



## Research Article

# Determination of gifted/talented students' interest in science subjects in terms of some variables

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### Abstract

The aim of this study was to reveal the interest levels toward the science subjects of gifted/talented primary and secondary students and to evaluate the interest level according to some variables. The research group consisted of total 82 gifted/talented primary and secondary school students who studied at the Science and Art Centre in Hatay, Turkey. In this research, a Personal Information Form that was consisted of 7 questions and “Interest Scale about Science Topic” were used as data collection tool. When the research data was examined, it was seen that the interest levels of gifted/talented students towards science subjects was high. While there were no significant differences between the students' interest levels toward science subjects according to whether there was a computer at home, the presence of internet at home, the grade level, the number of siblings, the education level of the mother and the education level of the father, there was a significant difference according to the gender variable.

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## Introduction

In this era of technological innovations, it is seen that countries that attach importance to science and technology are developing rapidly and giving direction to science. In this context, the education of young people who will shape the future of societies in line with their interests and interests is of great importance. The Ministry of National Education (MoNE) emphasized the importance of interest and included the expression make arousing interest and curiosity about the events taking place in nature and its immediate surroundings within the special aims of the science curriculum (MoNE, 2018:9). Therefore, the interest of all students towards the courses should be continued and increased.

XXI. century, artistic, scientific and technological fields in order to get better levels of the needs of the age of individuals to grow up now has become a necessity. There are also people with learning difficulties, individuals with normal learning levels, gifted and talented individuals and individuals with both giftedness and learning difficulties. Science and technology education should be prepared to cover all individuals in society. The existences of gifted and talented individuals in the society and the quality of science education to be provided to them are important. In this context, Turkey's science and determined to win respect on the superior technology and talented individuals to create a better educational environment and to provide resources is required.

When the education of gifted individuals in Turkish history is examined, it is seen that the Enderun School was established in order to give the most suitable education to these individuals by choosing the gifted and special talented individuals of the period in the Ottoman Period (Ataman, 2000). In recent years, the Ministry of Education has given

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great importance to the education of gifted/talented students. MoNE established Science and Art Centers (SACs) in 1997 to ensure that the education of gifted and talented students is more efficient and coordinated. Science courses of gifted and talented students are also realized through Individualized Education Programs (IEP) at SACs. The education and training of gifted and talented individuals in our country and the rules to be applied in this field are presented in “Gifted People Strategy and Implementation Plan 2013-2017 (MoNE, 2013). It is ensured that gifted/talented students receive support training at SACs after school. Because of the students' education, especially examining the developments in the scope of science course is considered important in terms of providing higher quality science education to these students.

In order to make the education given to gifted/talented students more successful, the abilities and personality traits of the students should be thoroughly understood and effective teaching methods should be used based on these characteristics (Han, Kim & Han, 2007). These effective teaching methods will be performed with gifted/talented; they should be able to understand the nature of science by thinking like a scientist, to be able to solve problems, to use their ability to think, assimilate and unite in the face of the problems they face for the first time (Roberts, 2001; Watters & Diezmann, 2003; Stott & Hobden, 2016). Because gifted and talented individuals have differences in their cognitive and affective domains compared to their peers (Aşut & Köksal, 2015). According to Bloom (1998), introductory characteristics such as affect, attitude and affective characteristics are 25% effective in individual learning. Many studies show that many variables such as talent, habits, family, living environment, interest, attitude, and educational status affect students' academic achievement (Bilicioğlu & Yılmaz, 2017). When all the processes are evaluated together, the development levels and interests of the students are also important in science education to be given to special talents.

As a dictionary meaning of interest, it means any relevance, commitment, relationship and belonging between the two things. To be close to a particular object, event or activity, to like it and to give priority to it (TLI, 2010). Educators show that the individual's interest has a great place in both the learning and teaching process (Renninger, Hidi & Krapp, 2004). Interest affects the classroom behaviors in the school environment, is influenced by social issues such as culture and gender and can carry the self-interest into the classroom environment (Bergin, 1999). A small interest in the classroom will increase the motivation of the student by making them curious about the course. Therefore, it is obvious that the interests of the students should be investigated and the positive ones should be supported.

Today, most of the achievements of nations made possible by developments in science and technology. For all people who make up nations, science has become a product that is used in all areas of life (Güven Yıldırım & Köklükaya, 2016). In this context, the students' interest in science and technology issues should be determined from pre-school period and learning environments and teaching methods should be developed in a way to sustain this interest.

When the related literature was examined, Baker & Leary (1995) found that second, fifth, eighth and eleventh-grade girl students liked science topics. In addition, Penny & McCann (1964), Maw & Maw (1970), Harty & Beall (1984) showed that students of elementary school had curiosity toward science. Güven Yıldırım & Köklükaya (2016) stated that primary and secondary school students had a high level of interest in science. They also found that this interest had a significant difference according to gender and grade level. A similar study was conducted by Demirel & Keleş (2016), and showed that the interest scores of 7<sup>th</sup> grade students towards science subjects differed significantly compared to 8<sup>th</sup> grade students. Yıldırım & Şensoy (2018) showed that the science festivals in the school significantly increased the interest levels of 6<sup>th</sup> grade middle school students towards science subjects. Sağır (2018) concluded that 4<sup>th</sup> grade students' level of interest in science subjects was quite high. However, no studies have been found to determine the level of interest of gifted/talented students and science subjects. It is thought that this study will contribute to the literature and will help researchers who will work with gifted/talented students.

### **Problem of Study**

This research carried out to determine the interest levels of gifted/talented primary and secondary school students on science subjects and to examine their interest levels according to various variables. For this purpose, answers to the following question were sought;

- Does the level of interest of gifted/talented students on science subjects differ significantly according to gender variable?
- Does the level of interest of gifted/talented students towards science subjects differ significantly according to the availability of computers at home?

- Does the level of interest of gifted/talented students towards science subjects differ significantly according to the availability of internet at home?
- Does the level of interest of gifted/talented students towards science subjects show a significant difference according to the grade level variable?
- Does the level of interest of gifted/talented students towards science subjects differ significantly according to the number of siblings?
- Does the level of interest of gifted/talented students towards science subjects show a significant difference according to the variables of mother education level?
- Does the level of interest of gifted/talented students towards science subjects show a significant difference according to the variables of father education?

## Method

### Research Model

In this research, which was one of the descriptive research methods, was used to determine the level of interest of gifted/talented students towards science subjects. It is possible to reveal some characteristics of the participants through descriptive research. In addition, it is possible to describe what is or may be present (Sönmez & Alacapınar, 2014; Büyüköztürk, Çakmak, Akgün, Karadeniz & Demirel, 2016).

### Participants

The participants who were thought to be suitable for the purpose of the study were determined by purposeful sampling method. In purposeful sampling method, it is possible to examine a subject in more detail (Akarsu, 2015). Therefore, individuals, objects or situations suitable for the purpose are selected (Balci, 2007). The research group consists of 82 gifted/talented students (44 girls and 38 boys) attending to BILSEM in Hatay in 2017-2018 academic year. Table 1 presents information on gender and grade levels of gifted/talented students.

**Table 1.**

*Gender and Grade Levels of Gifted/ talented Students*

		<i>f</i>	<i>%</i>
<b>Gender</b>	Female	44	53.7
	Male	38	46.3
	Total	82	100
<b>Grade Level</b>	3 grade	28	34.1
	4 grade	11	13.4
	5 grade	8	9.8
	6 grade	13	15.9
	7 grade	3	3.7
	8 grade	19	23.2
	Total	82	100

### Data Collection Tool

In this research, a personal information form consisting of 7 questions, and “scale of interest in science subjects” which was created by Laçın Şimşek & Nuhoglu (2009) were used as a data collection tool. While preparing a personal information form, a literature review was conducted, and similar studies were taken into consideration and variables that could affect the participants' level of interest were determined.

While developing the scale, the researchers considered firstly Harty & Beall's (1984) “Children's Science Curiosity Scale”, then taking into consideration similar scales in the literature (Hofstein, Ben-Zvi & Welch, 1981; Oruç, 1993; Dawson, 2000; Sencar, 2001; Baram-Tsabari & Yarden, 2005) formed a pool of items consisting of 44 questions. The scale has a 5-point Likert structure and the options are “fully agree”, “agree” “partially agree” “disagree” and “completely disagree”. The scale was applied to 167 secondary school students by the researchers. Because of the basic components' analysis applied to 44 items, 17 items were found to be under multiple factors and they were removed from the scale.

The Cronbach Alpha coefficient of the scale consisting of 27 items was determined as  $\alpha = 0.79$  by the researchers. This value indicates that the scale is sufficiently reliable (Büyüköztürk, 2016). The scale consists of 27 items and 21 items have positive expressions and 6 items have negative expressions. “I am interested in science and science

museums” is positive, and “I don't like watching television programs about science” is an example of negative expressions used in the scale. While items with positive expressions were scored, “Totally Agree” 5, “Agree” 4, “Partly Agree” 3, “Disagree” 2, “Never Agree” 1 point were calculated. For items with negative expressions, scoring was calculated as the opposite of positive expressions. The lowest score that can be obtained from this scale is 27 and the highest score is 135. When the scores obtained from the scale are taken into consideration, students' 27-63 points show low, 64-99 medium and 100-135 points show high interest in science subjects (Demirel & Keleş, 2016).

In order to determine the applicability of the scale to gifted/talented students, 1 science specialist, 1 science teacher and 2 science teachers were consulted. Because of the application, Cronbach-Alpha value was determined as  $\alpha = .84$ . In addition, Kaiser-Meyer-Olkin (KMO) coefficient was found to be 0.731 and Barlett Sphericity test showed significant significance = .000  $p < .001$ . In addition, as a result of confirmatory factor analysis,  $\chi^2 / sd = 1.627 < 5$ , RMSEA = 0.082, GFI = 0.84 and CFI = 0.86. GFI and CFI values approaching 0.90 shows that this study is acceptable (Tabachnick, 2001).

### Data Analysis

SPSS 20 package program was used for the analysis of the research data. IBM SPSS AMOS 23 program was used for confirmatory factor analysis. Firstly, it was tried to determine whether the data obtained were normally distributed or not. In cases where the size of the research group is more than 50, Kolmogorov-Smirnov test is used (Büyüköztürk, 2016). As a result of the normality test, nonparametric tests were performed for all variables since Kolmogorov-Smirnov values were less than  $p < 0.05$  and skewness-kurtosis values did not provide the required assumption. Mann-Whitney U test was used to determine the level of interest of gifted/talented students in science subjects, gender, computer status and availability of internet at home; Kruskal Wallis test was used to determine the class, the number of siblings and the educational status of the parents.

## Results

In this section, it has been tried to determine whether the level of interest of gifted/talented students towards science subjects has a significant difference according to the variables of gender, presence of a computer at home, presence of internet at home, class level, number of siblings, education level of mother and education level of father. The findings are given below.

Table 2 presents the average scores and standard deviations of students according to grade levels of interest scale for science subjects. The highest score that can be obtained from this scale is 135 and the lowest score is 27.

**Table 2.**

*Average Points and Standard Deviation of Gifted/ talented Students*

Class	N	$\bar{x}$	Sd	Min	Max
3 <sup>th</sup> grade	28	100.57	15.98	65	122
4 <sup>th</sup> grade	11	106.64	10.55	92	127
5 <sup>th</sup> grade	8	107.88	14.42	84	126
6 <sup>th</sup> grade	13	104.85	9.92	82	118
7 <sup>th</sup> grade	3	103.00	5.29	99	109
8 <sup>th</sup> grade	19	102.84	15.61	64	124
Total	82	104.30	13.87	64	127

When the data of Table 2 were examined, the total score average of the students was found to be 104.30 and it was found that the students' level of interest in science subjects was high (27-63 low points, 64-99 medium points and 100-135 high points) (Demirel & Keleş, 2016). When the class levels were considered, it was seen that the averages were very close to each other.

The results of the Mann Whitney U test, which was conducted to determine whether there was a significant difference between the gifted and male students in terms of their level of interest in science subjects, are presented in Table 3.

**Table 3.***Results of Mann Whitney U test according to Gender*

Gender	N	Mean rank	Sum of ranks	U	p
Female	44	46.68	2054.0	608.0	0.034*
Male	38	35.50	1349.0		

\*p&lt; .05

It was determined that the level of interest of gifted/talented students towards science subjects had a significant difference in terms of gender (U = 608.00, p < 0.05). When the average rank of the gifted/talented students' interest levels is examined; it is seen that the interest level of female students is higher than male students.

The results of Mann Whitney U test to determine whether there is a significant difference in the presence of computers in the homes of gifted/talented students in terms of their interest in science subjects are presented in Table 4.

**Table 4.***Results of Mann Whitney U Test according to Having or Not Having Computer at Home*

Computer	N	Mean rank	Sum of ranks	U	p
Have computer	76	40.63	3087.50	161.50	0.236*
Not have computer	6	52.58	315.50		

\*p&gt;.05

It was determined that the level of interest of gifted/talented students towards science subjects did not make a significant difference in the presence or absence of a computer at home (U = 161.50, p > 0.05).

The results of Mann Whitney U test, which conducted in order to determine whether there is a significant difference in the presence of internet in the homes of gifted/talented students at the level of interest in science subjects, presented in Table 5.

**Table 5.***Results of Mann Whitney U test according to Having or not having internet at home*

Internet	N	Mean rank	Sum of ranks	U	p
Have internet	72	40.27	2899.50	271.50	0.21*
Not have internet	10	50.35	503.50		

\*p&gt;.05

There was no significant difference in the level of interest of gifted/talented students towards science subjects in terms of presence or absence of internet at home (U = 271.50, p > 0.05). Considering the order averages, it seen that these averages are close to each other.

The results of Kruskal Wallis test conducted to determine whether gifted/talented students have a significant difference in their interest level towards science subjects according to class level are presented in Table 6.

**Table 6.***Results of Kruskal-Wallis H Test according to Grade Level*

Class	N	Mean rank	Sd	Chi-Square	p
3 <sup>th</sup> grade	28	38.70	5	1.313	0.93*
4 <sup>th</sup> grade	11	43.64			
5 <sup>th</sup> grade	8	48.06			
6 <sup>th</sup> grade	13	43.31			
7 <sup>th</sup> grade	3	36.17			
8 <sup>th</sup> grade	19	41.24			

\*p&gt;.05

It was determined that the level of interest of gifted/talented students towards science subjects did not show a significant difference in terms of grade level (p > 0.05). In addition, the average of the row is close to each other.

Kruskal Wallis test results shown in Table 7 in order to determine whether there is a significant difference in the level of interest of science students according to the number of siblings they have.

**Table 7.***Results of Kruskal-Wallis H Test according to Number of Siblings*

Number of siblings	N	Mean rank	Sd	Chi-Square	p
One children	5	40.50	4	5.37	0.251*
2	53	43.56			
3	16	33.06			
4	7	50.64			
5 and more	1	8.50			

\*p&gt;.05

It seen that the level of interest of gifted/talented students towards science subjects did not show a significant difference in terms of the number of siblings ( $p > 0.05$ ).

The results of the Kruskal Wallis test to determine whether there is a significant difference in the level of interest in science subjects according to the education level of the mothers of gifted/talented students are shown in Table 8.

**Table 8.***Results of Kruskal-Wallis H Test according to the Education Level of the Mother*

Mother's Education	N	Mean rank	Sd	Chi-Square	p
Not at school	-	-	3	2.056	0.561*
Primary school	5	28.0			
Middle School	6	36.92			
High school	13	42.92			
University	58	42.82			

\*p&gt;.05

It was determined that the interest level of gifted / talented students towards science did not have a significant difference in terms of mother's educational status ( $p > 0.05$ ). When the data in Table 8 is considered, it is seen that the majority of the students have university education.

Kruskal Wallis test results presented in Table 9 to determine whether there is a significant difference in the level of interest in science subjects according to the education level of gifted/talented students' fathers.

**Table 9.***Results of Kruskal-Wallis H Test according to the Father's Education Level*

Father's Education	N	Mean rank	Sd	Chi-Square	p
Not at school	-	-	3	6.096	0.107*
Primary school	4	15.63			
Middle School	5	51.90			
High school	7	37.14			
University	66	42.74			

\*p&gt;.05

It found that the level of interest of gifted/talented students towards science subjects did not make a significant difference in terms of father's educational status ( $p > 0.05$ ). When the data in the table is analyzed, it is seen that most of the students' father is a university graduate.

### Conclusion

This research was carried out to determine the level of interest of gifted/talented primary and secondary school students about science subjects and to examine their interest levels according to various variables. In the research, descriptive statistics results of the scale used as data collection tool were analyzed and the students' interest levels related to science subjects were examined individually according to variables such as gender, presence of a computer at home, presence of internet at home, class level, number of siblings, education level of mother and education level of father. .

When the descriptive results obtained from the scale are examined, it is seen that the total score of gifted/talented students is  $\bar{X}=104.30$ . Accordingly, it can be concluded that the students' level of interest in science subjects is high. Demirel & Keleş (2016) showed that the science interest level of the students was in the middle level in their study conducted with secondary school students. This result may be because gifted/talented students are overly interested in the events around them, being a good observer and being very successful in reasoning. Eke (2010), PISA 2006 study that investigated the interest in science subjects for students participating in the exam Considering the OECD average of student interest is high in Turkey were determined. Yaman & Öner (2006) stated that primary school students have high attitudes and interests towards science. Özaslan & Çetin (2018) showed that students showed great interest in animals and plants they could not see closely in their daily lives as a result of their biology activities with 26 gifted/talented students. They found that the students of gifted/special talents liked the biology lessons much more because they found the activities fun, interesting and exciting.

In terms of gender, the level of interest of gifted/talented students towards science subjects showed a significant difference. According to the findings of the study, it was found that female students showed more interest in science subjects than male students did. This finding is in parallel with the studies of Baker & Leary (1995), Harty & Beall (1984), Emre (2012) and Demirel & Keleş (2016). Jones, Howe & Rua (2000), Cavanagh (2005), Güven Yıldırım & Köklükaya (2016) and Sağır (2018) are in contradiction with the studies they have done. Harty & Beall (1984) stated that primary school students' curiosity towards science was higher in female students. Emre (2012) showed that primary school students' interest in plants and animals is higher female students than male students. Demirel & Keleş (2016) in a similar study with secondary school students found that the female students' level of interest in science subjects was higher than male students. Baram-Tsabari & Yarden (2005) stated that female students are more interested in biology and male students are more interested in physics and technology. Similarly, it is thought that the gifted male students are more interested in technology and technological tools.

It was researched whether the level of interest of gifted/gifted students on science subjects had a significant difference in the presence or absence of a computer at home and whether the students' level of interest had a significant difference according to the presence or absence of computers. Similarly, Sağır (2018) found that there was no significant difference in the level of interest of students in science at the level of having computer at home in 4th grade students.

When the data were examined in terms of the presence or absence of internet at home, it was seen that the interest levels of gifted/talented students about science subjects did not show a significant difference. Altuğ, Gencer & Ersöz (2011) state that many high school students use the internet to access information easily and provide the resources they need in a short way.

In terms of grade level, it was seen that the students' level of interest in science subjects did not show a significant difference compared to their classes. It was found that the interest points towards the lowest grade science subjects increased in the 3<sup>rd</sup> grade as it progressed towards the 5<sup>th</sup> grade. While the highest grade is obtained in 5<sup>th</sup> grade ( $\bar{X}=107.48$ ), it is observed that this score decreases gradually until 8<sup>th</sup> grade ( $\bar{X}=102.84$ ). It is thought that the differentiation of the interests of the students as they get older and the anxiety of the exams in the 8<sup>th</sup> grade can lead to a decrease in the interest levels of gifted/talented students. Similarly, Catsambis (1995) said that students' interest in science is gradually decreasing towards 8<sup>th</sup> grade. Emre (2012) found that as the grade level increased, the interest of secondary school students to plants and animals decreased. Contrary to the findings of our study, Güven Yıldırım & Köklükaya (2016) observed that primary and secondary school students' level of interest in science showed a significant difference compared to the classes they studied. In a similar study by Demirel & Keleş (2016), it was observed that the interest scores of the 7<sup>th</sup> grade middle school students were significantly different than the 8<sup>th</sup> grade interest scores.

It has been tried to determine whether the level of interest of gifted/gifted students towards science subjects has a significant difference in terms of educational status of their parents and it has been found out that the level of interest of students has no significant difference according to the educational level of parents. The findings of this study support the findings of the study showing that the education level of the mother does not show a significant difference in the level of interest of middle school 4<sup>th</sup> grade students towards science (Sağır, 2018). However, Sağır (2018) found a significant difference when students compared their interest in science according to their fathers' educational background. Significant differences were found in achievement tests of primary and university, secondary and university, high school and university graduates.

In the light of the findings, the level of interest of gifted/talented students studying in other provinces regarding science subjects can be determined and compared with the students studying in Hatay. In this study, students' interest in science subjects was analyzed by taking into account variables such as presence of computer and internet at home, number of siblings, class level and educational level of parents. Such studies can be expanded by considering other variables. Interviews with gifted/talented students can be used to determine what can be done to continue and increase their interest in science subjects.

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