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ATTITUDES OF SECONDARY SCHOOL STUDENTS TOWARDS SUSTAINABLE DEVELOPMENT

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Abstract

This study aims to investigate secondary school students' attitudes and demographic variables (gender, grade level, receiving environmental education, participation in an environmental project' environment and reading books about the environment) that are believed to influence these attitudes. The study was designed using the descriptive survey model and data were collected from 144 fifth, sixth, seventh and eighth grade students in a public school in the central Black Sea region. The data of the research were collected with the "Attitude Scale for Sustainable Development". In the analysis of the data, descriptive statistics (mean, frequency, percentage, and standard deviation), independent samples T-test, single-factor variance analysis (One-Way ANOVA), Levene's test, Welch's test, and Games-Howell's test were used. As a result of the research, it was determined that the total attitude scores of secondary school students for sustainable development were high. Similarly, it was found that the total attitude scores of the scale for the sub-factors were high. It was found that the overall scores for secondary school students' attitudes towards sustainable development showed a statistically significant difference in favour of the eighth grade in terms of 'grade level'. However, it was found that the total scores of secondary school students' attitude towards sustainable development did not show any significant difference with respect to the variables' 'gender', 'receiving environmental education', 'participating in an environmental project' and 'reading books about the environment'. It can be concluded that the findings from the study will contribute to the literature to determine the variables that influence secondary school students' attitudes towards sustainable development.

Keywords: attitude towards sustainable development, secondary school students, environmental education

1. Introduction

Today we are faced with various ecological problems such as the decline of biodiversity, invasion of alien species, global warming, global climate crisis, pollution from various sources, shortage of fossil fuels and energy, the rapid spread of some diseases, large-scale destruction of the environment in time and space, and ignorance about the environment (Odum & Barrett, 2005; Reece et al., 2011; Sadava et al., 2011). It is a well-known fact that human being is at the root of these problems (Karakaya et al., 2017). With the onset of the Industrial Revolution, human's aspiration to rise above nature increased rapidly (Steffen et al., 2007), leading to a



rapid increase in human population, the construction of mega-cities, deforestation and the disappearance of nature day by day (Chakraborty & Maity, 2020; Karakaya & Yilmaz, 2017; Palmer, 2002; Yıldız et al., 2005). In this age, also known as the Anthropocene, man has irrevocably damaged the World (Crutzen & Steffen, 2003; Steffen et al., 2007).

The damage caused by humans to the nature have begun to affect themselves over time, as well. Various global problems such as increasing hunger and poverty, difficulty in accessing clean water resources, decline in energy resources, deterioration of human health have affected the entire human race. These problems, which have reached global dimensions, have increased humanity's concern for the future of the world (Dunlap et al., 1993; Hopwood et al., 2005). Especially the terms eco-anxiety and climate anxiety are frequently used in the media today. The anxiety of the ecological crisis has been the subject of many newspaper articles, documentaries, interviews, and forums (Cunsolo et al., 2020; Panu, 2020).

People's concern for the future has led various scientists, politicians, educators, and intellectuals to turn their attention to this area. Various books have been written to draw attention to environmental problems, policies have been proposed, congresses, conferences and panels have been organised and scientific articles have been written (Arik & Yılmaz, 2020). As a result of these studies, the concepts of sustainable development (SD) and education for sustainable development (ESD) have come to the fore (Birdsall, 2014; United Nations Educational Scientific and Cultural Organization (UNESCO), 1997, 2005).

Since the early 1950s, human-induced damage to nature has increased rapidly. However, the rapid increase in human population has created various environmental problems, especially air pollution. These environmental problems were first discussed worldwide in 1972 at the "United Nations Conference (UN) on the Human Environment (Stockholm Conference)." At this conference, environmental problems and development issues were discussed, and the importance of international cooperation on these issues was emphasised. And as a result of the conference, the UN Framework Programme (United Nations Environment Programme) was established, and the "Action Plan for Human Environment" and the "Stockholm Declaration" were adopted.

The concept of SD, first introduced in 1982 in the World Charter for Nature in the context of environmental concerns, was defined for the first time in a global context in 1987 in the report "Our Common Future" (Brundtland) (Hák et al., 2016). According to this report, SD is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (The World Commission on Environment and Development (WCED), 1987, p. 41). At the same time, SD has been the main priority and agenda at many international meetings such as (the Rio+5 Earth Summit (1997), the Millennium Summit UN (2000), the Johannesburg Summit (2002), the Rio +20 Earth Summit (2012), the UN SK Summit (2015), the Paris Agreement (2015) and the Katowice Climate Change Conference (24th Session of the Conference of the Parties [COP 24]) (2018), [COP25] (2019) (Arik & Yılmaz, 2020a; Evans & Steven, 2012; Hák et al., 2016).

At the UN SD summit in 2015, the 2030 Agenda SD was adopted, which includes 17 Sustainable Development Goals (SDGs) (the 2030 Agenda for Sustainable Development). The goals in this agenda are shown in Figure (The United Nations (UN), 2022).



Figure 1. Sustainable Development Goals (UN, 2022)

If one examines the SDGs, one finds that one of the most important goals is the quality of education. Educating future generations with quality education is of great importance to achieve other goals. The goals for quality education to be achieved by 2030 can be briefly summarised as follows: "By 2030, all students should acquire the necessary knowledge and skills to support sustainable development through education, including human rights, gender equality, and promoting a peaceful and non-violent culture for sustainable development and lifestyles. Valuing global citizenship and cultural diversity and the contribution of culture to sustainable development should also be part of this" (UN, 2022).

ESD plays a distinctive role in the success of the 17 SDGs (Aleixo et al., 2021). The importance of ESD was recognised with the establishment of the United Nations Decade of ESD (2005-2014) (United Nations Educational Scientific and Cultural Organization (UNESCO), 2005). In 2019, the importance of ESD in achieving the SDGs was highlighted and this statement was included: "To achieve all 17 SDGs, the contribution of ESD should be strengthened by focusing on policies, learning environments, teachers and educators, youth and communities" (UNESCO, 2019, p. 1).

ESD, which is very important in the international dimension, is one of the special goals of science education in Turkey. For example: "To realise the mutual interaction between the individual, the environment, and society; to develop an awareness of sustainable development about society, the economy, and natural resources" (Ministry of National Education [MoNE], 2018, p. 8). In addition, environmental topics are included in the eighth grade in the lesson unit "Energy Conversion and Environmental Studies," which also includes the topic "Sustainable Development" in a separate section (MoNE, 2018, p. 52).

To reach the SDGs, the attitudes and behaviors of people, institutions, and organizations towards SD need to be changed (Dobson, 2007). This change is only possible if humans determine a sustainable lifestyle in line with the SDGs. This can only be achieved with

qualified education. The Science Curriculum (2018) states that education is not only about the cognitive dimension: "Education is not only given for 'knowing (thinking)' but also for 'feeling (emotion)' and 'doing (action)'; therefore, cognitive measurements alone cannot be considered sufficient" (MoNE, 2018, p. 6). At the same time, one of the specific objectives of science education is to "stimulate students' interest and curiosity in what is happening in nature and in their immediate environment and to develop an attitude" (MoNE, 2018, p. 8). To achieve the SDGs, students should be taught not only cognitive but also affective and psychomotor skills through ESD. To change students' negative behaviour towards the environment, the concept of attitude should be the focus (Newhouse, 1990). The concept of attitude is defined in sociology as "the mental process concerned with determining the actual or possible reactions of all individuals to an event or object in the social world" (Thomas, & Znaniecki, 1918; 1958 cited in Allport, 1967). In this context, it is of great importance to identify attitudes towards SD in order to change students' negative behaviours towards sustainable development and to determine their mental processes towards SD.

The aim of this study is to investigate secondary school students' attitudes towards sustainable development and the variables that are believed to influence attitudes. A review of the literature reveals that there are studies that examine secondary school students' attitudes towards sustainable development (Aleixo et al., 2021; Benli Özdemir & Arık, 2013, 2018; Kanmaz, 2019; Keles, 2017; Nikolic et al., 2020; Pérez-Franco et al., 2018; Sharma & Kelly, 2014; Tang, 2018). As can be seen, these studies generally focus on teachers and university students. However, education at a young age is very important to improve future generations' attitudes towards sustainable development and sustainable environmental education. Therefore, this study investigates secondary school students' attitudes towards sustainable development.

In reviewing the literature, there are studies on secondary school students' attitudes towards sustainable development that examine whether there are significant differences according to gender, grade level, parents' occupation, parents' educational level, age, economic level and membership in an environmental organisation (Aleixo et al., 2021; Benli Özdemir & Arık, 2018; Faiz & Bozdemir Yüzbaşıoğlu, 2019; Kanmaz, 2019; Liu et al., 2022; Pérez-Franco et al., 2018). However, in reviewing the literature, no study was found that examines students' attitudes towards sustainable development in terms of their receiving environmental education, their participation in environmental projects and their reading of books about the environment. As mentioned earlier, ESD is crucial to ensure that all people achieve the SDGs. This can only be achieved if individuals have a positive attitude towards the environment and sustainable development. In this context, it is very important to identify the attitudes of secondary school students towards SD and the factors that are likely to influence these attitudes. It can be said that this study will contribute to the literature by identifying the attitude of secondary school students towards SD and the factors that are believed to influence this attitude.

The aim of this study is to investigate secondary school students' attitudes towards sustainable development (SD) and the variables believed to influence these attitudes (gender, grade level, receipt of environmental education, participation in an environmental project and reading books on the environment). In this context, the answers to the following sub-questions were sought:

- What are the attitudes of secondary school students towards sustainable development?
- Do the total attitude scores of secondary school students toward SD show a statistically significant difference according to "gender"?

- Do the total attitude scores of secondary school students toward SD show a statistically significant difference according to "grade level"?
- Do the total attitude scores of secondary school students toward SD show a statistically significant difference according to "receiving environmental education"?
- Do the total attitude scores of secondary school students toward SD show a statistically significant difference according to "participation in an environmental project"?
- Do the total attitude scores of secondary school students toward SD show a statistically significant difference according to "reading books about the environment"?

2. Method

2.1. Research Model

This study used the 'descriptive survey' model. In surveys, the education, attitudes and thoughts of the population are quantified or the relationship between the variables of the population is tested by examining a sample of that population (Creswell & Creswell, 2018). In this study, a descriptive survey model was used to quantitatively describe the variables believed to influence SD attitudes of secondary school students.

2.2 Data Collection Tool

The data of the study were collected using the five-point Likert type "Attitude Scale for Sustainable Development" (ASSD) developed by Kaya (2013) with 21 items. The ASSD consists of three sub-factors: social (8 items), environmental (6 items), and economic (7 items). A minimum of 21 and a maximum of 105 points can be achieved with the scale.

The validity of the scale was determined by expert opinion and factor analysis (exploratory and confirmatory factor analysis), and its reliability was determined by calculating the Cronbach's alpha internal consistency coefficient. The Cronbach's α -value for the whole scale was 0.93; $\text{Cr}\alpha = 0.85$ for the social and environmental sub-factors and $\text{Cr}\alpha = 0.84$ for the economic sub-factor. As a result of this study, the Cronbach's α -value obtained was $\text{Cr}\alpha = 0.94$ for the whole scale, $\text{Cr}\alpha = 0.83$ for the social dimension, $\text{Cr}\alpha = 0.79$ for the environmental dimension, and $\text{Cr}\alpha = 0.88$ for the economic dimension. As the $\text{Cr}\alpha$ values obtained are higher than 0.70, it is assumed that the scale is reliable (DeVellis, 2012).

2.3. Data Analysis

SPSS (version 21.0) was used in the analysis of the data collected through ASSD. The distribution of normality of the research was determined by calculating the "skewness" and "kurtosis" coefficients (Tabachnick & Fidell, 2013). Since the skewness (-1.59) and kurtosis (2.17) values were ± 3 and the sample size was 30 and above, the distribution was considered normal (Büyüköztürk, 2009; DeCarlo, 1997). In analysing the data, "descriptive statistics (mean, frequency, percentage and standard deviation)", "T-test for independent samples", "single factor analysis of variance for independent samples (One-Way ANOVA)", "Levene's test", "Welch's test" and "Games-Howell's test" were used. The statistical significance value was assumed to be 0.05. For the results where a statistically significant difference was found, the effect size was calculated using Hedges' g-value. Hedges' g-value was based on Cohen's (1988) classification and was evaluated considering the cut-off values 0.2 (small effect), 0.5 (medium effect) and 0.8 (large effect) (Cohen, 1988, p. 44). Furthermore, a Hedges' g value of less than 0.2 indicates that there is no effect.

2.4. Research Sample

The sample of the study was obtained using a simple random sampling method. It consisted of 144 students studying at a public school in an urban centre in the Black Sea region during the autumn and spring semesters of the academic year 2021-2022. Demographic information about the participants can be found in Table 1.

Table 1. *Demographic information about the sampling*

Demographic information		n	%
Gender	Female	69	47.9
	Male	75	52.1
Grade level	Fifth grade	29	20.1
	Sixth grade	44	30.6
	Seventh grade	39	27.1
	Eighth grade	32	22.2
Receiving environmental education	Yes	43	29.9
	No	101	70.1
Participation in environmental projects	Yes	41	28.5
	No	103	71.5
Frequency of reading books about environment	Never	60	41.7
	Once a year	35	24.3
	Twice or more in a year	49	34.0

Table 1 shows that the distribution of students by gender is 69 (47.9%) females and 75 (52.1%) males. The distribution of students by grade level is 29 (20.1%) fifth graders, 44 (30.6%) sixth graders, 39 (27.1%) seventh graders and 32 (22.2%) eighth graders. 43 (29.9%) of the students received environmental education while 101 (70.1%) of them did not receive environmental education. 41 (28.5%) of the students participated in environmental education projects while 103 (70.1%) of them did not participate in any environmental education project. It was found that 60 (41.7%) of the students did not read any books about environment, 35 (24.3%) of them read books about environment once a year, 49 (34.0%) students read books about environment twice or more a year. The average age of the students is 11.81 years, and the socio-economic level is moderate.

4. Findings

The findings of the descriptive analysis to answer the first question of the study are shown in Table 2.

Table 2. *Descriptive findings obtained from the scale*

Scale and sub-factors	n	Minimum	Maximum	Mean	Std. Dev.
ASSD	144	26.00	105.00	81.51	17.68
First Factor: Social	144	10.00	40.00	31.15	6.85
Second Factor: Environmental	144	7.00	30.00	22.59	5.20
Third Factor: Economic	144	8.00	35.00	27.77	6.71

On examination of Table 2, it was found that the SD attitudes of the secondary school students ranged from a minimum of 26.00 to a maximum of 105.00 and the total score of the attitudes was 81.51. SD Total attitudes score for the sub factors of the scale was 31.15 for social factor, 22.59 for environmental factor and 27.77 for economic factor.

The results of the "independent samples t-test" conducted to answer the second research question are shown in Table 3.

Table 3. *Independent samples t-test results about second research question*

Gender	n	$\bar{X}$	s	t	p	95% confidence interval (min.-max.)
Female	69	82.80	17.11	0.839	.403	-3.36-8.31
Male	75	80.32	18.23			

Table 3 shows that there is no statistically significant difference between girls ($\bar{X}$ =82.80, s =17.11) and boys ($\bar{X}$ =80.32, s =18.23) in terms of their overall rating of sustainable development ($t(142) = 0.839$, $p=.403>.05$). The fact that the determined confidence range [-3.36; 8.31] includes the zero value confirms the equality of the mean values and therefore, there is no statistically significant difference.

To answer the third question of the study, the homogeneity of variance was first tested using the "Levene's test" to perform a One-Way analysis ANOVA. As a result of Levene's test, a significance of 0.004 was found. Since the value was less than 0.05 (sign. <0.05), the assumption of homogeneity of variance was not accepted. Therefore, Welch's test, which does not assume homogeneity of variance, was used to analyse the data (Field, 2018; Pallant, 2016). The results of the Welch's test are presented in Table 4.

Table 4. *Welch's test results about third research question*

Grade level	n	$\bar{X}$	s	F	p	Games-Howell's test	Hedges' g
Fifth grade	29	79.83	20.17	3.862	.013	6. grade- 8. grade*	.055
Sixth grade	44	78.77	19.92				
Seventh grade	39	80.79	18.25				
Eighth grade	32	87.66	7.94				

Table 4 revealed that the SD total scores for secondary school students' attitudes showed a statistically significant difference in terms of "grade level" ($F(3,140) = 3.862$; $p=.013<0.05$). According to the results of the Games-Howell's test results, this difference has been determined to be in favor of eighth grades between the sixth grades ($\bar{X}$ =78.77, s =19.92) and the eighth grades ($\bar{X}$ =87.66, s =7.94). The Hedges' g-value obtained ($g=0.055$) indicates a medium effect size.

The results of the "Independent samples t-test" conducted to answer the fourth question of the study can be found in Table 5.

Table 5. *Independent samples t-test results about fourth research question*

Receiving environmental education	n	$\bar{X}$	s	t	p	95% confidence interval (min.-max.)
Yes	43	80.05	17.88	-	.520	-8.46-4.29
No	101	82.13	17.65	0.645		

Table 5 shows that there is no significant difference ($t(142)=-0.645$, $p=.520>.05$) between the total sustainable development attitude scores of students who have received environmental education ($\bar{X}=80.05$, $s=17.88$) and the scores of students who have not received environmental education ($\bar{X}=82.13$, $s=17.65$). The confidence interval value [-8.46; 4.29] also confirms the obtained result.

The results of the "Independent samples t-test" conducted to answer the fifth question of the study can be found in Table 6.

Table 6. *Independent samples t-test results about fifth research question*

Participation in the environmental projects	n	$\bar{X}$	s	t	p	95% confidence interval (min.-max.)
Yes	41	83.85	16.19	1.01	.317	-3.17-9.74
No	103	80.57	18.23			

Table 6 shows that there is no significant difference ($t(142)=1.01$, $p=.317>.05$) between the total sustainable development attitude scores of students who have participated in environmental education projects ($\bar{X}=83.85$, $SD=16.19$) and the scores of students who have not participated in environmental projects ($\bar{X}=80.57$, $SD=18.23$). The confidence interval value [-3.17; 9.74] also confirms this result.

To answer the sixth question of the study, the homogeneity of variance was tested using the "Levene's test". As a result of Levene's test, a significance of 0.057 was found. Since the value was higher than 0.05 (sign. <0.05), the assumption of homogeneity of variance was accepted. The results of the "One-Way ANOVA" conducted in this direction are listed in Table 7.

Table 7. *One-Way ANOVA results about sixth research question*

Frequency of reading books about environment	n	$\bar{X}$	s	F	p
Never	60	79.92	18.65	0.941	.442
Once a year	35	80.34	19.63		
2-3 times a year	24	87.50	8.93		
4-5 times a year	16	82.81	16.90		
6 and more times a year	9	78.33	21.79		

In Table 7, the results of the "One-Way ANOVA" test show that the SD total attitude scores of secondary school students do not show significant differences in relation to "reading books about the environment" ($F(4.139)=0.941$; $p=.442>0.05$).

5. Discussion and Conclusions

This study aims to investigate the SD attitudes of secondary school students and the variables believed to influence these attitudes (gender, grade level, receiving environmental education, participation in environmental projects and reading books on the environment). In examining the descriptive data collected for this purpose, it was found that the total ASSD scores of secondary school students ranged from a minimum of 26 to a maximum of 105, and the average total attitude scores were 81.51. Based on these results, it can be concluded that the attitude of secondary school students towards sustainable development is above the medium level, i.e. at a high level. The mean total score for the social, environmental, and economic dimensions of the scale were 31.15, 22.59 and 27.77 respectively. From these results, it can be concluded that the attitude of secondary school students towards sustainable development in the social, environmental, and economic dimensions is above the mean, i.e. at a high level. When the literature is examined, one can find studies that come to similar conclusions as those of this study (Gökmen et al., 2017; Kanmaz, 2019). Gökmen et al. (2017) found in their study that prospective teachers have high attitudes towards education for sustainable development (ESD). At the same time, similar to this study, it was found that participants' attitudes towards ESD were high in the ecological dimension of the scale. In contrast to this study, it was found that participants' attitudes towards ESD were moderate in the social and economic dimensions. Kanmaz (2019), in his study, investigated the attitude of seventh and eighth grade students towards sustainable development and found that the participants' attitude towards SD was high in the general and sub dimensions. Furthermore, similar to the results of this study, it was found that the SD awareness of the participants was at a high level in the studies that examined SD awareness (Çobanoğlu & Türer, 2015; Faiz & Bozdemir Yüzbaşıoğlu, 2019; Öztürk Demirbaş, 2015). Considering the results of the research conducted with secondary school students, prospective teachers and teachers, it can be stated that the participants' attitude and awareness towards SD are above the medium level. However, a positive attitude and awareness should also be reflected in the behaviour of the students and teachers. It can be stated that the participants are insufficient at this point considering the consequences of global climate change and global warming (Arık & Yılmaz, 2020b; Çobanoğlu & Türer, 2015; Reece et al., 2011; Sadava et al., 2011). It can be said that this situation is due to the lack of courses in applied environmental education and sustainable development. Sustainable development consists of three sub-dimensions: Economic, Social and Environmental (Holmberg, 1992; Reed, 1997, cited in Harris, 2000). It is not possible to distinguish these dimensions with clear lines. However, students' attitudes towards these dimensions differ from each other. In this context, it is necessary to assess students' attitudes towards the economic, social and environmental dimensions differently and to design curricula in this direction.

As a result of the analyses conducted for the second research question, it was found that the SD total attitude scores of secondary school students did not show a statistically significant difference in relation to 'gender'. Although the SD total attitude scores did not differ significantly by gender, it was found that the SD total attitude scores for females were higher than the SD total attitude scores for males. When examining the literature, one finds that there are studies that come to similar conclusions as the present study (Benli Özdemir & Arık, 2013; Gökmen et al., 2017; Keles, 2017; Öztürk Demirbaş, 2015; Torbjörnsson et al., 2011). In their study, Benli Özdemir and Arık (2013) found that secondary school students' SD attitudes did not differ significantly by gender, but the total scores for males' SD attitudes were higher than the total scores for females' attitudes. Gökmen et al. (2018) found in their study that prospective teachers' attitudes towards ESD did not differ significantly by gender. Keles (2017) found in his study that the attitudes of prospective science teachers towards sustainable environmental

education did not differ significantly by gender. Öztürk Demirbaş (2015), on the other hand, concluded that prospective teachers' awareness of SD does not differ significantly by gender. Torbjörnsson et al. (2011) found that attitudes towards sustainability do not differ significantly by gender. In reviewing the literature, there are also studies that conclude that secondary school students' attitudes SD differ significantly by gender, in contrast to the results of this study (Benli Özdemir & Arık, 2018; Kanmaz, 2019). Benli Özdemir and Arık (2018) concluded that the attitudes of secondary school students SD differ significantly in favour of females by gender. Similarly, Kanmaz (2019), in his study examining the SD attitudes of seventh and eighth grade students, found that the SD attitudes of the participants showed a significant difference in favour of girls depending on their gender. In contrast to these studies, Faiz and Bozdemir Yüzbaşıoğlu (2019) concluded that prospective teachers' SD awareness did not differ significantly by gender in the environmental ethics and social awareness dimensions, while there was a significant difference in favour of females by gender in the dimension of environmental economics awareness. Examining all the research findings, it can be concluded that gender is an important variable in determining SD attitudes for both students and teachers. However, when the SDGs are examined, it is seen that gender equality is more important than gender. In this sense, it is not right to emphasise that women are more emotional, and men are more cognitive. Cognitive, affective, and psychomotor abilities vary from person to person. Therefore, to achieve the SDGs, the focus should be on individual characteristics and abilities, not on gender.

As a result of the analyses conducted for the third research question, it was found that the SD total attitude scores of secondary school students showed a statistically significant difference by 'grade level'. This difference was found to be in favour of the eighth grade between the sixth and eighth grades. Furthermore, the effect size found was at a medium level. A review of the literature shows that there are studies that indicate that participants' SD total attitude scores are significantly dependent on 'grade level', similar to the results of this study (Benli Özdemir & Arık, 2018; Kanmaz, 2019). In their study, Benli Özdemir and Arık (2013) found that the SD attitudes of secondary school students showed a significant difference in favour of eighth graders depending on their grade level. It was found that eighth grade students had more positive attitudes towards SD than fifth, sixth and seventh grade students towards SD. On the other hand, Kanmaz (2019) concluded in his study that the SD attitudes of seventh and eighth graders differed significantly in favour of seventh graders depending on their grade level. In contrast to the results of this study, there are studies that find that the attitudes of SD do not differ significantly according to grade level (Benli Özdemir & Arık, 2018; Faiz & Bozdemir Yüzbaşıoğlu, 2019; Gökmen et al., 2017). It is an expected result that the attitude towards SD increases with increasing grade level. The main reason for this could be that students who move from the concrete-operational stage to the formal-operational stage shift their attention from themselves to their environment. At the same time, the emphasis on environmental issues in the Turkish science curriculum, especially in the eighth grade, could be another important reason. In this context, it is of great importance to make environmental education, which starts in the family and continues in school, a social culture.

As a result of the analyses conducted for the fourth question of the study, it was found that the SD total attitude scores of secondary school students did not show a statistically significant difference in relation to 'receiving environmental education'. Although the SD total attitude scores did not show a statistically significant difference in relation to 'receiving environmental education', it was found that the SD total attitude scores of those who did not receive environmental education were higher than the SD total attitude scores of those who did receive environmental education. While there are no studies in the literature that examine the effects

of receiving environmental education courses on SD attitudes, there are studies that examine whether there is a significant difference between SD attitudes according to the number of environmental courses received (Gökmen et al., 2017). Gökmen et al. (2017) found in their study that the attitudes of prospective teachers SD showed no statistically significant difference depending on the number of environmental education courses received. Similarly, studies examining the impact of receiving environmental education courses on attitudes towards the environment were also found (Yenice & Alpak Tunç, 2018; Yoldaş & Demir, 2016). Yoldaş and Demir (2016) found in their research that there was no significant difference between the prospective primary school teachers' receiving environmental education and their environmental attitudes. Yenice and Alpak Tunç (2018) found no statistically significant difference between prospective science teachers' attitudes towards the sustainable environment and their participation in environmental science courses. Despite these findings, the importance of environmental education courses is an undeniable fact (Karakaya, Avgin, & Yilmaz, 2018). In this study, it is found that the majority of the participants have not taken any courses on the environment. In this context, the number of environmental education courses should be increased and the content of these courses should focus on creating a positive attitude towards SD. To show positive behaviour, which is one of the most important dimensions of attitude, practical and extracurricular education should be provided.

As a result of the analyses conducted for the fifth research question, it was found that the SD total attitude scores of secondary school students did not show a statistically significant difference in relation to their 'participation in the environmental project'. Although the SD total attitude scores did not show a statistically significant difference in relation to their 'participation in the environmental project', it was found that the SD total attitude scores of those who participated in the environmental project were higher than the SD total attitude scores of those who did not participate in the environmental project. If one examines the literature, one finds that there are similar results to this study (Yoldaş & Demir, 2016). Yoldaş and Demir (2016) found that the variables of membership in an environmental organisation and participation in an environment-related project did not have a statistically significant effect on attitudes towards the environment. However, in contrast to the result of this study, Özgel (2018) found that an environmental education programme supported by a nature camp positively influenced students' environmental awareness (Özgel et al., 2018). Buldur, Bursal, Yücel and Yalçın Erik (2018) found in their studies that nature education projects make an important contribution to increasing students' environmental awareness (Buldur et al., 2018). However, these studies did not compare groups that received environmental education and those that did not. The number of environmental educations in Turkey has increased significantly in recent years. This is an important development when it comes to raising people's awareness and improving their attitudes. However, these figures are still insufficient. If we look at the sample of this study, we find that only a quarter of the participants have received such training. This situation was encountered in big cities. It is believed to be less common in rural areas.

As a result of the analyses conducted for the sixth question of the survey, it was found that the SD total attitude scores of secondary school students did not show a statistically significant difference in relation to 'reading books about the environment'. Although the SD total attitude scores did not show a statistically significant difference in relation to 'reading books about the environment', it was found that the SD total attitude scores of those who read 2-3 books per year were higher than the SD total attitude scores of the others. In reviewing the literature, no study was found that examined a similar research question to this one. In order to achieve the goals of environmental education and the SDGs, all people must internalise these goals. It can be said that people who internalise these goals will read more books to learn more about these

issues. However, it is very important to read from accurate sources to get correct information on this topic.

6. Recommendations

In view of the findings of this study, the following suggestions can be made to the researchers:

In this study, the variables affecting the attitude of SD were analysed using quantitative research methods. It can be suggested that the results of future studies be analysed in depth using qualitative research methods.

This study analysed the variables of gender, grade level, environmental education, participation in environmental projects and reading books about the environment, which are thought to influence attitudes towards SD. The effects of other variables can be investigated in future studies.

In light of the findings of this study, the following suggestions can be made to environmental educators and programme developers:

In this study, it was found that the variables of gender, grade level, environmental education, participation in environmental projects, and reading books about the environment, which are thought to influence attitudes SD, did not show a statistically significant difference. In this context, it can be suggested that future studies on environmental education should take the individual characteristics and affective structures of the students into account rather than these variables, which are assumed to influence SD attitude.

It can be suggested that the curriculum and its outcomes be studied with affective characteristics in mind.

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