haven't	35	24.0
Are you interested in environmental problems?	Yes	110	75.3
	No	36	24.7
Total		146	100.00

As can be seen in Table 1, 51.42% of the participants are females and 48.6% of them are males. Of the participating students, 34.9% are in the RIT program, 27.4% in the SUPPORT program, 24.0% are in the DST program and 13.7% are in the PROJECT program. Twenty four percent of the students have not participated in any environmental activity and 76% of them participated in environmental activities and the activities participated by the students were found to be categorized into three categories in general. These categories are; planting a tree (35.6%), sorting out wastes (17.8%) and cleaning environment (22.6%). Finally, 75.3% of the students were found to be interested in environmental problems while 24.7% were found to be not interested in environmental problems.

2.3. Data collection tools

In the current study, the Environmental Awareness Scale developed by Okur-Berberoğlu and Uygun (2012) was used to determine the gifted students' environmental awareness. The scale is a five-point Likert scale consisted of 18 items and a single dimension called "Human Ecology". The Cronbach Alpha reliability coefficient of the scale is 0.858 and the highest score to be taken from the scale is 90 while the lowest score is 18. In the current study, the Cronbach Alpha reliability coefficient of the scale was calculated to be .782.

2.4. Data analysis

In data analysis, descriptive statistics such as frequency, percentage, and mean values were used. In addition, the non-parametric Kruskal-Wallis and Mann-Whitney U tests

were used as Kolmogorov-Smirnov and Shapiro-Wilk tests indicated that data did not meet the normality criterion.

Table 2. Normality Test Results of the Scale

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistics	sd	p	Statistics	sd	p
Environmental Awareness Scale	,197	146	,000	,806	146	,000

*p<.05

While evaluating the normality results, as the number of students was lower than 50, Shapiro-Wilk results were analyzed (McKillup, 2012). As p<.05 according to the results of Shapiro-Wilk, it was concluded that the data collected from the study group did not distribute normally and thus, it was decided to use non-parametric tests.

In order to determine the gifted students' degree of agreement with the items in the Environmental Awareness Scale, the formula (the number of options-1/the number of options) was used and thus categorical variables were converted into continuous variables. In this way, it became possible to interpret the obtained data. In the current study, score intervals for the five-point Likert scale were determined as follows:

Table 3. Score intervals for the Environmental Awareness Scale

Options	Intervals
Strongly Disagree	1.00-1.80
Disagree	1.81-2.60
Undecided	2.61-3.40
Agree	3.41-4.20
Strongly Agree	4.21-5.00

3. Findings

Results of the Descriptive Analysis related to the Gifted Students' Environmental Awareness

In the current study, first, descriptive analysis was conducted to determine the participants' environmental awareness. In this context, the means and standard deviations of the gifted students taken from the Environmental Awareness Scale are given in Table 4.

Table 4. Descriptive statistics of the items in the Environmental Awareness Scale

Environmental Awareness Scale Human Ecology Factor Items	N	X	S
1. Deforestation should be prevented in order for biodiversity not to	146	4.90	.402

decrease.			
2. Forests should be protected and new forests should be created for the compensation of carbon emission.	146	4.86	.434
3. Bicycles should be used to reduce fossil fuel consumption.	146	4.31	.899
4. For the effective use of water, dripping taps should be repaired.	146	4.88	.483
5. Green areas should not be destroyed so that drinking water resources can be renewed.	146	4.68	.751
6. Consumer frenzy should be ended to do less harm to nature.	146	4.83	.413
7. In order for recycled products to enter the market, the demand of consumers should be to buy recycled products.	146	4.75	.570
8. Global warming should be brought under control due to its negative effects on biodiversity.	146	4.86	.407
9. Solar energy should be utilized in sun-drenched geographies to reduce carbon emissions.	146	4.79	.550
10. Energy must be used efficiently to reduce carbon emissions.	146	4.75	.641
11. In order to use energy efficiently, thermal insulation should be implemented in buildings.	146	4.85	.445
12. Uncontrolled fertilizer should not be used in agricultural land in order not to contaminate drinking water resources.	146	4.84	.480
13. Biological control should be used to prevent soil and water pollution.	146	4.66	.659
14. Recycling practices should be adopted to generate less waste.	146	4.97	.164
15. Garbage should be disposed by being separated into contents in order to generate less waste.	146	4.90	.318
16. In order not to damage biodiversity in the soil, filters should be installed in the factory chimneys.	146	4.82	.640
17. Due to their negative effects on human health, industrial wastes should not be discharged to nature in an uncontrolled manner.	146	4.94	.241
18. Compact fluorescent lamps should be used to reduce electricity consumption.	146	4.51	.816
Total	146	4.78	.253

As can be seen in Table 4, the mean score of the students taken from the items in the Environmental Awareness Scale is $X=4.78$. This mean score shows that the participating gifted students “strongly agree” with the scale items, indicating that their environmental awareness is high. When the items in the scale are separately evaluated, the item having the highest mean score is “Recycling practices should be adopted to generate less waste.” ($X=4.97$) while the item having the lowest mean score is “Bicycles should be used to reduce fossil fuel consumption.” ($X=4.31$). These findings suggest that

the participants attach importance to social movements rather than individual efforts in solving environmental problems. In Figure 1, graphical presentation of the means of the scale items is given.

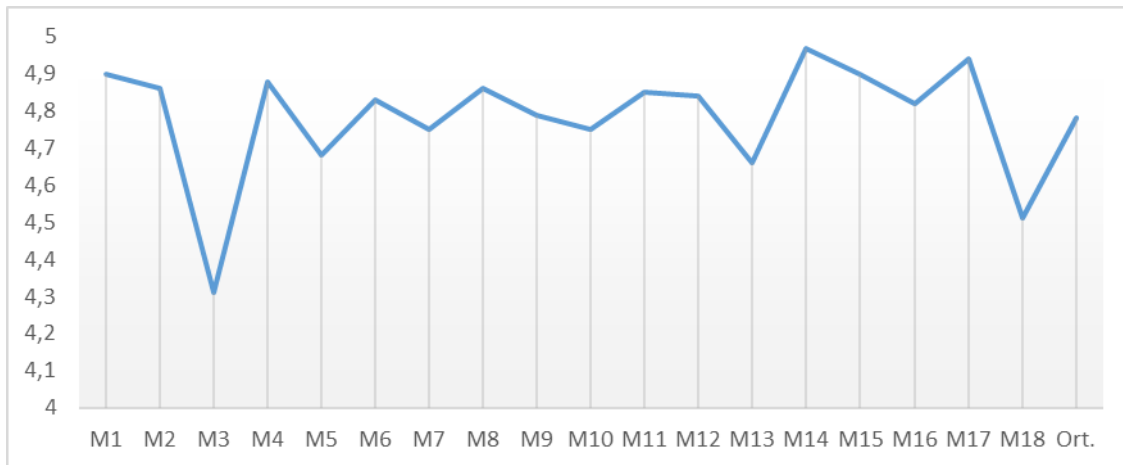


Figure 1. Mean scores of the items in the Environmental Awareness Scale

As can be seen in Figure 1, mean scores taken from individual items and from the whole scale are high.

Investigation of the Gifted Students' Environmental Awareness in relation to Gender

The results of the Mann Whitney U test conducted to determine whether the participating students' environmental awareness varies significantly depending on gender are presented in Table 5.

Table 5. Results of the Mann Whitney U Test Conducted to Determine the Relationship between Environmental Awareness and Gender

Gender	n	Mean Rank	Sum of Ranks	U	z	p
Female	75	83.93	6295.00	1880.0	-3.114	.002*
Male	71	62.48	4436.00	0		

*p<.05

As can be observed in Table 5, the analysis yielded a significant statistical difference between the male and female participants in terms of environmental awareness [U=1880.00 (p<.05)]. This finding shows that the environmental awareness of the female students is higher than that of the male students.

Investigation of the Gifted Students' Environmental Awareness in relation to BILSEM Program Attended

The results of the Kruskal Wallis H test conducted to determine whether the participating students' environmental awareness varies significantly depending on the BİLSEM program attended are presented in Table 6.

Table 6. Results of the Kruskal Wallis H Test Conducted to Determine the Relationship between Environmental Awareness and the BİLSEM Program Attended

BİLSEM Program	n	Mean Rank	sd	X^2	p	Significant Difference
RIT	51	72.51	3	2.992	.993	-
SUPPORT	40	65.49				
DST	35	79.47				
PROJECT	20	81.60				

As can be seen in Table 6, the participating students' environmental awareness does not vary significantly depending on the BİLSEM program attended [$X^2(sd=3, N=146) = 2.992$ ($p > .05$)]. This finding shows that the program attended in BİLSEM by the gifted students does not have any significant effect on their environmental awareness.

Investigation of the Gifted Students' Environmental Awareness in relation to Whether Having Participated in an Environmental Activity

The results of the Kruskal Wallis H test conducted to determine whether the participating students' environmental awareness varies significantly depending on whether having participated in an environmental activity are presented in Table 7.

Table 7. Results of the Kruskal Wallis H Test Conducted to Determine the Relationship between Environmental Awareness and Whether Having Participated in an Environmental Activity

Activity Participation	n	Mean Rank	sd	X^2	p	Significant Difference
Yes, planting a tree	52	68.56	3	4.242	.236	-
Yes, sorting out wastes	26	65.33				
Yes, cleaning environment	33	76.27				
No, I haven't	35	84.30				

As can be seen in Table 7, the participating students' environmental awareness does not vary significantly depending on whether having participated in an environmental activity [$X^2(sd=3, N=146) = 4.242$ ($p > .05$)]. Thus, it can be said that participation in an environmental activity and the type of the activity performed do not have any significant effect on the gifted students' environmental awareness.

Investigation of the Gifted Students' Environmental Awareness in relation to Whether Being Interested in Environmental Problems

The results of the Kruskal Wallis H test conducted to determine whether the participating students' environmental awareness varies significantly depending on whether being interested in environmental problems are presented in Table 8.

Table 8. Results of the Kruskal Wallis H Test Conducted to Determine the Relationship between Environmental Awareness and Whether Being Interested in Environmental Problems

Interest in Environmental Problems	n	Mean Rank	Sum of Ranks	U	z	p
Yes	110	71.18	7829.50	1724.500	-1.179	.238
No	36	80.60	2901.50			

As can be seen in Table 8, the participating students' environmental awareness does not vary significantly depending on whether being interested in environmental problems [$U=1724.500$ ($p>.05$)]. Thus, it can be said that interest in environmental problems does not have any significant effect on the participating gifted students' environmental awareness.

4. Discussion

In the current study, the environmental awareness of the gifted students attending a BİLSEM in the Central Anatolian Region of Turkey and whether their environmental awareness varies significantly depending on gender, the BİLSEM program attended, whether having participated in an environmental activity and whether being interested in environmental problems were investigated and the results are discussed below.

In the current study, first it was determined that the participating students' environmental awareness is high. When the psychomotor factors of the gifted students related to the environment are examined, a similar picture found in other studies is seen. Studies have revealed that gifted students have positive attitudes towards the environment (Aydın and diğerleri, 2011; Bakar and Aydın, 2012; Esen, 2011; Sarıcam & Şahin, 2015; Sontay, Gökdere & Usta, 2014; 2016; Uğulu, 2013), that they have a high level of environmental knowledge (Esen, 2011) and that they have high tendency to behave in an environmentally friendly manner (Sontay, Gökdere and Usta, 2014). This might be because of the intense interest of gifted students in environmental problems (Clark, 1992; Culligford, 1996).

Another finding of the current study is that the environmental awareness of the participating students varies significantly depending on gender in favour of the female students. This might be due to the fact that girls are sensitive, naive and maternal individuals with developed empathy and they approach the environment with these characteristics. In the literature, there is no data directly related to the effect of gender on the environmental awareness of gifted students. However, there are studies showing that the gifted female students' attitudes towards the environment (Aydın et al., 2011; Uğulu, 2013; Uğulu et al., 2013) and attitudes towards the recycling of plastic waste are higher than those of the gifted male students (Bakar, Avan and Aydın, 2018). Saraç and Özarslan (2018) on the other hand determined that the gifted male students' attitudes towards the environment are statistically significantly higher than those of the gifted female students. These results indicate that there is no clear conclusion about the effect

of gender on the environmental attitudes of gifted people and related studies should continue.

In the current study, it was found that the gifted students' environmental awareness does not vary significantly depending on the BİLSEM program attended. This finding might indicate that in all the programs of BİLSEM, there are activities conducted to raise students' environmental awareness. Similarly, the fact that all the participating students have a high level of environmental awareness indicates that there are activities in each program of BİLSEM to raise students' environmental awareness. This finding of the current study is parallel to the study by Saraç ve Özarslan (2018) in which they also reported that the gifted students' environmental attitudes do not vary significantly depending on the program attended in BİLSEM. In the literature, there are studies investigating whether the attitudes of gifted students towards the environment vary significantly depending on grade level. In this connection, while Aydın et al., (2011) stated that the attitudes of gifted students towards the environment vary significantly depending on grade level, Uğulu (2013) and Uğulu et al. (2013) reported that the attitudes of the gifted students towards the environment do not vary significantly depending on grade level.

Another finding of the current study is that the participating students' environmental awareness does not vary significantly depending on whether having participated in an environmental activity and the type of the activity performed. However, participation in an environmental activity is directly related to individuals' own lives. In this case, it can be thought that large-scale activities rather than small-scale individual environmental activities have more positive reflections on the environmental awareness of gifted students, or that the activities attended by the participants do not show enough continuity to create awareness. When the literature is examined, it is seen that there are studies with findings that are the exact opposite of the current study. For example, in a study conducted by Irmak Kazazoğlu (2020) on university students, it was found that the environmental awareness of the participants showed a significant difference depending on their participation in environmental activities.

Finally, in the current study, it was concluded that whether the participants are interested in environmental problems or not did not create a significant difference on their environmental awareness. The probable reason for this result may be that the difference disappears because most of the participants are interested in environmental problems or the participants are receiving similar training.

5. Suggestions

In light of the findings of the current study, following suggestions can be made:

The environmental awareness of the gifted students participating in the current study is considerably high. Considering that these students are educated in formal education institutions together with mainstream students, activities can be conducted in schools in which gifted students are encouraged to participate together with mainstream students

to raise environmental awareness and gifted students can be used as leaders in such activities.

In the current study, the environmental awareness of the gifted female students was found to be higher than that of the gifted male students. Thus, peer-learning environments can be created so that gifted male students can interact with their female counterparts and their environmental awareness can be increased. Moreover, extra activities can be organized for male students to eliminate the difference resulting from gender difference. For individuals to improve their environmental awareness, their contact with the environment is important. Therefore, in order to increase the environmental awareness of male students, conducting environmental activities in out-of-school environments can be useful.

As in the current study, it was determined that the participating students' environmental awareness does not vary significantly depending on the BİLSEM program attended, whether having participated in an environmental activity and whether being interested in environmental problems, it can be thought that the students attending different programs in BİLSEM are homogenous in themselves and receive a similar environmental training. Given that the environmental awareness of the participants of the current study was found to be high, the activities conducted in BİLSEM can be determined and be shared with other schools.

Future research can focus on the determination of the predictors of gifted students' environmental awareness by using larger samples, on the comparison of the environmental awareness of gifted students and mainstream students and on the in-depth investigation of gifted students' environmental awareness by using qualitative methods.

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