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AWARENESS OF THE GIFTED STUDENTS AND THEIR NORMALLY DEVELOPING PEERS ABOUT ENVIRONMENTAL EDUCATION CONCEPTS

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Abstract: The aim of this study was to examine the awareness levels of the gifted students and normally developing peers related to the environmental education concepts. In line with this purpose, the survey design, which is one of quantitative research methods, was used in the study. 209 gifted students receiving education in a Science and Art Center in the Eastern Anatolia and 250 secondary school students receiving education in the public schools during the fall term of the 2019-2020 school year, participated in the study. In the study, the Environmental Education Concepts Awareness Scale was used as data collection tool. Necessary validity and reliability studies were conducted for the scale used. The independent samples t-test and ANOVA were used in the analysis of the data. As a result of the study it was determined that the gifted students had higher awareness scores related to environmental education concepts, compared to their normally developing peers. In addition, while the environmental education concepts awareness scores of the gifted students did not differ significantly according to gender, age range and class level, there was a significant difference in all variables examined in the normal-development group.

Key words: environmental education concepts, gifted students, non-gifted students, awareness levels

1. Introduction

Environment is a dynamic system that covers also human beings and human-made systems and is an integral part of an integrated structure and where there is a close relationship between living and non-living creatures (Ozturk & Ozturk, 2016). On the other hand, natural environment, to formation of which human beings do not contribute is a living space where creatures maintain their lives depending on the opportunities offered by natural life (Yavetz, Goldman & Pe'er, 2014). Human beings, forming an inseparable whole with natural environment, have been affected by their environment and also affected it in return (Pahl-Wostl, Palmer & Richards, 2013).

1. 1. Environmental Risks

While other creatures strive to live by adapting to the opportunities offered by nature, human beings have altered environmental conditions with scientific, technological and industrial developments in an attempt to take control of these conditions. While doing this, they have used natural resources unconsciously and destroyed the ecological balance (Hobsbawm, 2013). The destruction of ecological balance and this effort of human beings to dominate nature, have caused the destruction of their harmony with nature and the emergence of many environmental problems (Fu & Liu, 2017).

Situations such as global warming, greenhouse effect, ozone depletion, destruction of forests, acid rains and proliferation of nuclear power plants, which appeared as a result of intense industrial activities especially after the second half of the 20th century, have turned into environmental crises in the global scale (Dalelo, 2012). These environmental problems have become so enormous that they threaten all species (Ramadhan, Sukma & Indriyani, 2019). This condition stands out also in the Global Risks Report 2020, published by the World Economic Forum. In the report, the destruction of natural resources and ecosystem is involved among the greatest risks. However, it is seen that the Global Risks Report 2020 has collected the long-term global risks under the topic of environment, in contradistinction to the previous reports (World Economic Forum, 2020). Accordingly, it is indicated

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that “excess weather events”, “failure in struggle and adaptation with climate change”, “natural disasters”, “loss of biodiversity and destruction of ecosystem” and “human-induced environmental damages and disasters” are the five risks with the highest probability of happening in the next ten years. Thus, it is possible to say that environmental risks have exercised influence over the whole world, regional and global environmental problems will continue to increase in the years to come, and these problems will bring along greater negative problems (Dalelo, 2012). In this context, environmental education activities become more and more important due to increasing environmental problems and living spaces that decrease every passing day and it is understood that environmental education will be the most important solution (Ozturk, 2013).

1. 2. Environmental Education

Environmental education is a whole of common efforts that contain the processes of recognizing and noticing the values, attitudes and concepts related to a person’s physical and social environment (Ramadhan, Sukma & Indriyani, 2019). With environmental education, it is aimed to enable the individuals to have basic knowledge and skills about the environment and develop responsible behaviors to protect the natural environment. It is also aimed to enable the students to participate in environmental protection activities (Jacobs & Cates, 2012). The most important structuring for creating sensitive communities who have environmental education and environmental consciousness and have made this consciousness a lifestyle and handing this consciousness down the next generations is realized during primary education years (Jacobs & Cates, 2012).

The goals of the science curriculum applying a constructivist approach include teaching basic knowledge related to environmental sciences, adopting scientific process skills and a scientific research approach, generating a solution to problems encountered in these areas in the process of exploring the nature and understanding the human-environment relationship and developing a sustainable progress consciousness for society, economy and natural resources (Ministry of National Education (MoNE), 2018a). The following statement in the social studies curriculum, “It is aimed to enable them to notice the natural environment and limitation of resources; protect natural resources within an environmental sensitivity and have a sustainable sense of environment”, comes to the forefront as a basic goal related to environmental education (MoNE, 2018b). However, in the literature it is indicated that the students from different education levels have inadequate knowledge about the concepts in environmental education, especially about important environmental problems such as greenhouse effect, global warming and acid rains and they are confused about concepts related to environmental problems (Broddy, Chirpman & Marison, 1988; Cutter-Mackenzie, 2009; Celikler, Aksan & Yenikalayci, 2019; Emli & Afacan, 2017; Kilinc, Stainsstreet & Boyes, 2008; Meadows & Wiesenmayer, 1999; Mutlu & Nacaroglu, 2019). This condition reveals that the students considerably lack knowledge and have different perceptions about environmental concepts. Thus their awareness remains deficient in an aspect.

1. 3. Environmental Education Concepts and Gifted Students

It is possible to define and remove environmental problems only through realizing environmental education concepts. It becomes more important considering that determination of the individuals’ awareness levels related to environmental education concepts will reveal their opinion about the issue. Therefore, it is necessary to reveal the individuals’ awareness levels related to environmental education concepts in detail and to determine and remove their misconceptions, if available. In this context, the Science and Art centers (SAC) where the gifted students receive education with flexible programs, are important (Ozturk, Es & Turgut, 2017). The SACs are independent special education institutions established in Turkey for the gifted students to develop their abilities and use them at maximum (MoNE, 2016). In these institutions, it is aimed to develop the individuals who would bring forward important ideas in solving the world problems, in a multi-directional way (Clark, 2013). The gifted students receiving education in the SACs have a higher sensitivity toward global environmental problems and a higher potential for generating appropriate solutions to these problems (Hartsell 2006; Ugulu, 2013). Thus, it might be possible to overcome or prevent the problems that concern the whole humanity, through the gifted students (Piechowski,1997; Sontay, Gokdere & Usta, 2014). Therefore, it is important that awareness be raised in the gifted students related to environmental problems. In this

context it is primarily significant to determine their awareness related to environmental education concepts.

In the literature there are studies on the gifted students and environment. However, number of these studies are inadequate in Turkey (Aydin, Coskun, Kaya & Erdonmez, 2011; Cal, 2019; Mutlu & Nacaroglu, 2019; Sarac & Ozarslan, 2018; Ugulu, Akkaya & Erkol, 2013). On the other hand, the literature includes a limited number of comparative studies on the gifted students and their normally developing peers, related to environment. The extent of these studies comprises a comparative examination of environmental perceptions (Karaya, Unal, Cimen & Yilmaz, 2018), attitude toward recycling and its environmental impacts (Bakar, Avan & Aydinli, 2018), correlation between environmental consciousness, environmental attitude, curiosity and exploration (Saricam & Sahin, 2015), attitude toward environment (Ugulu, 2013), scientific creative solutions to environmental problems (Oz-Aydin & Ayverdi, 2014) and environmental behaviors (Sontay, Gokdere & Usta 2014). As a consequence, it is seen that the studies mainly have addressed environmental consciousness, perceptions, attitudes and environmental literacy of the gifted and normally developing students. In the present study, in contradistinction to other studies, it was endeavored to determine the awareness of the gifted students and their normally developing peers related to environmental education concepts. It is expected that the results to be acquired from comparing the awareness levels of the students with different learning levels related to environmental education concepts and assessing the extent of fulfilling environmental education activities conducted in different curricula, will contribute to the environmental education studies and to the researchers who intend to conduct studies in this field. In addition, it was endeavored to determine how their awareness related to environmental education concepts which are among the important components of the curricula, varied according to the gender, age range and class level variables. This study is also expected to offer an integrated perspective regarding the extent of fulfilling environmental education activities conducted in schools. Within the scope of the study, answers were sought to the following problems.

What are the awareness levels of the gifted students and normally developing peers related to environmental education concepts?

Do the environmental education concepts awareness scores of the gifted students and normally developing peers show a significant difference in terms of the overall scale and its subscales?

Is there a significant difference between the environmental education concepts awareness scores of the gifted students and normally developing peers in terms of gender?

Is there a significant difference between the environmental education concepts awareness scores of the gifted students and normally developing peers from different age ranges?

Is there a significant difference between the environmental education concepts awareness scores of the gifted students and normally developing peers from different class levels?

2. Method

2. 1. Research Design

In this research, it was aimed to examine the awareness of the gifted and normally developing secondary school students related to environmental education concepts. In line with this purpose, the survey design, which is one of quantitative research methods, was used in the research. Survey design is a quantitative research design which describes features of a sample such as ability, attitude, interest and skill concerning an incident, situation or a subject and usually studies on larger samples (Buyukozturk, Cakmak, Akgun, Karadeniz & Demirel, 2011).

2. 2. Research Participants

The study was conducted with 209 gifted students (111 females, 98 males) receiving education in a SAC in the Eastern Anatolia and 250 students (136 females, 114 males) receiving education in public schools during the fall term of the 2019-2020 school year. Table 1 shows the demographic information of the participants in the study.

Table 1. Demographic information of the participants

Development level	Variables	Demographic characteristics	*f*	%
Gifted Student	Gender	Female	111	53.1
		Male	98	46.9
	Age	9-11	100	47.8
		12-15	109	52.2
	Class	Fifth grade	58	27.8
		Sixth grade	54	25.8
		Seventh grade	57	27.3
		Eighth grade	40	19.1
Normally Developing Student	Gender	Female	136	54.4
		Male	114	45.6
	Age	9-11	107	42.8
		12-15	143	57.2
	Class	Fifth grade	78	31.2
		Sixth grade	56	22.4
		Seventh grade	48	19.2
		Eighth grade	68	27.2

The accessible population of the study consisted of 722 gifted students receiving education in the SAC in the province where the study was conducted. While the students' class levels varied between fifth and eighth grades, their age ranges varied between 9-15 years. The sample of the study was selected by using the convenience sampling method and accessing at least 10% of the accessible population.

2. 3. Data Collection Tools

In this research the Environmental Education Concepts Awareness Scale (EECAS), developed by Otun, Artun, Temur, and Tozlu (2017) was used as data collection tool. Before using the scale, the researchers who developed the scale were contacted and necessary permissions were obtained from them. The scale comprises 22 items including the following subscales; "Greenhouse Effect", "Human Effect", "Causes of Global Warming", "Environmental Pollution", "Environmental Consciousness", and "Importance of Environmental Protection". In order to provide reliability for the data collection tool, the Cronbach's alpha value was calculated by Otun, Artun, Temur, and Tozlu (2017) and also in the present study. In this context, the reliability coefficient of the scale was found to be .75 by the researchers who developed the scale and .86 in the present study. The reliability coefficient value for each subscale was found to be; .72 for the Greenhouse Effect, .77 for the Human Effect, .70 for the Causes of Global Warming, .69 for the Environmental Pollution, .76 for the Environmental Consciousness and .84 for the Importance of Environmental Protection.

2. 4. Data Analysis

Descriptive statistical analyses were performed for the purpose of applying inferential statistics related to the scores obtained by the participants from the scale within the scope of the study. In order to check whether or not the scores obtained from the scale varied according to the gender, class level and age variables or not; whether the scores were normally distributed according to these variables was checked at first. The values determined are shown in Table 2.

Table 2. Descriptive statistical findings

Level	Variables		Mean	Median	Skewness	Kurtosis	Min.	Max.
Gifted	Gender	Male	90.81	92.40	.224	-.307	74	110
		Female	89.05	89.00	-.939	.784	45	107
	Class	Fifth grade	90.06	88.00	.753	.524	74	110
		Sixth grade	88.53	88.00	-.969	.590	45	106

		Seventh grade	90.59	90.00	.209	-.425	75	106
		Eighth grade	90.40	90.50	.268	.199	75	107
	Age	9-11	89.54	88.00	.464	-.012	74	110
		12-15	90.19	90.00	.076	.615	45	107
Normally Developing	Gender	Male	78.84	81.00	-.639	-.022	40	110
		Female	83.47	84.00	-.911	.541	39	110
	Class	Fifth grade	77.82	80.00	-.824	.651	44	102
		Sixth grade	80.92	84.00	.226	.623	39	100
		Seventh grade	83.50	84.50	-.856	.282	49	104
		Eighth grade	84.27	87.00	-.844	.099	40	110
	Age	9-11	79.00	81.00	-.912	.715	44	102
		12-15	83.13	85.00	-.855	.710	39	110

When examining the EECAS total scores of the participants in terms of gender, class level and age, it was determined that while the mean and median values were very close to each other, the kurtosis and skewness values ranged from (-1) to (+1). Considering from this point of view, it can be asserted that the scores obtained from the scale were normally distributed in terms of gender, class level and age (Fraenkel & Wallen, 2006). Thus, the independent samples t-test was used to compare the scale scores of the female and male participants in terms of the gender and age variables and the ANOVA was used to compare the scores in terms of class level. In addition, the effect size (Eta squared) values showing the effect degree of the independent variable of the dependent variable were calculated. The calculated effect size is interpreted to be "low" if it is between $0.01 \leq \eta^2 < 0.06$, "moderate" if it is between $0.06 \leq \eta^2 < 0.14$ and "large" if it is between $\eta^2 \geq 0.14$ (Cohen, 1988). In order to determine the agreement levels of the gifted and normally developing students for the items in the subscales in the EECAS, the option number-1/option number formula was used. The reason for using this formula was to make the discontinuous answer options continuous and to facilitate interpretation of the data acquired statistically. In this context, the point range of the EECAS, which is a five-point likert scale, is illustrated in Table 3.

Table 3. Point range of the scale

EECAS	
Strongly disagree	1.00-1.80
Disagree	1.81-2.60
Uncertain	2.61-3.40
Agree	3.41-4.20
Strongly agree	4.21-5.00

3. Results

3. 1. Awareness Levels of the Gifted and Normally Developing Students Related to Environmental Education Concepts

Within the scope of the study, an answer was sought to the following question; "What are the awareness levels of the gifted students and normally developing peers related to environmental education concepts?". In this context, Table 4 shows the descriptive statistical findings related to the EECAS scores of the gifted and normally developing students.

Table 4. Descriptive statistical findings related to the eecas scores

Group	**EECAS**	**N**	$\bar{X}$	**S.s.**	**Min.**	**Max.**
Gifted Student	Greenhouse Effect	209	4.09	2.57	10	25
	Human Effect	209	4.13	1.64	6	15
	Causes of Global Warming	209	4.07	2.11	7	20
	Environmental Pollution	209	3.91	1.77	4	15

	Environmental Consciousness	209	4.08	2.04	6	20
	Importance of Environmental Protection	209	4.20	1.28	3	15
	Total Scale	209	4.08	1.90	45	110
Normally Developing Student	Greenhouse Effect	250	3.30	3.78	7	25
	Human Effect	250	4.27	3.16	3	15
	Causes of Global Warming	250	3.64	3.55	3	20
	Environmental Pollution	250	3.70	2.92	2	15
	Environmental Consciousness	250	3.83	3.85	4	20
	Importance of Environmental Protection	250	3.64	2.90	3	15
	Total Scale	250	3.69	2.41	39	110

When examining Table 4, it was determined that the lowest total score obtained by the gifted students was 45 and their highest total score was 110. The lowest total score of the normally developing students was 39 and their highest total score was 110. The total mean score was found to be 4.08 for the gifted students and 3.69 for the normally developing students. This result showed that EECAS mean score of the gifted and normally developing students from the EECAS was "high" in the point range of *agree*. When examining the scale subscales, the gifted students indicated their views as *agree* in all subscales. The normally developing students, on the other hand, indicated their views as *strongly agree* in the items in the "*Human Effect"* subscale at the agreement level of 4.27 and *uncertain* in the items in the "*Greenhouse Effect*" subscale at the level of 3.30.

3. 2. Comparing the Environmental Education Concepts Awareness Scores of the Gifted and Normally Developing Students

Within the scope of the study, an answer was sought to the following question; "Do the environmental education concepts awareness scores of the gifted students and normally developing peers show a significant difference in terms of the overall scale and its subscales?". In this comparison, the EECAS scores of the two groups were examined individually in terms of each subscale and the results are shown in Table 5.

Table 5. Independent samples t-test results related to the EECAS scores of the gifted and normally developing students

Subscale	Development Level	N	$\bar{X}$	S.s.	Levene's Test		sd	t	p
					F	p			
Greenhouse Effect	Gifted	209	20.45	2.57	23.503	.000	457	12.742	.000*
	Normal	250	16.52	3.78					
Human Effect	Gifted	209	12.39	1.64	35.669	.000	457	-1.745	.067
	Normal	250	12.82	3.16					
Causes of Global Warming	Gifted	209	16.29	2.11	53.155	.000	457	6.103	.000*
	Normal	250	14.58	3.55					
Environmental Pollution	Gifted	209	11.74	1.77	37.645	.000	457	2.740	.006*
	Normal	250	11.11	2.92					
Environmental Consciousness	Gifted	209	16.35	2.04	51.479	.000	457	3.301	.001*
	Normal	250	15.37	3.85					
Importance of Environmental Protection	Gifted	209	12.63	1.28	113.962	.000	457	7.772	.000*
	Normal	250	10.94	2.90					
Total Scale	Gifted	209	89.88	8.21	37.245	.000	457	7.536	.000*
	Normal	250	81.36	14.50					

p*<.05

When examining Table 5, it was determined that there was a statistically significant difference between the EECAS mean scores of the gifted and normally developing students (Gifted=89.88; Normally developing =81.36), in favor of the gifted students (p=.000<.05, t =7.536). In addition, a statistically significant difference was observed in favor of the gifted students between the mean scores of the gifted and normally developing students in the *"Greenhouse Effect"*, "*Causes of Global*

Warming", "*Environmental Pollution"*, "*Environmental Consciousness"* and "*Importance of Environmental Protection"* subscales in the scale. However, it was found that there was no difference between the "*Human Effect"* subscale scores, in terms of development level [t(457)= -1.745; p=.067>.05].

3. 3. Examining the Environmental Education Concepts Awareness Scores of the Gifted and Normally Developing Students in Terms of the Gender Variable

Within the scope of the study, an answer was sought to the following question; "Is there a significant difference between the environmental education concepts awareness scores of the gifted students and normally developing peers in terms of gender?". In this context, the independent samples t-test was conducted to compare the scores obtained by each group from the overall scale and each subscale in terms of gender. The results are shown in Table 6.

Table 6. Findings related to the scale scores of the female and male students

Group	Subscale	Gender	N	$\bar{X}$	S.s.	Levene's Test		sd	t	p
						F	p			
Gifted Student	Greenhouse Effect	Male	98	20.61	2.52	.083	.774	207	.830	.408
		Female	111	20.31	2.62					
	Human Effect	Male	98	12.45	1.54	1.942	.165	207	.510	.611
		Female	111	12.34	1.74					
	Causes of Global Warming	Male	98	16.55	1.98	.358	.550	207	1.638	.103
		Female	111	16.07	2.21					
	Environmental Pollution	Male	98	11.87	1.81	.365	.546	207	1.002	.318
		Female	111	11.63	1.74					
	Environmental Consciousness	Male	98	16.48	1.90	.306	.581	207	.899	.370
		Female	111	16.23	2.17					
	Importance of Environmental Protection	Male	98	12.82	1.01	1.164	.282	207	2.074	**.039***
		Female	111	12.45	1.46					
	Overall Scale	Male	98	90.81	7.90	.052	.819	207	1.552	.122
		Female	111	89.05	8.43					
Normally developing student	Greenhouse Effect	Male	114	16.12	3.62	.781	.378	248	-1.521	.129
		Female	136	16.85	3.90					
	Human Effect	Male	114	12.23	3.59	13.690	.520	248	-2.704	**.007***
		Female	136	13.30	2.65					
	Causes of Global Warming	Male	114	14.33	3.58	.301	.584	248	-1.038	.300
		Female	136	14.80	3.52					
	Environmental Pollution	Male	114	10.84	3.14	3.067	.081	248	-1.338	.182
		Female	136	11.33	2.71					
	Environmental Consciousness	Male	114	14.75	4.12	5.442	.070	248	-2.358	.019*
		Female	136	15.89	3.53					
	Importance of Environmental Protection	Male	114	10.55	2.82	.209	.648	248	-1.984	.058
		Female	136	11.27	2.93					
	Overall Scale	Male	114	78.84	15.23	2.601	.108	248	-2.544	**.012***
		Female	136	83.47	13.55					

p*<.05

When examining Table 6, it was determined that there was no statistically significant difference between the EECAS total mean scores obtained by the female and male gifted students (t(207) =1.552; p= .122>.05). However, it was found that there was a significant difference between the scores obtained by the female and male participants from the "*Importance of Environmental Protection"* subscale in the scale [t(207)=2.074; p=.039<.05]. This difference was in favor of the male participants (Female participant=12.45<Male participant=12.82). It was determined that there was a statistically significant difference between the EECAS total mean scores of the female and male normally

developing students (t(248) = -2.544; p= .012<.05) and between scores of the "*Human Effect"* (t(248)=-2.704; p=.007<.05) and *"Environmental Consciousness"* (t(248)= -2.358; p= .019<.05) subscales, in favor of the female participants.

3. 4. Examining the Environmental Education Concepts Awareness Scores of the Gifted and Normally Developing Students in Terms of the Age Variable

Within the scope of the study, an answer was sought to the following question; "Is there a significant difference between the environmental education concepts awareness scores of the gifted students and normally developing peers from different age ranges?". In this context, the independent samples t-test was conducted to compare the scores obtained by each group from the overall scale and each subscale, in terms of age. The results are shown in Table 7.

Table 7. Findings related to the scale scores of the students from different age ranges

Group	Subscale	Age	N	$\bar{X}$	S.s.	Levene's Test		sd	t	p
						F	p			
Gifted Student	Greenhouse Effect	9-11	100	20.32	2.40	.367	.545	207	-.721	.471
		12-15	109	20.57	2.73					
	Human Effect	9-11	100	12.52	1.50	2.942	.088	207	1.032	.303
		12-15	109	12.28	1.76					
	Causes of Global Warming	9-11	100	16.21	2.15	.498	.481	207	-.565	.572
		12-15	109	16.37	2.08					
	Environmental Pollution	9-11	100	11.59	1.91	.800	.372	207	-1.220	.224
		12-15	109	11.88	1.63					
	Environmental Consciousness	9-11	100	16.40	1.92	.286	.593	207	.310	.757
		12-15	109	16.31	2.16					
	Importance of Environmental Protection	9-11	100	12.50	1.56	2.507	.115	207	-1.419	.157
		12-15	109	12.75	.96					
	Overall Scale	9-11	100	89.54	7.69	.196	.658	207	-.573	.568
		12-15	109	90.19	8.69					
Normally developing student	Greenhouse Effect	9-11	107	15.86	3.27	6.919	.509	248	-2.370	**.019***
		12-15	143	17.00	4.07					
	Human Effect	9-11	107	12.60	3.30	1.004	.317	248	-.919	.359
		12-15	143	12.97	3.05					
	Causes of Global Warming	9-11	107	14.02	2.98	9.943	.102	248	-2.171	**.031***
		12-15	143	15.00	3.88					
	Environmental Pollution	9-11	107	11.25	2.82	.425	.515	248	.655	.513
		12-15	143	11.00	3.00					
	Environmental Consciousness	9-11	107	15.00	3.90	.736	.392	248	-1.338	.182
		12-15	143	15.65	3.80					
	Importance of Environmental Protection	9-11	107	10.24	2.66	1.476	.225	248	-3.393	**.001***
		12-15	143	11.47	2.96					
	Overall Scale	9-11	107	79.00	13.12	1.936	.165	248	-2.247	**.026***
		12-15	143	83.13	15.26					

p*<.05

Examining Table 7, it was determined that there was no statistically significant difference between the mean scores obtained by the gifted students from different age ranges from the overall EECAS and each subscale (p>.05). On the other hand, it was found that there was a statistically significant difference in favor of the participants in the age range of 12-15 years between the EECAS mean scores obtained by the normally developing secondary school students from different age ranges (t(248) =-2.247; p=.026<.05) and between the scores of "*Greenhouse Effect"* (t(248)=-2.370; p=.019<.05), *"Causes of Global Warming"* (t(248)=-2.171; p=.031<.05) and *"Importance of Environmental Protection"* (t(248)=-3.393; p=.001<.05) subscales.

3. 5. Examining the Environmental Education Concepts Awareness Scores of the Gifted and Normally developing students in Terms of the Class Level Variable

Within the scope of the study, an answer was sought to the following question; "Is there a significant difference between the environmental education concepts awareness scores of the gifted students and normally developing peers from different class levels?". The ANOVA which is among parametric tests, was conducted to answer this sub-problem. In this context, Table 8 shows the ANOVA results.

Table 8. Results of the ANOVA statistics

Group	Subscales	Source of Variance	Sum of Squares	df	Mean of Squares	F	p
Gifted Student	Greenhouse Effect	Intergroup	23.774	3	7.925	1.194	.313
		Intragroup	1360.044	205	6.634		
		Total	1383.818	208			
	Human Effect	Intergroup	7.534	3	2.511	.922	.431
		Intragroup	558.505	205	2.724		
		Total	566.038	208			
	Causes of Global Warming	Intergroup	22.517	3	7.506	1.689	.171
		Intragroup	911.091	205	4.444		
		Total	933.608	208			
	Environmental Pollution	Intergroup	15.610	3	5.203	1.662	.176
		Intragroup	641.950	205	3.131		
		Total	657.560	208			
	Environmental Consciousness	Intergroup	5.467	3	1.822	.430	.732
		Intragroup	868.332	205	4.236		
		Total	873.799	208			
	Importance of Environmental Protection	Intergroup	6.786	3	2.262	1.373	.252
		Intragroup	337.846	205	1.648		
		Total	344.632	208			
	Overall Scale	Intergroup	139.540	3	46.513	.685	.562
		Intragroup	13910.469	205	67.856		
		Total	14050.010	208			
Normally developing student	Greenhouse Effect	Intergroup	184.211	3	61.404	4.453	**.005***
		Intragroup	3392.189	246	13.789		
		Total	3576.400	249			
	Human Effect	Intergroup	50.641	3	16.880	1.703	.167
		Intragroup	2438.259	246	9.912		
		Total	2488.900	249			
	Causes of Global Warming	Intergroup	196.067	3	65.356	5.453	**.001***
		Intragroup	2948.497	246	11.986		
		Total	3144.564	249			
	Environmental Pollution	Intergroup	6.054	3	2.018	.234	.873
		Intragroup	2124.810	246	8.637		
		Total	2130.864	249			
	Environmental Consciousness	Intergroup	24.159	3	8.053	.540	.655
		Intragroup	3668.497	246	14.913		
		Total	3692.656	249			
	Importance of Environmental Protection	Intergroup	124.592	3	41.531	5.182	**.002***
		Intragroup	1971.732	246	8.015		
		Total	2096.324	249			
	Overall Scale	Intergroup	1786.983	3	595.661	2.896	**.036***
		Intragroup	50602.893	246	205.703		
		Total	52389.876	249			

p*<.05

When examining Table 8, it was determined that there was no significant difference between the mean scores obtained by the gifted students from the overall EECAS and each subscale, in terms of the class level variable (p>.05). On the other hand, it was found that there was a statistically significant

difference between the scores obtained by the normally developing students from the overall scale [F(3-246) =2.896; p=.036<.05] and the "*Greenhouse Effect"* [F(3-246) =4.453; p=.005<.05], "*Causes of Global Warming"* [F(3-246) =5.453; p=.001<.05] and "*Importance of Environmental Protection"* [F(3-246) =5.453; p=.001<.05] subscales. The LSD (Least Significant Difference), which is one of Post Hoc tests, was used to determine the source of the difference. As the variances were homogeneously distributed, the LSD, which is among multiple comparison tests, was chosen (Kayri, 2009). In this context, it was determined that the mean scores obtained by the eighth grade students from the overall scale and from the "*Greenhouse Effect", "Causes of Global Warming"* and *"Importance of Environmental Protection"* subscales, were higher than the mean scores obtained by the students receiving education in the other class levels. The effect size which was calculated as .06, can be expressed to be at the moderate level. This finding showed that the normally developing eighth grade students had a higher awareness related to environmental education concepts, compared to the students from other grades.

4. Conclusion

This study was conducted for the purpose of determining the awareness levels of the gifted students and normally developing peers related to environmental education concepts and their correlation according to the gender, age range and class level variables. When examining the awareness levels of the students related to environmental education concepts; the mean score of the overall scale was found to be 4.08 for the gifted students and 3.69 for the normally developing students. This result indicated that the EECAS mean score of the gifted and normally developing students was "high" in the point range of *agree*. However, the total mean score of the overall scale was found to be 89.88 for the gifted students and 81.36 for the normally developing students. Also the mean scores of the "*Greenhouse Effect*", "*Causes of Global Warming*", "*Environmental Pollution"*, "*Environmental Consciousness*" and "*Importance of Environmental Protection*" subscales in the scale, were in favor of the gifted students. This result demonstrated that the gifted students had higher awareness scores related to environmental education concepts, compared to their normally developing peers (Table 5). Accordingly, the students are expected to have high environmental sensitivities and high environmental awareness levels, in parallel with their levels of having basic concepts and skills related to environment (Otun, Artun, Temur & Tozlu, 2017). As no study was found in the literature aimed investigating the environmental education concepts awareness levels of the students via the same scale, the comparison of different study results remained limited. The fact that the gifted students had higher environmental education concepts awareness levels than the normally developing students, can be explained with not only the effectiveness of education programs applied in the SACs, but also can be associated with individual sufficiency of the gifted students (Akbas & Cetin, 2018).

In the literature, other studies on environment have found that the gifted students have higher environmental attitudes (Aydin, Coskun, Kaya & Erdonmez, 2011; Ugulu, Akkaya & Erkol, 2013) and their positive attitudes and sensitivities toward environment significantly vary compared to their normally developing peers (Ugulu, 2013; Sontay, Gokdere & Usta, 2014). Changes in the individuals' environmental knowledge, attitudes and behaviors may also affect their awareness levels (Evans et al., 2007; Okur & Yalcin-Ozdilek, 2012). At this point it can be interpreted that environmental education has a positive effect on the students' awareness related to environmental education concepts. The findings suggesting that the SAC students have higher metacognitive skills of recycling (Bakar, Avan & Aydinli, 2018), environmental attitude, curiosity and exploration scores (Saricam & Sahin, 2015) and environmental literacy (Sontay, Gokdere & Usta 2016) than their normally developing peers, are compatible with the findings of the present study. In the literature, it is stated that the gifted students show a greater interest in issues and problems that concern humanity and nature, have intense feelings about problems and make an effort to generate scientific creative solutions to environmental problems (Piechowski, 1997; Sak, 2012; Stuart & Beste, 2011). This great interest, curiosity and positive environmental attitude might be considered among the reasons for the gifted students to have a higher awareness related to environmental education concepts. In addition, it was concluded that the normally developing students responded to the items in the "*Greenhouse Effect"* subscale in the point range of *uncertain*. This result is supported by the studies suggesting that the students have insufficient

information and some misconceptions about global warming (Aksan, 2011; Durkaya & Durkaya, 2018). Also the preferences of the gifted and normally developing students related to the subscales in the scale can be associated with end-of-process outputs of their awareness levels related to environmental education and the educational activities conducted in relevant educational institutions.

As a result of the study, it was determined that there was no significant difference between the EECAS total scores of the female and male gifted students (Table 6). In line with this result, it can be interpreted that gender did not cause a significant difference in the awareness of the gifted students related to environmental education concepts. Similarly, Sontay et al., (2014) determined that environmental behaviors of the gifted students did not vary according to gender. Also Esen (2011) found that environmental knowledge and environmental attitudes of the gifted students did not vary according to gender. However, this result is different from the results of studies on environmental attitude and gender (Aydin et al., 2011; Bakar, Avan & Aydinli, 2018; Sarac & Ozarslan, 2018; Ugulu, 2013). It was found that the female normally developing students had higher environmental education concepts awareness scores compared to the male students. In the study conducted by Atasoy and Erturk (2008), based on results of an environment success test applied to the secondary school students it was seen that the female students were more successful than the male students. In addition, there are studies suggesting that environmental attitudes vary in favor of the female students according to the gender variable (Aydin et al., 2011; Nalcaci & Beldag, 2012; Ugulu, 2013; Ugulu, Akkaya & Erol, 2013). Additionally, as the studies on environmental education do not have consistent results in terms of gender, there is a need for new studies in this field.

It was determined that there was no significant difference between the mean scores obtained by the gifted students from different age ranges from the overall EECAS and each subscale. Similarly, Ugulu (2013) and Ugulu et al., (2013) found that environmental attitudes of the gifted students did not vary according to age. However, it was found that there was a statistically significant difference in favor of the participants in the age range of 12-15 years between the EECAS mean scores obtained by the normally developing students from different age ranges and between the scores of the "*Greenhouse Effect"*, *"Causes of Global Warming"* and *"Importance of Environmental Protection"* subscales in the scale. Meydan and Dogu (2008) determined that environmental views of the second-stage primary education students positively increased as their age increased. This showed that the awareness levels of the gifted students related to environmental education concepts had a similar distribution in different age groups and the environmental education awareness levels of the normally developing students may increase with increasing age.

It was determined that there was no significant difference between the environmental education concepts awareness scores of the gifted students in terms of the class level variable. This result showed that the gifted students from different class levels had a similar awareness related to environmental education concepts. In addition, Aydin et al., (2011) indicated that environmental attitudes of the gifted students varied according to their class levels, but Ugulu (2013) and Ugulu et al., (2013) stated that the students' environmental attitudes did not significantly vary according to their class levels. It was determined that among the normally developing secondary school students, the mean scores of the "*Greenhouse Effect", "Causes of Global Warming",* and *"Importance of Environmental Protection"* subscales, were in favor of the eighth grade students. This result is compatible with the study conducted by Meydan and Dogu (2008), determining that environmental views of the primary school students positively increased as their class levels increased. Also in the studies by Atasoy and Erturk (2008) and Bakar et al., (2018), the environmental efficiency data related to the class level, supports the result of the present study. This may be interpreted as the fact that the awareness levels of the normally developing students related to environmental education concepts increased as their class levels increased. The fact that the eighth grade students had higher awareness scores related to environmental concepts, can also be associated with fact that the eighth grade students had acquired the environmental education subjects in their curriculum (Bakar et al., 2018). In addition, Sarac and Ozarslan (2018) determined that as the class level increased, the environmental consciousness improved better with the increase of metacognition level. The difference between the awareness scores of the gifted and normally developing students related to environmental education

concepts according to the class level can be associated with individual differences of the students and effectiveness of the curricula in schools.

The results of this study have an important potential for both brining environmental education in Turkey to the desired levels and protecting and sustaining the environment, owing to higher awareness levels of the gifted and normally developing students related to environmental education concepts. Based on the results acquired as a result of this study, the following recommendations can be made:

In order for the students to reach exact and scientific information about global warming and greenhouse effect, these subjects should be included in the curricula more often.

In order to obtain profound information about the awareness levels of the secondary school students related to environmental education concepts, qualitative researches can be planned using data collection tools such as observation and interview.

It can be asserted that there is a need for providing age-appropriate environmental education to children and conducting more detailed studies on awareness as they grow older.

Methods such as comics, project-based learning, argumentation and collaborative learning can be used in the environmental education process of the gifted and normally developing students.

More explanatory information should be given in the subjects related to environment, which may lead to misconceptions for the students and the teaching of these subjects should be concretized.

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