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## Research Article

# Investigating the critical thinking skills and autonomous learning of gifted students

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## Abstract

This paper examines the characteristics of gifted students in the context of autonomous learning and critical thinking skills. It explores the historical background of gifted education in Turkey and highlights the importance of identifying and nurturing gifted learners for societal development. The study focuses on understanding how gifted students achieve success in autonomous learning and the potential impact of critical thinking skills on their autonomous learning. A quantitative research design was employed, and data were collected using validated scales measuring critical thinking disposition and autonomous learning. A total of 397 gifted learners from Art and Science Centres in Turkey participated in the study. The data were analysed using T-test, Pearson correlation and simple linear regression analysis. The findings reveal significant relationships between the age and gender of gifted students and their critical thinking skills and autonomous learning. Additionally, a positive relationship was observed between autonomous learning and critical thinking skills. The results also suggest that critical thinking skills have a predictive effect on autonomous learning. These findings contribute to the existing literature on gifted education and provide insights into the educational practices and support needed for gifted students. The study underscores the importance of individualised curriculum and differentiated teaching methods to cater to the unique learning needs and abilities of gifted students. By fostering autonomous learning and developing critical thinking skills, educators can enhance the educational experiences and outcomes of gifted students, promoting their personal growth and societal contributions. Additionally, findings reveal a strong positive relationship between Autonomous learning and the critical thinking of high-potential learners. Regression analysis showed that critical thinking is a good predictor for autonomous learning. Any change in critical thinking affects autonomous learning of highly able learners. There is no effect of gender on the said variables.

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## Introduction

Gifted and talented individuals have made significant contributions to the realms of science and art world, making ground-breaking discoveries, and playing a significant role in the development of societies. Through unique and exceptional abilities, gifted individuals have actively supported cultural and intellectual progress by generating innovative solutions to encountered challenges, thereby taking a vital part in fostering an innovative transformation within their respective societies (Kontas and Yagci, 2016; Rimm et al., 2018; Renzulli and Reis, 2021).

In many countries, although not universally applicable, the belief that gifted individuals cannot fulfil their potential without intervention has led to the implementation of various approaches, programs, and organizations to support

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gifted education. This notion underscores the significance of tailored programs, applications, and specialised organisations to maximise the development of gifted individuals (Boettger and Reid, 2015). In Turkey, too, several schools and organisations have been established to identify and nurture gifted children, facilitating the exploration of their talents and supporting their self-actualisation (Kaya, 2013). Fine Arts High Schools that has been operating since 1989 to educate gifted students in areas such as art and music (Altinkurt, 2015), science high schools, which started in the early 1960s with the opening of Ankara Science High School to educate gifted students in mathematics and science and continues to exist today (Bal, 2020) and the 'Turk Egitim Vakfi (Turkish Education Foundation) Inanc Turkes' Private High School, which was established by Inanc Foundation in 1993 to provide education to gifted students with limited financial means ([www.tevitok.k12.tr](http://www.tevitok.k12.tr), 2023) are cited as examples of these institutions. Additionally, in various cities across Turkey, Science and Art centres known as BILSEM were established in 1992 to cater to the educational needs of gifted students at different academic levels (Balca et al., 2023). These initiatives aim to make gifted children visible, discover their abilities, and assist them in realising their full potential.

### **Characteristics of Gifted Students**

According to Renzulli (2016), gifted students exhibit exceptional intelligence, remarkable innovation, superior cognitive abilities, and strong drive and determination. Despite exceptional abilities, intelligence, and creativity, gifted individuals require guidance and support in order to discover and develop their talents (Fernández et al., 2017). As well as these characteristics, gifted students have a greater tendency to be motivated by internalising events around them compared to non-gifted individuals, and these inner attitudes of gifted individuals play a critical role in promoting autonomous learning (Gottfried, Fleming, and Gottfried, 2001). In studies related to gifted individuals, awareness is raised by focusing on various concepts, their characteristics, and individual differences, while addressing the learning needs of gifted students. Regarding the exploration of these areas, contemporary research delves into captivating topics such as "peer relationships" as examined by Cross (2021), and the investigation of 'social problem-solving skills' in gifted students conducted by Senol, Koca, and Erbasan (2023). As Deci and Ryan (2000) points out that autonomy is a fundamental aspect of the psychological needs of gifted children and that these students possess the ability to self-develop in a range of environments and with diverse materials. Moreover, the significance of fostering critical thinking skills among students, including gifted ones, is highlighted by Parks (2009 and Struck and Little, 2011). Furthermore, Lawless and Brown, (2015) states that this ability is essential for the students to acquire life-long skills that allow them to tackle obstacles in their daily lives outside of school. Hence, this study underscores the significance of autonomy and critical thinking skills, which are considered a requirement for development and well-being, cannot be detached from gifted individuals due to the fact that these two concepts are intrinsically intertwined with gifted students' inherent tendencies, and addressing them is imperative. Thus, they are expected to enhance their skills and individual growth if they are guided in developing of autonomy and critical thinking skills.

### **Autonomous Learning in Gifted Students**

Benson, (2007) posits that students, in a learner-centred approach to education, exhibit autonomous learning behaviours by recognising their personal responsibility for their education and their role as active participants in the learning process. This educational environment fosters the development of students' sense of identity and role through their active engagement in social learning. Educators, thus, can facilitate the creation of a self-directed learning atmosphere by assigning responsibilities to students, thereby raising their awareness of their roles and encouraging them to embrace challenges in their assignments. (Harmer, 2001). The examination of autonomy should encompass three interrelated dimensions: behavioural, emotional, and cognitive. Behavioural aspect involves an individual's capability for self-control and self-administration, demonstrated by their skill in arranging themselves based on their own set standards, while the emotional dimension concerns the role of parents as perceived sources of control over the individual, and their potential impact on restricting the sphere of autonomy for their children. (Zimmer-Gembeck and Collins, 2003; Parra and Oliva, 2009). The cognitive approach refers to an individual's decision-making and inference

abilities, which are considered crucial components of cognitive autonomy. This perspective has been echoed by numerous researchers in the field, including Steinberg and Morris (2001), Bednar and Fisher (2003) and Beckert (2005).

### **Critical Thinking Skills of Gifted Students**

The implementation of critical thinking education should be integrated into the curriculum for students of all aptitudes (Augustine, 2011). Saylor (2009) proposes that cultivating specialized critical thinking skills is deemed a necessity for gifted students, as their needs and abilities differ from their peers. The diversity in the intellectual development of gifted students should be considered when evaluating their critical thinking abilities (Kettler, 2014). To enhance their critical thinking performance, teachers should provide these students with challenging tasks that can stimulate their capacities and allow for more efficient learning (Winebrenner, 2001). Despite being a natural talent for gifted individuals, their critical thinking skills can still be cultivated through instruction (Kaufman and Sternberg, 2008; Alghamdi and Hassan, 2016). The teaching methods used by educators to promote critical thinking in gifted students can differ due to their varying cognitive development (Kanevsky and Geake, 2004). These diverse instructional approaches can also promote autonomous learning styles among gifted children (Alnesyan, 2012; Ghazivakili, et al., 2014). According to Fahim and Behdani (2011) and Nosratinia and Zaker (2013), autonomous learning and critical thinking are interrelated skills and teaching gifted students critical thinking skills enhances their skills in autonomous and collaborative learning, due to their inquisitive and analytical approach. Thus, critical thinking can foster autonomous learning, which is a prevalent learning style among gifted students. Dilekli (2017), similarly, concurs with this viewpoint in his study, finding a correlation between critical thinking skills, which are considered higher order thinking skills, and learning styles.

### **Gifted Students and Curriculum**

Differentiated curriculum and activities benefit gifted students by helping them recognise their potential and improving their critical thinking abilities and autonomous learning (Roberts and Inman, 2009; Robinson, Shore, and Enersen, 2007; Van Tassel-Baska, 2013; Kettler, 2014). It is also significant to understand that although gifted individuals have high IQ and exceptional abilities, they can still have diverse learning experiences, socio-economic, and cultural backgrounds. Thus, when creating educational programs for the students to have critical thinking ability and autonomous learning, it is necessary to consider individual cognitive differences and the factors mentioned, leading to a personalised curriculum. (Ford, Grantham, and Whiting, 2008; Dixon, et al., 2004). When considering educational programs, it becomes evident that the programs serve as a fundamental platform for empowering students to discover and cultivate their unique abilities, providing them with opportunities for growth and achievement of their potential (Clark, 2009). When examining the principles of the education program implemented at BILSEMs, it can be observed that it adopts an approach that strengthens and supports the skills of gifted students, including critical thinking skills and autonomy (The Ministry of National Education, 2007). In addition, Kazu and Senol (2012) argue that the educational programs implemented in BILSEMs help students become aware of their individual abilities. They also suggest that these programs provide opportunities for students to engage in exploratory and questioning activities through project work, allowing them to express themselves and encouraging them to generate new ideas. However, there are numerous challenges in evaluating the effectiveness of education programs targeting gifted students and accessing relevant outcomes. The primary reasons for these challenges include the lack of a consensus on education standards, assessment conducted with unclear objectives, inadequate qualified evaluation principles, insufficient measurement tools, a shortage of experts, and budget constraints (Avci, 2015). In this respect, although educational programs aim to support individuals' cognitive skills, including autonomous learning and critical thinking skills, it is essential to consider students' individual differences and needs.

### **Problem of Study**

This research aims to determine the characteristics of gifted students based on relevant literature and on learning and thinking styles, and to have a contribution to the literature where there are limited studies found. Moreover, the research aims to provide a better understanding of gifted students' education in Turkey. Findings aim to further knowledge

regarding how gifted students achieve success in learning autonomously, and whether critical thinking skills have an effect on their autonomous learning. The sub-questions of the study are as follows:

- Does age play a significant role in determining the critical thinking skills of gifted students?
- Does the age of gifted students have a significant impact on their capacity for autonomous learning?
- Is there a notable correlation between the gender of gifted students and their critical thinking skills?
- Is there a significant relationship between the gender of gifted students and their ability to engage in autonomous learning?
- How do autonomous learning and critical thinking skills interact with one another?
- To what extent can critical thinking skills predict the ability of gifted students to engage in autonomous learning?

## **Method**

### **Research Model**

In this research, quantitative research methods were used to generate numerical data, which can provide a comprehensive understanding of phenomena (McLeord, 2008). It involves reduction, control, and precision in order to obtain specific data that can be generalised to the population from a randomly selected sample. Additionally, it emphasizes measurement, logistics, and deduction (Creswell 2009; Johnson and Christensen, 2019). Quantitative methods are characterised by higher validity and reliability compared to qualitative methods and involve formulating hypotheses prior to data collection for testing purposes. Moreover, the researchers' biases have minimal influence on the data. By employing techniques such as surveys, it becomes feasible to recruit a large number of participants and gather reliable data within a short timeframe (Christensen and Johnson, 2016). In this study, the quantitative method have been adopted, specifically employing surveys, to collect extensive data from gifted students and obtain a comprehensive understanding of the phenomena using numerical analysis (Creswell, 2009). Given the objective of examining the autonomous learning and critical learning skills of gifted students and their relationship, the quantitative research method was deemed appropriate. The primary objective of selecting the quantitative research method in this study is to comprehend the autonomous learning skills and critical learning skills of the gifted learners in Turkey and assess the extent to which critical learning skills predict autonomous learning skills.

### **Participants**

For the recent quantitative research study, participant recruitment plays a crucial role in gathering the necessary for analysis and drawing meaningful conclusions. To ensure a robust and diverse participant pool, the target population was clearly defined that would best represent the research objective. This involves identifying specific demographic characteristics, such as age, gender, education level, that are relevant to the study. Online platforms and scales were utilized to reach out to and engage specific groups and communities that matched the defined characteristics of the target population. Art and Science Centres were contacted to request their assistance in participant recruitment. By leveraging their networks and channels, a more focused and knowledgeable participant pool was accessed. In total, 397 participants were successfully reached out to and recruited from across Turkey, both online and physically. Among the participants, 55% were female ( $n = 219$ ) and 45% were male ( $n = 178$ ). These participants were identified as gifted students aged between 7 and 18, who received education in Art and Science Centres during the 2017-2018 academic year. Importantly, it should be noted that the selected sample represents the entire population, as data was collected directly from the entire population. The demographic features of the participants are listed in table 1:

**Table 1.** Demographic features of the participants.

		N	%
<b>Sex</b>	Female	219	55.2
	Male	178	44.8
<b>Age</b>	Before adolescence	257	64.7
	Adolescence	140	35.3
<b>Class</b>	Primary Sc.	155	39
	Secondary Sc.	242	61
<b>Total</b>		<b>397</b>	<b>100.0</b>

The participants' gender distribution consisted of 219 (55.2%) females and 178 (44.8%) males. Regarding the class distribution, 155 (39%) students were enrolled in primary school, while 242 (61%) were receiving education at the secondary school level in Turkey. In terms of age demographics, participants were divided into two groups: those before adolescence and those in adolescence, with the commonly accepted age of 12 years old as the dividing line. There were 257 participants (64.7%) in the before adolescence group, while 140 participants (35.3%) were classified as adolescents.

#### **Data Collection Instruments**

The following two data collection scales were utilized: Critical Thinking Disposition Scale, originally developed by Sosu (2013) and Autonomous Learning Scale, originally developed by Macaskill and Taylor (2010)

#### **Critical Thinking Disposition Scale**

This scale was originally developed by Sosu (2013) to determine the critical thinking disposition of high-potential learners. It consists of 11 items that are rated from 1 to 5 which represent strongly disagree (1); disagree (2); neither agree nor disagree (3); agree (4), and strongly agree (5). The scale was adapted to Turkish by Arslan and Yurdakul (2015) after a validity and reliability study. For this purpose, factor analysis was adopted, and factor loading was varied between .68 and .75. That means the Turkish-adapted version of the critical thinking disposition scale can be used to determine the critical thinking of high-potential learners in Turkey.

#### **Autonomous Learning Scale**

This scale was originally developed by Macaskill and Taylor (2010) with the aim of investigating autonomous learning of gifted students. It consists of 12 items that are rated from strongly disagree (1); disagree (2); neither agree nor disagree (3); agree (4), and strongly agree (5). The students can assess their autonomous learning abilities by answering the scale's questions. The scale was designed with 12 items to avoid overwhelming participants with a large number of questions. This approach is believed to enhance the validity and reliability of the scale by focusing on a single target for assessment (Macaskill and Taylor, 2010). The scale was adapted to Turkish by Arslan and Yurdakul (2015) following a validity and reliability study, which determined that it can be effectively used in assessing the autonomous learning of gifted students in Turkey.

#### **Data Collection Procedure**

The data collection process in this study was conducted with the aim of achieving the research goals and addressing the research questions. Initially, participants were selected using an appropriate sampling technique, and validated scales were adapted and administered in both online and printed formats. Subsequently, the online survey, comprising the two scales, was distributed to all participants, while the physical version of the scales was handed out face-to-face to participants who received education at the Art and Science Centre in Turkey during the 2016-2017 academic year. The responses were collected, and for paper-based surveys, data were manually entered into the SPSS analysis program, while for online surveys, data were transferred from Excel software.

## Results

To examine the correlation between variables and predict the independent variable's impact on the dependent variable, statistical analysis techniques such as T-test, Pearson correlation, and simple linear regression analysis were utilized. These analyses were conducted using IBM SPSS Statistics software version 26. Before proceeding with the analysis, the normality of the data distribution was assessed. To assess normality, skewness and kurtosis tests were employed. Based on the results, it was found that the Critical Thinking variable had a skewness of -1.153 and a kurtosis of 1.980, while the Autonomous Learning variable had a skewness of -0.890 and a kurtosis of 0.821. These findings indicated that the data was within an acceptable range of normal distribution, in line with the guidelines provided by George and Mallery (2012, p. 113). "*A kurtosis value between  $\pm 1.0$  is considered excellent for most psychometric purposes, but a value between  $\pm 2.0$  is in many cases also acceptable, depending on the particular application.*" The analysis results are presented in tables below.

A total of 397 participants were included in this study. The aim was to compare the mean scores of critical thinking and autonomous learning skills between two groups, namely females and males. To analyse the data, an independent group t-test was performed, which allowed for a comparison of the means between the two groups. The results of the t-test are presented below.

**Table 2.** Independent group t-test results for comparing means of females and males according to autonomous learning.

	Group	N	X	ss	Sh <sub>x</sub>	t	df	p
<b>Autonomous learning</b>	female	219	4.00	.699	.047	-2.630	384.553	.009*
	Male	178	4.18	.669	.050			

p<.05

Assuming unequal variances, the results of the independent group t-test are as follows: The t-value is -2.630. The degrees of freedom (df) for the t-test are 384.553. The associated p-value for the two-tailed test is 0.009. The mean difference, standard error difference, and confidence interval remain the same as mentioned earlier. These findings indicate a statistically significant difference between the means of the two groups. The negative mean difference suggests that the "female" group has a lower mean score compared to the "male" group. Specifically, it suggests that males exhibit higher autonomous learning skills compared to females.

**Table 3.** Independent group t-test results for comparing means of females and males according to critical thinking

	Group	N	X̄	ss	Sh <sub>x</sub>	t	df	p
<b>Critical Thinking</b>	Female	219	4.10	.674	.046	-1.626	377.266	.105
	Male	178	4.21	.679	.051			

p>.05

The equal variances are not assumed, the results are as follows: The t-value is -1.626. The degrees of freedom (df) for the t-test is 377.266. The associated p-value for the two-tailed test is 0.105. The mean difference, standard error difference, and confidence interval remain the same as above. In this case, the p-value (0.105) indicates that there is no statistically significant difference between the means of the two groups. Therefore, based on the available information, there is no strong evidence to suggest a difference in means between the groups for the variable "critical thinking". Means that there is no difference between Males and Females in terms of critical thinking skills.

**Table 4.** Independent group t-test results for comparing means of primary and secondary school according to autonomous learning.

	Group	N	X̄	ss	Sh <sub>x</sub>	t	df	p
<b>Autonomous Learning</b>	Primary Sc.	155	4.27	.575	.046	4.404	395	.0001*
	Secondary Sc.	242	3.96	.732	.047			

p<.05

T-test is used to assess whether the variances of the two groups are significantly different. t-value: 4.404 (assuming equal variances); Degrees of freedom (df): 395; p-value: 0.0001. The equal variances are assumed, the t-test results

indicate that there is a significant difference between the means of the two groups. In this case, the p-value of 0.0001 suggests that there is a significant difference in variances between the two groups. Means that primary school students have higher autonomous learning skills compare to secondary school according to t-test.

**Table 5.** Independent group t-test results for comparing means of school level according to critical thinking

	Group	N	$\bar{X}$	ss	Sh <sub>x</sub>	t	df	p
<b>Critical Thinking</b>	Primary Sc.	155	4.26	.697	.056	1.935	394	.054
	Secondary Sc.	242	4.10	.661	.043			

p>.05

Independent samples t-test was conducted to compare the means of two groups. t-value: 1.935 (assuming equal variances); degrees of freedom (df): 394, and p-value: 0.054. Under the assumption of equal variances, the t-test results indicate that the difference between the means of the two groups is not statistically significant. Therefore, it could be said that there is no significant difference between primary and secondary school students in terms of critical thinking skills.

**Table 6.** Independent group t-test results for comparing means of age according to autonomous learning.

	Group	N	$\bar{X}$	ss	Sh <sub>x</sub>	t	df	p
<b>Autonomous Learning</b>	Bef. Adoles.	257	4.18	.641	.040	4.048	395	.0001*
	Adolescence	140	3.89	.741	.063			

p<.05

T-test is used to assess whether the variances of the two groups are significantly different. T-test for Equality of Means: t-value: 4.048 (assuming equal variances); degrees of freedom (df): 395; p-value: 0.0001. Under the assumption of equal variances, the t-test results indicate a significant difference between the means of the two groups. Means that before adolescent students have higher autonomous learning skills compare to adolescent students according to t-test.

**Table 7.** Independent group t-test results for comparing means of age according to critical learning.

	Group	N	$\bar{X}$	ss	Sh <sub>x</sub>	t	df	p
<b>Critical Thinking</b>	Bef. Adoles.	257	4.21	.685	.043	2.185	296.935	.030
	Adolescence	140	4.05	.655	.055			

p>.05

T-test is used to assess whether the variances of the two groups are significantly different. If equal variances are not assumed: t-value: 2.185; degrees of freedom (df): 296.935; p-value: 0.030. Under the assumption of equal variances not assumed, the t-test results indicate a significant difference between the means of the two groups. Based on the provided information, there is evidence to support a significant difference in means of before adolescent students in terms of critical thinking skills. However, it is important to note that the p-values are close to the significance level, indicating that the results may be borderline significant.

Pearson correlation was utilised to determine the relationship between autonomous learning, critical thinking, gender, class, and age. The analysis results are shown below.

**Table 8.** Correlations between Autonomous Learning, Critical Thinking Skills, Gender, Class, and Age of gifted students

	M	S.D.	N	AL	CTS	Gender	Class	Age
<b>AL</b>	4.08	0.691	397	1				
<b>CTS</b>	4.15	0.677	396	.718**	1			
<b>Gender</b>		0.498	397	.131**	0.082	1		
<b>Class</b>		1.807	397	-.216**	-0.089	0.023	1	
<b>Age</b>		1.908	397	-.190**	-0.078	0.066	.956**	1

CTS: Critical Thinking Skills AL: Autonomous learning \*\*Correlation is significant at the 0.01 level (2-tailed)



Table 8 states that a Pearson correlation coefficient was computed to assess the linear relationship among Autonomous Learning, Critical Thinking Skills, Gender, Class, and Age of gifted students. There is a strongly positive significant relationship between autonomous learning and critical thinking skills of the gifted learners,  $r(397) = .718$ ,  $p < .01$ . That means, when Autonomous Learning of the gifted students increases, their Critical Thinking skills do too. The reverse is true for the direction to the negative level. There is also a positive relationship between Autonomous Learning and Gender, despite the relationship being weak  $r(397) = .131$ , it is significant according to  $p < .01$  value. As a relationship was found between Autonomous Learning and Gender, it is interesting that there was not a significant relationship between critical learning and gender of gifted learners. It is noted that there is a positive but very weak relationship between critical thinking and gender of gifted learners according to  $r(397) = .082$  value. Likewise, a similar relationship was found for the relationship between gender and year  $r(397) = .023$ ,  $p > .01$ , and between Gender and Age,  $r(397) = .066$ ,  $p > .01$ . This means there is a very weak positive relationship between gender and class, and between gender and age, but this relationship is not significant for both groups. There is a strong, significant positive relationship between Class and Age,  $r(397) = .956$ ,  $p < .01$ . This analysis supports the division into year group stages from preschool to high school according to age that is used by many education systems.

It was also found that there is a weak negative relationship between autonomous learning and class  $r(397) = -.216$ ,  $p > .01$ , and autonomous learning and age  $r(397) = -.190$ ,  $p > .01$ , but this relationship is not significant. It could mean that gifted students lose their autonomous learning when they grow up and reach the upper class. Another finding is that there is a weak negative relationship between critical thinking skills and class  $r(397) = -.089$ ,  $p > .01$ , and a weak negative relationship between critical learning and age  $r(397) = -.078$ ,  $p > .01$ . This means that critical thinking of gifted learners correlated negatively with age and class, but this correlation is not significant according to the p-value.

The analysis was conducted on data derived from 397 participants. In order to understand the extent to which critical thinking predicts autonomous learning, the simple linear regression analysis was conducted. The results are presented in table 2 shown below.

**Table 9.** Regression analysis to investigate the degree to which critical learning predicts autonomous learning of high-potential students.

Variable	B	SH <sub>B</sub>	$\beta$	t	p
(Constant)	1.036	0.151		6.875	0.000
Critical Thinking	0.733	0.036	0.718	20.475	0.000
R=.718; R <sup>2</sup> =.516					
F <sub>1, 394</sub> = 419.214; p<.05					

a. Dependent Variable: Autonomous learning

Table 9 shows results from a simple linear regression which was calculated to predict Autonomous Learning based on the Critical Thinking of high-potential students. A significant regression equation was found  $F(1, 394) = 419.214$ ,  $p < .5$ , with an R<sup>2</sup> of .516. Participants predicted unit is equal to  $1.036 + 0.733(\text{Critical Thinking})$  when Autonomous Learning is measured in learning abilities. Autonomous Learning increased by .733 for each learning abilities unit of Critical Thinking. Hence, based on the regression analysis, it can be concluded that critical thinking serves as a strong predictor for autonomous learning.

### Findings and Discussion

This study was carried out to determine whether there is a relationship between autonomous learning and the critical thinking skills of gifted learners and to find out whether the critical thinking skill of high-potential learners predicts their autonomous learning and if their demographic features affect those skills. For this purpose, t-test, Pearson correlation and simple linear regression analyses were applied.

According to t-test results; Males has higher autonomous learning skills compare to Females while there is no significant difference in terms of critical thinking skills of both groups. Moreover, gifted students who attended primary

school have higher autonomous learning skills compare to those in secondary schools. Similarly, when the age is considered, before adolescent students have higher autonomous learning skills compare to adolescent students according to t-test. Therefore, it can be argued that age may have an impact on autonomous skills. In terms of critical thinking skills, no significant difference was found between primary and secondary gifted students. However, there was evidence to support a significant difference in mean scores of critical thinking skills among students before adolescence. These findings prompt to reconsider the role of schools in fostering autonomous learning. It raises the question of whether schools contribute to enhancing or limiting autonomous learning skills. Based on the t-test results, it is possible to suggest that an increased level of schooling may limit the autonomous learning of gifted students. Traditional educational methods often fail to provide adequate support for enhancing the autonomous learning skills of gifted students.

It is found that there is a substantially positive significant relationship between Autonomous learning and critical thinking skills of high-potential learners, and critical thinking skills can predict autonomous learning of high-potential learners reliably. This implies that an increase in critical thinking skills among high-potential learners is associated with an increase in their autonomous learning. Similarly, a decrease in critical thinking skills is linked to a decrease in autonomous learning. These findings align with previous studies conducted by Nosratinia and Zaker (2013) and Fahim and Behdani (2011), which reported a significant positive relationship between the two variables. These studies further demonstrated that critical thinking skills can serve as predictors of autonomous learning among high-potential learners.

According to the findings of research carried out by Dilekli (2017), gifted students have higher critical thinking scores than their non-gifted peers. The research of 225 gifted students aged 9 to 15 years old concludes that there is a positive correlation between learning styles and the critical thinking ability of gifted children. Furthermore, the study of Kettler (2014), which has compared measures of critical thinking qualifications in gifted and non-gifted students shows similar results as that of Dilekli (2017). Accordingly, critical thinking is a distinctive characteristic for gifted students and is more advanced in gifted students. As understood from the results mentioned above, critical thinking, which is a higher-level thinking skill, exists in gifted individuals, and this positively affects their learning styles. Moreover, according to Willingham (2007), educational activities and practices used in both teaching and learning develop critical thinking in individuals.

There was also a weak positive relationship between Autonomous Learning and Gender. Although the relationship is weak  $r(397) = .131$ , it is significant according to  $p < .01$  value. Although a relationship was found between Autonomous Learning and Gender, it is interesting that a significant relationship between Critical thinking and Gender of the gifted learners was not found within the significance of  $p > .01$  value. This means that gender correlated weakly with autonomous learning but not with critical thinking skills. A study by Shirazi et al, (2019), found a similar result - a weak positive relationship between gender and autonomous learning.

On the other hand, a study by Rudd et. al. (2000) did not find a relationship between learning styles and critical thinking skills. The reason why this finding is different may derive from participants involved, related educational content, or a different culture. In other words, whether the group participating in the study is gifted or not can affect the results of the research. From this point of view, it can be inferred that both gifted and non-gifted participants can be involved in studies to understand the relationship between these skills more clearly. The most interesting result of this study is that there is a significant negative relationship between autonomous learning and class, and autonomous learning and age. This could mean that gifted students lose their autonomous learning when they grow up and pass to the upper class. Therefore, the education system may be a barrier for gifted students who possess autonomous learning and critical thinking skills.

There is no significant relationship between age and gender, while there is a significant strong positive relationship between Age and Class. In Turkey, the education stages are structured based on the age of the students, starting from year 1 at the age of six and progressing up to the upper class (year 12) as they grow older. In light of the findings, it can

be concluded that designing an educational system that takes into account students' age has significant advantages for both students and their learning outcome.

### Limitation of Study

This study exclusively collected data from gifted students enrolled in BILSEMs during the 2016-2017 academic year in Turkey, indicating that the findings are confined to this specific dataset. As a result, it is not possible to generalize the findings to other groups of students. The outcomes of this study are specific to the quantitative data collected. However, it is worth noting that qualitative data could complement and provide further support to the results obtained in this research.

### Suggestions

Based on the results, it is recommended that schools consider revising their curriculum to better cater to the individual needs of gifted students and foster their autonomous learning and critical thinking skills. This would involve creating an educational environment that encourages and supports other skills as well as autonomous learning and critical thinking. By doing so, schools can maximize the potential of gifted students and provide them with the necessary tools and opportunities to thrive academically and personally.

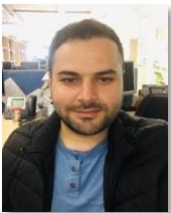
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