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The prediction level of university students' critical thinking dispositions to achievement goal orientations

Aysel Arslan[a**]

[a] *Sivas Cumhuriyet University, Faculty of Education, Department of Educational Sciences, Sivas, Turkey*

Abstract

The aim of this study; is to examine the critical thinking dispositions and achievement goal orientations of university students in terms of various variables, and to determine the predictive level of students' critical thinking dispositions on their achievement goal orientations. The sample of the research consists of 785 (333 female, 452 male) university students studying at Sivas Cumhuriyet University in the spring semester of 2021-2022 academic year. The study group of the research was determined by the random sampling method, which is one of the screening methods. *"California Critical Thinking Disposition Scal*e" and *"Achievement Goal Orientations Scale"* were used to obtain the research data. Descriptive and normality analysis, independent sample t-test, one-way ANOVA, Tukey and multiple regression analysis were used to obtain the data. In the findings obtained, students' critical thinking dispositions were related to the variables of grade level, income status, and graduated school type; on the other hand, it was determined that achievement goal orientations differed statistically significantly according to the type of program studied, class level, income status, and type of school graduated. In addition, it was determined that the change in the sub-dimensions of the critical thinking dispositions scale explained the learning/approach goal orientation by 12.2%, the learning/avoidance goal orientation by 12.6%, the performance/approach goal orientation by about 10.6%, and the performance/avoidance goal orientation by about 15.2%.

Keywords: *Achievement orientation, critical thinking, student, university*

1. Introduction

Thinking is the most important and valuable skill that humans have from the day they exist (De Bono, 1999). Thinking, which directly affects the existence of human beings and the purpose of life, develops with direct or indirect effects from birth to the end of life (Fisher, 2005; Robson, 2012). Thinking is not a simple feature, but includes active, collective, goal-related processes. In this way, the individual can transfer the different knowledge and experiences he has to new situations, use it appropriately and establish a relationship between the factors according to the situation (Kurnaz, 2011; Mckendree, Small, Stennnig, & Conlon, 2002). Understanding all kinds of situations and events that

* Corresponding author: Aysel Arslan, ORCID ID:
Email: ayselarslan@cumhuriyet.edu.tr

an individual experiences, solving the problems he encounters, perceiving things that are negative for him, protecting his physical and mental integrity, and knowingly realizing positive behaviors for himself are realized by having the ability to think (De Bono, 1992; Dewey, 1997). Thinking is of fundamental importance in meeting the needs of the individual's existence and enables him to produce solutions for any situation that will upset his balance (Frensch & Funke, 1995). Thanks to thinking, which is a complex cognitive process, the individual learns much more than the intuitive knowledge in understanding, interpreting and shaping his environment (Gibson, 1998).

Today, it is accepted that thinking is a feature that exists in the individual from birth, but it can be developed with different education and experiences. Here, it is more important how the individual should think rather than what he should think. It is stated that knowing how to think will activate the higher-level cognitive skills of the individual before making a direct decision on any subject. The activation of high-level processes in thinking processes is defined as critical thinking skill. critical thinking; it is an individual's analysis, interpretation, and evaluation by making inferences in the face of any situation, phenomenon or event (Banks, McCarthy, & Rasool 1993). In this way, different solutions and ideas are put forward. In critical thinking, the individual reaches different possible results by establishing different hypotheses on any subject (Yurdabakan, 1998). Hudgins and Edelman (1988) use critical thinking to reach conclusions by searching the relevant evidence instead of directly accepting the situations faced by the individual; Craver (1989) defines it as a way of providing access to information, the evaluation of ideas and the process of explaining the relations between concepts by classifying them. As a result, critical thinking involves employing higher mental processes before making a judgment on a subject; it is seen that it is the presentation of evidence, concepts, methodologies and criteria related to the decision (Facione, 1990; Huitt, 1998).

Cüceloğlu (2001) emphasizes that being aware of other individuals' thinking processes is as important as knowing one's own thinking processes in critical thinking. An individual with advanced critical thinking skills takes into account both his own thoughts and those of other individuals, evaluates events and situations accordingly, and tries to reach a logical conclusion by methodological thinking (Ertaş-Kılıç & Şen, 2014; Simpson & Courtney, 2002). Critical thinking skills should be used effectively in order to be able to interpret today's multi-layered world correctly, to take the right decision in any situation and to lead a successful and quality life (Gibson, 1998). In this context, it is seen that critical thinking skill is not a scientific subject or a philosophical discussion, but rather a competency in the middle of daily life (Banks, et al, 1993; Demir & Aybek, 2014; Facione et al., 1994; Paul, 1993; Yagci, 2008; Zhang, 2003). Individuals with critical thinking skills are expected to have thinking tendencies expressed as analytical, inquisitive, mature, open-minded, systematic, truth-seeking, and self-confident. It is also

stated that these individuals should use the skills of analysis, synthesis, inference, evaluation, interpretation, explanation, and self-regulation effectively (Facione, 1990).

Having the ability to think critically is a necessary skill in all areas of life, but it is especially important for students' learning at school. Özden (2014) states that critical thinking can be used to evaluate information with a realistic perspective, to distinguish the difference between claims and facts, to remove unreliable ones by researching the validity of sources, not to rely on prejudice, to minimize cognitive errors, to ask the right questions, to use verbal and written language, and to manage thinking. indicates that he has acquired skills. All these skills ensure that the desired efficiency is obtained from the learning and teaching processes, which have a complex structure in today's world (Hotaman, 2008). There are studies in the literature examining the relationship between critical thinking and different cognitive skills. Ulusoy and Karakuş (2018) critical thinking and self-directed learning, Öztürk (2018) problem solving skills, Yıldız and Yılmaz (2020) lateral thinking disposition, Erişti and Erdem (2018) media literacy, Çakır, Yalçın and Yalçın (2020) STEM activities examined the relationship between There are also studies in the literature revealing that critical thinking is related to academic success (Akbıyık & Seferoğlu; Karagöl & Bekmezci, 2015; Kıran, 2019; Polat, 2019). Studies have shown that critical thinking has a positive effect on positive cognitive skills and academic achievement. Another important factor on the academic success of students is their level of motivation towards success. Achievement goal orientation examines students' motivation to succeed. The theory of achievement goal orientations aims to reveal the relationship between students' success by examining these behaviors and tendencies, and to determine these factors by examining their tendencies (Kaplan & Maehr, 1999).

Achievement goal orientations mainly focus on students' behaviors about being successful, but also deal with concepts such as attending school and classes, and attitudes towards learning and school (Schunk, Pintrich, & Meece, 2010). When students encounter a situation, event or task that they need to be successful in, they try to explain their behaviors and the reasons for these behaviors (Murayama, Elliot, & Yamagata, 2011). Achievement goal orientation was initially examined in a dual structure as learning orientation and performance orientation (Elliot & McGregor, 2001; Matos, Lens, & Vansteenkiste, 2007). In the studies conducted on this subject in the process, it was stated that the learning and performance dimensions also have dual structures called learning approach/avoidance and performance approach/avoidance (Elliot, McGregor, & Gable, 1999; Elliot & McGregor, 2001; Pintrich, 2000). . Approach orientations focus on the individual's positive attitude towards learning and self-disclosure in terms of being successful. In the learning approach orientation, the individual's effort to develop his own knowledge, skills and abilities in the face of the learning task; in performance approach orientation, the individual's efforts to show his knowledge and skills to others and to surpass others come to the fore (Elliot & McGregor, 2001; Matos et al., 2007). Avoidance

orientations focus on the individual's avoidance of learning or performing for different reasons. It is stated that the reasons such as the fear of making mistakes while learning and the anxiety of not being able to learn fully come to the fore in the learning avoidance orientation (Schunk et al., 2010). In performance avoidance orientation, reasons such as possible negative judgments about the individual's performance, fear of being criticized by others, failure, and low grade anxiety are effective (Elliot, 1999; Elliot & McGregor, 2001; Fryer & Elliot, 2007). It is seen that the approach dimensions of achievement goal orientations are related to the positive aspects of students' success, while the avoidance dimensions are related to the negative aspects (Arslan & Akın, 2015).

When the relevant literature is examined; it has been observed that there are studies in which achievement goal orientations are examined with different variables. Koç and Arslan (2015) achievement goal orientations and metacognitive strategies, Berber and Eker (2018) hope level, Matos et al. (2007) examined the relationship between cognitive strategies, Gencer (2019) performance anxiety and perfectionism, Phan (2009) effort requiring continuous effort, Karakış (2020) foreign language motivation, Bahadır (2021) attitude towards e-learning, Arslan and Bardakçı (2022) attitude towards school. Studies show that learning and performance approach orientations affect the researched subject positively, while learning and performance avoidance orientations affect negatively. Achievement goal approach orientations; the time students spare for learning positively affects their power to struggle with the problems they encounter, their determination to be successful, and their belief that they will be successful. It also determines the quality and permanence of the learned knowledge. In the information above, it is seen that both critical thinking and achievement goal orientations are investigated together with many different variables and the level of interaction between them is revealed. However, a study examining the interaction between university students' critical thinking dispositions and achievement goal orientations was not found in the literature review. Since critical thinking primarily provides a correct and healthy thinking process, it is thought that it will be effective in providing the necessary motivation for students to learn and perform in order to be successful. In this context, the study was planned to determine the effect of critical thinking on achievement goal orientations and the answers to the following questions were sought:

University students,

- ✓ Do critical thinking dispositions and achievement goal orientations differ statistically according to the variables of gender, grade level, type of education, type of education program and type of high school graduated?
- ✓ What is the level and direction of critical thinking dispositions to predict achievement goal orientations?

2. Method

In this part of the research, the model used in the research, the sample group of the research, the data collection tools, the statistical methods used and the data analysis are given.

2.1. Model of the research

The sample group of the study was determined by the random sampling method, which is among the screening methods. This method is preferred because it is difficult to reach each unit in cases where the research population is large in number. Individuals who have the ability to represent the research universe are included in the research completely randomly. The characteristics of the units that are taken from the universe in accordance with a certain criterion, which are tried to be determined within the scope of the research, are determined and generalized to the universe (Aziz, 2014). In the screening model, which is frequently used in quantitative research, it is aimed to present and describe the situation or phenomenon that existed in the past or today (Karasar, 2014).

2.2. Participants

The sample group of the study consists of 785 (333 female, 452 male) university students studying at three different vocational schools and six different faculties at Sivas Cumhuriyet University (SCU). The sample group was determined based on d= ±0.03 sampling error at a significance level of 0.05 from 35,898 university students studying in the SCU center in the spring term of the 2021-2022 academic year (Yazıcıoğlu & Erdoğan, 2014).

The frequency distributions of the students in the sample group according to their demographic characteristics are presented in Table 1.

Table 1. *Demographic information of the sampling*

Variables		**(f)**	**(%)**	**Variables**		**(f)**	**(%)**
Gender	Female	333	42.4	Type of Teaching	First	615	78.3
	Male	452	57.6		Second	170	21.7
Economical situation	Very good	83	10.6	Type of School	Faculty	435	44.6
	Good	336	42.8		VS	350	55.4
	Middle	320	40.8	High School Graduation	Vocational	277	35.3
	Low	46	5.8		Anatolia	439	55.9
Class level	1st Class	258	9.8		İHS	28	3.6
	2nd Class	307	25.0		Science	29	3.7
	3rd grade	143	48.9		Other	12	1.5

4th Grade	77	16.3	

2.3. Data collection tools

"California Critical Thinking Tendency Scale" and "Achievement Goal Orientations Scale" were used together with the demographic information form prepared by the researchers to obtain the research data.

2.3.1. California critical thinking tendency scale (CCTT)

Kökdemir (2003), adapted the scale to Turkish, which was developed by Facione and Giancarlo (1998) within the scope of the Delphi project organized by the American Philosophical Society. In the adapted scale; it was determined that some of the items in the cognitive maturity sub-dimension were eliminated in the original scale, and some of them were included in the open-mindedness sub-dimension. In addition, while the original had a seven-factor structure, it was determined that a six-factor structure emerged by combining the factors of open-mindedness and maturity in the adaptation scale. The Alpha Cronbach value of the original form of the scale was .90, and the adapted scale was .88, and in this study it was found to be .92. The adapted scale consists of 51 items in total. There are 10 items in the analytical sub-dimension, 12 items in the open-mindedness sub-dimension, 9 items in the curiosity sub-dimension, 7 items in the self-confidence sub-dimension, 7 items in the truth-seeking sub-dimension, and 6 items in the systematicity sub-dimension of the scale. 22 of these items are reverse coded. The scale was prepared in a six-point Likert type and the degrees were prepared as "I totally disagree=1 … I totally agree=6". When all questions of the scale are answered negatively, 51 points are obtained, and when positive answers are given, 306 points are obtained.

2.3.2. Achievement goal orientations scale (AGO):

The scale, whose original form was developed by Elliot and Murayama (2008), was adapted into Turkish by Arslan and Akın (2015). The 1st and 3rd items of the scale, which consists of four factors and 12 items, are related to the Learning Approach (LAP) sub-factor, 4th and 6th items to the Learning Avoidance (LAV) factor, 7th and 9th items to the Performance Approach (PAP) factor, and 10th and 12th items of the scale. It relates to the Performance Avoidance (PAV) factor. The scale items were prepared in accordance with the five-point Likert type within the reference range of "Strongly Disagree … Strongly Agree". Cronbach Alpha value of the scale; it was calculated between .84 and .94 in the original form, between .62 and .72 in the adapted scale, and between .63 and .83 in this study. While the highest score that the participants can get from the scale is 60, the lowest score is 12.

The descriptive information obtained about the scales in this study is presented in Table 2 below.

Table 2. *Descriptive statistics on scales.*

	Sub-Factors	n	x̄	ss	Min.	Max.	Cronbach Alpha	Skewness	Kurtosis
CCTT	Analyticity	785	42.58	7.16	10.00	59.00	0.719	-.258	.261
	Catholicity	785	48.12	8.62	12.00	69.00	0.741	-.309	.264
	Curiosity	785	38.34	6.91	9.00	54.00	0.765	-.003	-.273
	Trust yourself	785	28.95	5.43	7.00	42.00	0.677	-.157	-.014
	Searching for the Truth	785	27.73	5.40	7.00	41.00	0.671	-.265	.171
	Systematicity	785	22.69	4.67	6.00	36.00	0.644	-.013	-.184
AGO	LAP	785	12.17	2.14	3.00	15.00	0.634	-.996	1.551
	LAV	785	11.98	2.45	3.00	15.00	0.792	-.941	.600
	PAP	785	11.82	2.42	3.00	15.00	0.732	-.881	.500
	PAV	785	11.52	2.97	3.00	15.00	0.827	-1.072	.615

Considering the Cronbach Alpha coefficient values of the scale sub-dimensions given in Table 2, it is seen that the Cronbach Alpha coefficients of the critical thinking disposition sub-dimensions range from 0.644 to 0.719. The Cronbach Alpha coefficients belonging to the sub-dimensions of Achievement Goal Orientations scale vary between 0.634 and 0.827. Considering these values, it can be said that the scales are quite reliable according to Kartal and Bardakçı (2019). Kalaycı (2014) states that if normality cannot be achieved in the scales, parametric tests can be performed by assuming normality in cases where the skewness and kurtosis values that need to be checked are ± 1.96. In this context, it is seen that the skewness and kurtosis values are in the acceptable range.

2.5. Data collection and scoring

The data of the research was obtained by applying the data collection tool to 785 students in the study group of the research through an online questionnaire on the Google Forms platform. The answers given to the scales were scored as 1, 2, 3, 4, 5, starting from the most negative option to the most positive option. In the calculation of the mean scores of the sub-dimensions of the scale, the answers given by the students to the items in the dimensions were used.

2.6. Statistical methods used

Whether the total scores of the sub-dimensions of the scales showed normal distribution or not was examined by using the Kolmogorov-Smirnov (K-S) normality test, taking into account the total number of participants (n>30). Since it was determined that the assumption of normality was not met (p<.05), skewness and kurtosis values were also taken into account (± 1.96). Comparison of the mean scores of two unrelated groups with

each other was made using the independent groups t-test. One-way analysis of variance was used to compare the mean scores of three or more independent groups. Tukey test, which is a multiple comparison test, was applied in order to determine between which groups the statistically significant difference was determined as a result of the analyzes made. Tamhane T2 test was used when group variances were not homogeneous. Whether students' critical thinking dispositions have a significant effect on achievement goal orientations was examined using multiple linear regression analysis. IBM SPSS 23.0 package program was used in the application of all the statistical techniques used in the research.

3. Results

In this part of the study, the findings obtained from the analysis of the research data in line with the research questions are presented respectively.

Table 3 shows the results of the unrelated groups t-test, which was applied to determine whether the scores obtained by the students from the scales differ statistically according to the gender variable.

Table 3. *T-test results of CCTT and AGO scales by gender*

	Sub-Factors	**Gender**	**n**	$\bar{x}$	**ss.**	**t**	***p***
CCTT	Male	Female	333	42.45	7.37	-0.452	0.651
		Male	452	42.68	7.00		
	Catholicity	Female	333	47.79	8.80	-0.939	0.348
		Male	452	48.37	8.49		
	Curiosity	Female	333	38.35	6.82	0.041	0.968
		Male	452	38.33	6.98		
	Trust yourself	Female	333	28.80	5.37	-0.633	0.527
		Male	452	29.05	5.48		
	Searching for the Truth	Female	333	27.68	5.40	-0.234	0.815
		Male	452	27.77	5.41		
	Systematicity	Female	333	22.78	4.77	0.500	0.617
		Male	452	22.62	4.59		
AGO	LAP	Female	333	12.13	2.10	-0.480	0.631
		Male	452	12.20	2.18		
	LAV	Female	333	11.80	2.42	-1.846	0.065
		Male	452	12.12	2.46		
	PAP	Female	333	11.68	2.33	-1.410	0.159
		Male	452	11.92	2.48		
	PAV	Female	333	11.45	2.83	-0.516	0.606
		Male	452	11.56	3.07		

When examined in Table 3; it was determined that the scores of university students in the Critical Thinking Tendency scale sub-dimensions did not differ statistically significantly according to gender (p>0.05). Similarly, it was determined that the average scores of all sub-dimensions of the Achievement Goal Orientation scale did not differ significantly according to the gender of the students (p>0.05).

The results of the unrelated groups t-test applied to determine whether the scores of the participants from both scales differ statistically according to the variable of teaching type are presented in Table 4.

Table 4. *CCTT and AGO scales t-test results by education type*

	Sub-Factors	**Type of Instruction**	**n**	$\bar{x}$	**ss.**	**t**	***p***
CCTT	Analyticity	First	615	42.72	7.24	1.004	0.316
		Second	170	42.09	6.86		
	Catholicity	First	615	48.21	8.65	0.522	0.602
		Second	170	47.82	8.56		
	Curiosity	First	615	38.41	6.99	0.530	0.596
		Second	170	38.09	6.63		
	Trust yourself	First	615	29.06	5.37	1.087	0.278
		Second	170	28.55	5.66		
	Searching for the Truth	First	615	27.77	5.48	0.422	0.673
		Second	170	27.58	5.12		
	Systematicity	First	615	22.71	4.64	0.218	0.828
		Second	170	22.62	4.79		
AGO	LAP	First	615	12.13	2.17	-1.001	0.317
		Second	170	12.32	2.07		
	LAV	First	615	11.93	2.48	-1.127	0.260
		Second	170	12.17	2.32		
	PAP	First	615	11.82	2.35	-0.055	0.956
		Second	170	11.83	2.67		
	PAV	First	615	11.51	2.86	-0.148	0.882
		Second	170	11.55	3.34		

According to the results in Table 4, all sub-dimension average scores of the Critical Thinking Tendency scale do not show a significant difference according to the education type of the students (p>0.05). Likewise, all of the Achievement Goal Orientation scale sub-dimension average scores do not show a significant difference according to the education type of the students (p>0.05).

The findings of the unrelated groups t-test, which was applied to determine whether there is a statistically significant difference in the scores of the scales in terms of the type of program they are studying, are given below.

Table 5. *CCTT and AGO scales t-test results according to the type of program studied*

	Sub-Factors	**Type of School**	**n**	**$\bar{x}$**	**ss.**	**t**	***p***
CCTT	Analyticity	VS	350	42.47	6.99	-0.409	0.683
		Faculty	435	42.68	7.30		
	Catholicity	VS	350	48.29	8.83	0.481	0.631
		Faculty	435	47.99	8.46		
	Curiosity	VS	350	38.34	7.21	-0.020	0.984
		Faculty	435	38.35	6.66		
	Trust yourself	VS	350	29.03	5.72	0.374	0.709
		Faculty	435	28.88	5.19		
	Searching for the Truth	VS	350	27.55	5.14	-0.836	0.403
		Faculty	435	27.88	5.60		
	Systematicity	VS	350	22.76	4.80	0.395	0.693
		Faculty	435	22.63	4.56		
AGO	LAP	VS	350	11.98	2.07	-2.256	**0.024***
		Faculty	435	12.33	2.19		
	LAV	VS	350	11.84	2.34	-1.474	0.141
		Faculty	435	12.10	2.53		
	PAP	VS	350	11.69	2.45	1.371	0.171
		Faculty	435	11.93	2.39		
	PAV	VS	350	11.35	3.05	-1.428	0.154
		Faculty	435	11.65	2.89		

***p<.05**

In line with the findings in Table 5, it can be said that all the sub-dimension average scores of the Critical Thinking Tendency scale do not show a significant difference according to the type of program the students are studying ($p>0.05$). On the other hand, the average score of the Learning/Approach sub-dimension of the Achievement Goal Orientation scale shows a significant difference according to the type of program students are studying ($p<0.05$). Accordingly, the average scores of the Learning/Approach sub-dimension of the students studying in the undergraduate program were found to be higher than the students studying in the associate degree program. It was determined that the mean scores of the other three sub-dimensions of the Achievement Goal Orientation scale did not show a significant difference according to the type of program they were studying ($p>0.05$).

The findings of the ANOVA test applied to determine whether the scores obtained by the participants from the scales differ statistically in terms of the grade level variable are presented in Table 6.

Table 6. *ANOVA test results of CCTT and AGO scales by grade level*

	Sub-Factors	**Class**	**n**	**$\bar{x}$**	**ss.**	**F**	***p***	**Difference Between Groups**
CCTT	Analyticity	1st Class	258	42.44	7.58	0.518	0.670	-
		2nd Class	307	42.46	7.30			
		3rd grade	143	43.25	6.55			
		4th Grade	77	42.31	6.23			
	Catholicity	1st Class	258	47.96	9.51	1.720	0.161	-
		2nd Class	307	48.80	8.08			
		3rd grade	143	47.87	8.25			
		4th Grade	77	46.42	8.17			
	Curiosity	1st Class	258	38.03	7.32	0.432	0.730	-
		2nd Class	307	38.60	7.02			
		3rd grade	143	38.55	6.70			
		4th Grade	77	37.99	5.33			
	Trust yourself	1st Class	258	28.56	5.83	0.821	0.483	-
		2nd Class	307	29.19	5.38			
		3rd grade	143	29.25	5.19			
		4th Grade	77	28.73	4.63			
	Searching for the truth	1st Class	258	27.75	5.59	2.187	0.088	-
		2nd Class	307	27.87	5.27			
		3rd grade	143	28.16	5.60			
		4th Grade	77	26.30	4.73			
	Systematicity	1st Class	258	22.55	4.87	2.641	**0.048**	**2>4**
		2nd Class	307	23.12	4.45			
		3rd grade	143	22.65	4.43			
		4th Grade	77	21.49	5.09			
AGO	LAP	1st Class	258	11.65	2.21	10.098	**0.000**	**2>1; 3>1; 4>1**
		2nd Class	307	12.23	2.13			
		3rd grade	143	12.61	2.06			
		4th Grade	77	12.86	1.71			
	LAV	1st Class	258	11.47	2.35	7.498	**0.000**	**2>1; 3>1; 4>1**
		2nd Class	307	12.12	2.53			
		3rd grade	143	12.19	2.58			
		4th Grade	77	12.79	1.79			
	PAP	1st Class	258	11.62	2.35	5.082	**0.002**	**3>1; 4>1; 3>2; 4>2**
		2nd Class	307	11.61	2.52			
		3rd grade	143	12.28	2.36			
		4th Grade	77	12.48	2.13			
	PAV	1st Class	258	11.25	2.71	5.849	**0.001**	**3>1; 4>1; 3>2; 4>2**
		2nd Class	307	11.25	3.24			
		3rd grade	143	12.05	2.77			
		4th Grade	77	12.48	2.72			

***p<.05**

Looking at Table 6; it is seen that the mean scores of university students from the "Systematicity" sub-dimension of the Critical Thinking Tendency scale differ statistically in terms of the grade level they continue their education ($p<0.05$). It was concluded that the mean scores of the students from the other five sub-dimensions of the Critical Thinking Tendency scale did not differ statistically significantly according to the grade level variable ($p>0.05$). It was found that there was a significant difference between the mean scores of university students in all sub-dimensions of the Achievement Goal Orientation scale in terms of the variable of the grade level they continue their education ($p<0.05$).

The results obtained from the ANOVA test applied to determine whether there is a significant difference in the scores of the students from the scales in terms of the economical situation variable are presented in Table 7 below.

Table 7. *ANOVA test results of CCTT and AGO scales by income level*

	Sub-Factors	**Economical situation**	**n**	**$\bar{x}$**	**ss.**	**F**	***p***	**Difference Between Groups**
CCTT	Analyticity	Very good	83	44.22	7.78	2.701	**0.045**	**1>3**
		Good	336	42.79	7.00			
		Middle	320	41.87	7.14			
		Low	46	43.09	6.85			
	Catholicity	Very good	83	50.05	9.25	5.175	**0.002**	**1>3; 2>3**
		Good	336	48.99	7.95			
		Middle	320	46.99	8.87			
		Low	46	46.22	9.29			
	Curiosity	Very good	83	40.34	7.24	4.222	**0.006**	**1>3**
		Good	336	38.66	7.10			
		Middle	320	37.49	6.65			
		Low	46	38.33	5.76			
	Trust yourself	Very good	83	29.87	6.01	2.649	**0.048**	**1>3; 2>3**
		Good	336	29.25	5.41			
		Middle	320	28.33	5.30			
		Low	46	29.41	5.13			
	Searching for the truth	Very good	83	28.75	6.14	3.772	**0.010**	**1>3; 2>3**
		Good	336	28.21	5.28			
		Middle	320	27.03	5.26			
		Low	46	27.33	5.38			
	Systematicity	Very good	83	23.63	5.28	3.068	**0.027**	**1>3; 1>4**
		Good	336	22.97	4.47			
		Middle	320	22.30	4.59			
		Low	46	21.63	5.07			
AGO	LAP	Very good	83	12.70	1.64	5.405	**0.001**	**1>3; 2>3**
		Good	336	12.33	1.97			
		Middle	320	11.83	2.27			
		Low	46	12.48	2.87			
	LAV	Very good	83	12.60	2.12	3.393	**0.018**	**1>3**
		Good	336	11.96	2.67			
		Middle	320	11.77	2.25			
		Low	46	12.52	2.45			

	PAP	Very good	83	12.05	2.29	1.849	0.137	-
		Good	336	11.92	2.36			
		Middle	320	11.60	2.48			
		Low	46	12.26	2.55			
	PAV	Very good	83	11.49	3.23	1.748	0.156	-
		Good	336	11.37	3.14			
		Middle	320	11.54	2.74			
		Low	46	12,43	2.67			

***p<.05**

In the findings in Table 7; it was determined that the mean scores of university students for all sub-dimensions of the Critical Thinking Tendency scale differed statistically significantly according to the variable of economic status ($p<0.05$). On the other hand, it was concluded that the scores of the students regarding the LAP and LAV sub-dimensions of the scale differed significantly according to the variable of economic status ($p<0.05$), but not in the other two sub-dimensions ($p>0.05$).

The results of the ANOVA test applied to determine whether there is a difference in the scores obtained from the participants included in the study in terms of the type of high school graduated are given in Table 8.

Table 8. *ANOVA test results of CCTT and AGO scales by type of high school graduated*

	Sub-Factors	**High School Graduation**	**n**	**$\bar{x}$**	**ss.**	**F**	***p***	**Difference Between Groups**
CCTT	Analyticity	1.Vocational	277	42.01	6.73	1.401	0.232	-
		2.Anatolia	439	42.90	7.46			
		3.İHS	28	44.46	5.82			
		4.Science	29	41.24	7.99			
		5.Other	12	43.08	5.58			
	Catholicity	1.Vocational	277	47.62	7.63	0.909	0.458	-
		2.Anatolia	439	48.44	9.26			
		3.İHS	28	49.61	8.34			
		4.Science	29	46.38	8.16			
		5.Other	12	49.00	7.48			
	Curiosity	1.Vocational	277	37.67	6.15	2.716	**0.029**	**2>4; 3>4**
		2.Anatolia	439	38.88	7.36			
		3.İHS	28	39.36	6.83			
		4.Science	29	35.52	6.64			
		5.Other	12	38.50	4.85			
	Trust yourself	1.Vocational	277	28.40	5.06	1.683	0.152	-
		2.Anatolia	439	29.37	5.64			
		3.İHS	28	29.07	6.00			
		4.Science	29	27.86	5.19			
		5.Other	12	28.58	4.40			
	Searching for the truth	1.Vocational	277	27.26	5.08	1.607	0.170	-
		2.Anatolia	439	27.94	5.59			
		3.İHS	28	28.71	4.94			
		4.Science	29	27.21	5.78			
		5.Other	12	30.17	4.99			
	Systematicity	1.Vocational	277	22.53	4.50	0.130	0.971	-

		2.Anatolia	439	22.78	4.62			
		3.İHS	28	22.82	5.58			
		4.Science	29	22.66	5.70			
		5.Other	12	22.75	5.99			
AGO	LAP	1.Vocational	277	12.23	1.89	1.045	0.383	-
		2.Anatolia	439	12.10	2.25			
		3.İHS	28	12.89	2.06			
		4.Science	29	11.97	2.61			
		5.Other	12	12.33	2.71			
	LAV	1.Vocational	277	11.94	2.26	0.600	0.663	-
		2.Anatolia	439	11.99	2.53			
		3.İHS	28	12.57	2.53			
		4.Science	29	12.07	2.49			
		5.Other	12	11.42	3.32			
	PAP	1.Vocational	277	11.93	2.37	1.429	0.222	-
		2.Anatolia	439	11.67	2.46			
		3.İHS	28	12.61	2.01			
		4.Science	29	12.07	2.34			
		5.Other	12	12.17	2.72			
	PAV	1.Vocational	277	11.36	3.06	2.667	**0.031**	**3>1; 3>2**
		2.Anatolia	439	11.49	2.98			
		3.İHS	28	13.25	1.67			
		4.Science	29	11.76	2.73			
		5.Other	12	11.67	2.31			

It was determined that the mean scores of the students' Critical Thinking Tendency scale "Curiosity" sub-dimension showed a significant difference according to the type of high school they graduated from ($p<0.05$). It was determined that the mean scores of the other five sub-dimensions of the Critical Thinking Tendency scale did not differ significantly according to the type of high school from which the students graduated ($p>0.05$). Considering the findings of the Achievement Goal Orientation scale, there was a significant difference only in the performance/avoidance sub-dimension average score according to the type of high school they graduated from ($p<0.05$), while the average scores of the learning/approach, learning/avoidance and performance/approach sub-dimensions were found to be significant. It was concluded that the students did not show a significant difference according to the type of high school they graduated from ($p>0.05$) (Table 8).

The results of the multiple regression analysis applied to determine whether the participants' critical thinking dispositions predict their achievement-goal orientations are presented in Table 9.

Table 9. *Multiple regression analysis results regarding the effect of CCTT scale sub-dimensions on AGO scale sub-dimensions*

Dependent variable	Independent variable	β	t	*p*	F	Model (*p*)	Adjusted R^2
Learning / Approach Goal Orientation	Constant	8.620	17.737	**0.000**	19.085	**0.000***	0.122
	Analyticity	-0.034	-2.239	**0.025**			
	Catholicity	0.022	1.534	0.125			
	Curiosity	0.080	4.702	**0.000**			
	Trust yourself	0.066	3.113	**0.002**			
	Searching for the Truth	0.010	0.479	0.632			
	Systematicity	-0.060	-3.004	**0.003**			
Learning / Avoidance Goal Orientation	Constant	7.685	13.835	**0.000**	18.729	**0.000***	0.126
	Analyticity	0.013	0.760	0.448			
	Catholicity	0.036	2.160	**0.031**			
	Curiosity	0.085	4.397	**0.000**			
	Trust yourself	0.052	2.152	**0.032**			
	Searching for the Truth	-0.037	-1.514	0.131			
	Systematicity	-0.077	-3.381	**0.001**			
Performance / Approach Goal Orientation	Constant	8.528	15.368	**0.000**	15.453	**0.000***	0.106
	Analyticity	-0.017	-0.992	0.322			
	Catholicity	0.042	2.565	**0.011**			
	Curiosity	0.058	3.005	**0.003**			
	Trust yourself	0.065	2.663	**0.008**			
	Searching for the Truth	0.009	0.374	0.709			
	Systematicity	-0.105	-4.635	**0.000**			
Performance / Avoidance Goal Orientation	Constant	7.105	10.705	**0.000**	23.274	**0.000***	0.152
	Analyticity	-0.027	-1.329	0.184			
	Catholicity	0.020	0.997	0.319			
	Curiosity	0.095	4.076	**0.000**			
	Trust yourself	0.137	4.697	**0.000**			
	Searching for the Truth	0.018	0.612	0.540			
	Systematicity	-0.152	-5.615	**0.000**			

***p<.05**

The regression analysis findings in Table 9 are as follows:

The multiple regression model, which was created to determine the effect of university students' learning/approach goal orientation from the sub-dimensions of critical thinking disposition, was determined to be statistically significant (F=19.085; p<0.05). According to the model, it was determined that the sub-dimensions of Curiosity and Self-Confidence, which are the sub-dimensions of critical thinking dispositions, had a positive effect on the learning/approach goal orientations of the students, while the Analyticity and Systematicity sub-dimensions had a statistically significant effect on the negative side (p<0.05). Open-mindedness and Searching for the Truth sub-dimensions, on the other hand, do not have a significant effect on university students' learning/approach

goal orientations (p>0.05). This established model explains the change in learning/approach goal orientation by approximately 12.2% (R2 =0.122).

It was concluded that the regression model created to test the effect of students' critical thinking disposition sub-dimension scores on learning/avoidance goal orientation was statistically significant (F=18.729; p<0.05). According to this model, the sub-dimensions of Open-Mindedness, Curiosity and Self-Confidence, which are the sub-dimensions of critical thinking dispositions, have a positive effect on students' learning/avoidance goal orientations, while the Systematicity sub-dimension has a negative effect (p<0.05). It was determined that the sub-dimensions of Analyticity and Truth Seeking did not have a statistically significant effect on students' learning/avoidance goal orientations (p>0.05). This established model explains the change in university students' learning/avoidance goal orientations at a rate of 12.6% (R2 =0.126).

The regression model established to determine the effect of the sub-dimension scores of critical thinking disposition on performance/approach goal orientation was found to be statistically significant (F=15.453; p<0.05). According to this model, it was found that the sub-dimensions of Open-Minded, Curiosity and Self-Confidence, which are the sub-dimensions of the critical thinking disposition of university students, had a positive effect on their performance/approach goal orientations, while the Systematicity sub-dimension had a negative significant effect on their performance/approach goal orientations (p). <0.05). It was determined that the sub-dimensions of Analyticity and Truth Seeking did not have a significant effect on the performance/approach goal orientations of university students (p>0.05). It was determined that the model created explained approximately 10.6% of the change in students' performance/approach goal orientations (R2 =0.106).

Finally, the multiple regression model created to determine the effect of university students' critical thinking disposition sub-dimension scores on performance/avoidance goal orientation was also found to be statistically significant (F=23.274; p<0.05). According to this model, Curiosity and Self-Confidence dimensions, which are sub-dimensions of critical thinking disposition, have a positive effect on students' performance/avoidance goal orientations, while the Systematicity sub-dimension has a negative effect (p<0.05). On the other hand, it was found that the sub-dimensions of Analyticity, Open-Minded, and Truth-Seeking did not have a significant effect on the performance/avoidance goal orientations of university students (p>0.05). In addition, the model explains the change in performance/avoidance goal orientation at a rate of about 15.2% (R2 =0.152).

4. Discussion, Conclusion and Recommendations

It was determined that the average scores of all the sub-dimensions of the critical thinking disposition scale did not show a significant difference according to the gender of

the students. There are many studies in the literature that support this study, in which it is concluded that gender does not have a decisive effect on students' critical thinking dispositions (Akar, 2007; Bayındır, 2015; Çetin, 2008; Eğmir & Ocak, 2017; Kawashima & Shiomi, 2007; Koçoğlu & Kanadlı, 2019; Korkmaz, 2009; Küçük & Uzun, 2013; Polat, 2017; Narin, 2009; Özcan, 2017; Salahshoor & Rafiee, 2016; Şen, 2009). However, it was observed that there were studies in which the finding that the gender variable had an effect on critical thinking was obtained. In the study conducted by Köksal and Çöğmen (2018), a significant difference was determined in favor of female students. Facione, Giancarlo, Facione, and Gainen (1995) found results in favor of female students in the open-mindedness sub-dimension of the scale and in favor of male students in the analytical thinking dimension. Again, in the studies conducted by Kökdemir (2003), Beşoluk and Önder (2010), Uluçınar (2012), Can and Kaymakçı (2015), Arslan (2022), a statistically significant difference was determined in favor of female students. In the studies conducted, it is seen that there are different findings, but in studies with a significant difference, this difference is predominantly in favor of female students. However, it can be stated that it is difficult to generalize about critical thinking dispositions in terms of gender (Doğanay, Taş, & Erden, 2007).

It was determined that the average scores of all sub-dimensions of the Achievement Goal Orientation scale did not differ significantly according to the gender of the students. In the study conducted by Arslan (2021), it was seen that female students scored higher in the performance avoidance orientation factor of the scale. This means that female students avoid exhibiting their performances more. In the study conducted by Küçükoğlu, Kaya, and Turan (2010) at the university level, a significant difference was found in favor of female students. Similar results were obtained in many studies in the literature (Akın, 2006; Altıparmak, 2015; Gözler, Bozgeyikli, & Avcı, 2017; Koç & Arslan, 2015; Toğluk, 2009; Arslan and Bardakçı, 2022). There are also studies in the literature with significant differences in favor of male students (Karakış, 2020; Odacı, Berber Çelik, & Çıkrıkçı, 2013). When the studies are evaluated in general, it can be thought that the success orientation of women is more positive than that of men.

It can be said that all of the sub-dimension average scores of the Critical Thinking Tendency scale do not show a significant difference according to the type of program students are studying. In the research findings of Can and Kaymakçı (2015), no significant difference was determined in the critical thinking dispositions of the students in terms of the type of program they study. In addition, Hamurcu, Günay, and Akamca (2005) reached similar findings. However, studies conducted by Kürüm (2002), Zayif (2008) and Uluçınar (2012) found that students' critical thinking dispositions differed significantly according to the type of program. Achievement Goal Orientation scale Learning/Approach sub-dimension average score shows a significant difference according to the type of program students are studying. Accordingly, the average scores of the Learning/Approach sub-dimension of the students studying in the undergraduate

program were found to be higher than the students studying in the associate degree program. It was determined that the average scores of the other three sub-dimensions of the Achievement Goal Orientation scale did not show a significant difference according to the type of program that the students studied. In the study conducted by Arslan (2021), it was observed that there was a significant difference in the achievement goal orientations of the students according to the type of program they were studying.

Achievement Goal Orientation scale differ significantly according to the grade level, in favor of the upper classes. eyes et al. (2017), it was concluded that the grade level variable made a significant difference on the achievement goal orientations of the students, in favor of the upper classes. There are other studies in the literature in which there are significant differences according to grade level (Aydın, Gürbüzoğlu Yalman, & Yel, 2014; Küçükoğlu et al, 2010; Arslan and Bardakçı, 2022).

It was determined that the mean scores of all sub-dimensions of the Critical Thinking Tendency scale showed a significant difference according to the income level of the students. On the other hand, while the average scores of the Learning/Approach and Learning/Avoidance sub-dimensions of the Achievement Goal Orientation scale differ significantly according to the income level of the students, the average scores of the Performance/Approach and Performance/Avoidance sub-dimensions do not show a significant difference according to the income level. In the study conducted by Arslan (2021), it was determined that there was a significant difference in the scores of the students in the sub-dimensions of approaching learning, avoiding learning and avoiding performance, in favor of students with good and moderate economic status.

It was determined that the average scores of the students' Critical Thinking Tendency scale "Curiosity" sub-dimension showed a significant difference according to the type of high school they graduated from, and this difference was in favor of the students who graduated from Anatolian high school. However, no significant difference was found in the other five sub-dimensions of the scale. In the studies conducted by Akar (2007), Çekiç (2007), Gülveren (2007), Zayif (2008), Şen (2009), Çekin (2013) Can and Kaymakçı (2015), it was concluded that the type of high school graduated from has no effect on students' critical thinking dispositions. has been reached. Although there is a significant difference in one dimension in this study, it is seen that there is no significant difference in the studies in the literature. These results can be interpreted as secondary education institutions generally do not have a decisive effect on students' critical thinking dispositions (Çekin, 2013). In this context, it is thought-provoking that secondary education institutions with different qualities do not have a distinctive effect in this context. In order for students to develop their critical thinking skills, it is necessary to provide school structures that enable them to be more active and participatory, discovering, researching, questioning, and becoming an individual (Can & Kaymakçı, 2015). When the findings related to the achievement goal orientation scale are taken into

account, there is a significant difference only in the performance/avoidance sub-dimension average score according to the type of high school from which the students graduated, while the average scores of the learning/approach, learning/avoidance and performance/approach sub-dimensions are based on the type of high school students graduated from. It was concluded that there was no significant difference between similar findings were obtained in the study conducted by Arslan (2021). There are other studies in the literature that have an effect on the achievement goal orientation of students (Arkan & Altunel, 2019; Berber & Eker, 2018; Vahapoğlu, 2013). In the study of İzci and Koç (2012), it was found that the type of high school graduated from does not affect students' achievement goal orientations.

The regression model established to test the university students' learning/approach goal orientation being affected by the critical thinking disposition sub-dimensions is statistically significant. According to the model, Curiosity and Self Confidence dimensions, which are sub-dimensions of critical thinking disposition, have a positive effect on students' learning/approach goal orientations, while Analyticity and Systematicity sub-dimensions have a negative effect. Open-Minded and Truth-Seeking sub-dimensions, on the other hand, do not have a significant effect on students' learning/approach goal orientations. This model explains about 12.2% of the change in learning/approach goal orientation. The regression model established to test the effect of students' critical thinking disposition sub-dimension scores on learning/avoidance goal orientation is statistically significant. According to this model, Open-Mindedness, Curiosity and Self-Confidence dimensions, which are sub-dimensions of critical thinking disposition, have a positive effect on students' learning/avoidance goal orientations, while the Systematicity sub-dimension has a negative effect. Analyticity and Truth-Seeking sub-dimensions, on the other hand, do not have a significant effect on students' learning/avoidance goal orientations. This model explains about 12.6% of the change in learning/avoidance goal orientation.

The regression model established to test the effect of critical thinking disposition sub-dimension scores on performance/approach goal orientation is also statistically significant. According to the model, Open-Mindedness, Curiosity and Self-Confidence dimensions, which are sub-dimensions of students' critical thinking disposition, have a positive effect on performance/approach goal orientations, and Systematicity sub-dimension has a negative significant effect on performance/approach goal orientations. Analyticity and Truth Seeking sub-dimensions do not have a significant effect on students' performance/approach goal orientations. The model in question explains the change in performance/approach goal orientation by approximately 10.6%. Finally, the regression model established to test the effect of students' critical thinking disposition sub-dimension scores on performance/avoidance goal orientation is statistically significant. According to this model, Curiosity and Self-Confidence dimensions, which are sub-dimensions of critical thinking disposition, have a positive effect on students'

performance/avoidance goal orientations, while Systematicity sub-dimension has a negative effect. On the other hand, the sub-dimensions of Analyticity, Open-Minded and Truth-Seeking do not have a significant effect on students' performance/avoidance goal orientations. In addition, the model explains the change in performance/avoidance goal orientation by approximately 15.2%. When evaluated in general, it is seen that students' critical thinking dispositions explain their achievement-goal orientations, their approach orientations in a positive way and their avoidance orientations in a negative way. In this context, it is seen that critical thinking disposition has a positive effect on positive achievement goal orientations. In the study conducted by Uluçınar (2012), it was determined that the critical thinking dispositions of university students explained 18% of the democratic values related to their education life. In the study conducted by Akar (2017), it was determined that students' critical thinking dispositions predicted 25% of their multiculturalism values.

Critical thinking skill has an important place among 21st century skills and forms the basis for the development of other cognitive skills. The development of critical thinking skills of students who continue their education at all different levels is not only a good wish, but also a reality that has taken its place in curricula. The increase in students' critical thinking skills will enable them to make correct inferences about the situation, away from being guided by all the information, facts and events they encounter not only in their academic life but also in their entire lives. In the literature, it is seen that there are studies for students at different levels (Akar, 2017; Bayındır, 2015; Demir & Aybek, 2014; Vahapoğlu, 2013), as well as studies for teachers (Arslan, 2022). It is thought that a teacher with advanced critical thinking skills will be more productive for his students at this point. However, in the research conducted in the literature, it was seen that the number of studies conducted for teachers was less when compared to the studies conducted with students. It is seen that increasing the number of studies for teachers will support the literature.

Studies can be conducted in which mixed research design is applied, which can provide an in-depth examination of the effects of different variables on students' critical thinking skills and achievement goal orientations and the reasons for this together. In this study, it was aimed to determine the level of explaining the critical thinking dispositions of university students and their achievement goal orientations. In future studies, the relationship between critical thinking dispositions and a different factor on learning can be investigated. In addition, a similar study can be done at different educational levels. It is thought that the studies of the researchers will be a source for both the researchers and the experts who prepare the curriculum.

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