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Investigation of Reasoning Styles and Causal Attributions for Success of Teacher Candidates

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Abstract

The aim of this research is to investigate reasoning styles and causal attributions for success of university students. The study is a quantitative study based on correlational survey model. The population of the study consists from 267 teacher candidates in Ondokuz Mayıs University. The sample was selected in terms of convenience sampling technique. The result shows that there is no significant difference among the sub-dimensions of causal attributions and reasoning styles except the metaphorical-deductive style of reasoning in terms of gender. Besides, the results show that there is no significant difference among the sub-dimensions of causal attributions and reasoning styles in terms of departments. The result shows that there is no significant difference among the sub-dimensions of causal attributions and reasoning styles in terms of students' most liked courses. The result of the test statistics about whether causal attributions and reasoning styles differ according to the object of their causal attributions shows that there is no significant difference among the sub-dimensions of causal attributions and reasoning styles except personal control and external control dimension in the causal attribution scale. According to test results, some dimensions of reasoning styles are correlated with causal attributions at a low level. Importance level of reasoning styles for causal attributions show that metaphorical-deductive reasoning style is the most important factor for causality focus, emprical dimension is the most significant dimension for external control, analogical inductive and hypothetical dimensions are the most important factors for personal control and hypothetical dimension is the most important factor for persistance dimension.

Keywords: *Reasoning Styles, Causal Attributions for success, Reasoning Skills*

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Öğretmen Adaylarının Akıl Yürütme Stillerinin ve Başarıya Dönük Nedensel Yüklemelerinin İncelenmesi

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Öz

Bu araştırmanın amacı öğretmen adaylarının akıl yürütme stilleri ve başarıya dönük nedensel yükleme biçimlerini incelemektir. Çalışma tarama çalışması modeline dayalı nicel bir çalışmadır. Araştırmanın evrenini Ondokuz Mayıs Üniversitesi'ndeki 267 öğretmen adayı oluşturmaktadır. Örnek, uygun örnekleme tekniği açısından seçilmiştir. Sonuçlar, nedensel yüklemelerin veakıl yürütme stillerinin alt boyutları arasında cinsiyet açısından metaforik-tümdengelimli akıl yürütme stili dışında anlamlı bir fark olmadığını göstermektedir. Ayrıca, nedensel yüklemeler ile akıl yürütme stilleri alt boyutları arasında bölümler arasında anlamlı bir fark bulunmamıştır. Sonuçlar, nedensel yüklemelerin ve akıl yürütme stillerinin alt boyutları arasında öğrencilerin en çok sevdiği dersler açısından anlamlı bir fark olmadığını göstermektedir. Nedensel yüklemelerin ve akıl yürütme stillerinin nedensel yüklemelerin nesnesine göre farklılık gösterip göstermediğine ilişkin test istatistiklerinin sonucu, nedensel yüklemelerin kişisel kontrol ve dış kontrol boyutu dışında diğer boyutlar arasında anlamlı bir fark olmadığını göstermektedir. Test sonuçlarına göre, akıl yürütme stillerinin bazı boyutları, düşük düzeydeki nedensel yüklemelerle ilişkilidir. Nedensel yüklemeler için akıl yürütme stillerinin önem düzeyi, metaforik-tümdengelimli akıl yürütme stilinin nedensellik odağı için en önemli faktör olduğunu, emprik boyutun dış kontrol için en önemli boyut olduğunu, analojik-tümevarumsal ve hipotetik akıl yürütme boyutlarının kişisel kontrol için en önemli boyut olduğunu, hipotetik akıl yürütme boyutunun, kalıcılık boyutu için en önemli faktör olduğunu göstermiştir.

Anahtar Kelimeler: *Akıl yürütme stilleri, başarıya dönük nedensel yüklemeler, akıl yürütme becerileri*

Introduction

Attributions can be defined as the perceptions or explanations of the person regarding or about things happening (Ickes and Laydon, 1976; Kelley and Michela, 1980). Individuals attribute limitless reasons to their supposed victories and shortcomings, which affect their future behavior. They can also cause different physiological and affective responses (Williams, Burden & Al-Baharna, 2001). The theory of attribution encompasses causal explanations provided by ordinary people for events. The attribution theorists hold the belief that causal attributions play a significant role in human behavior (Kelly & Michela, 1980). Therefore the theory of attribution has drawn numerous scholars' attention in almost three decades as a leading idea in education psychology (Weiner, 2000). For instance, Weiner's model (1979) proposes a three-dimensional taxonomy given as locus of causality (internal or external), stability (stable or unstable), and controllability (controllable or uncontrollable) (Weiner, 1986).

We investigated atributions in terms of locus of causality, the stability of cause, external control, and personal control dimensions based on the scale we used. The locus of causality in the scale we used refers to the direction of the attribution is related to whether the cause of the attribution is perceived as internal, personal, or external. Locus of cauality is linked to personal and environmental variables.(Koçyiğit, 2011, p.29). The stability of a cause in the scale we used refers to the belief whether the perceived state is permanent or changeable. The stability of a cause is related to whether that cause will change in the future. Therefore, hope (failure attributed to a variable cause) and hopelessness (failure attributed to something immutable) are related to perceived causal stability (Feshbach and Weiner, 1991). External control refers to the belief whether the state can be controllable or influeced by others or not. Personal control refers to the belief whether the state can be controllable or influeced by the person himself/herself or not. In this regard, personal control is similar to the locus of control dimension, but it distiguished itself by focusing on the will of the subject rather than objects. For example, Kelley & Michela (1980: 468) reports that success attributes are generally relatively internal and failure attributes are usually relatively external. This finding can be interpreted both based on locus of control and personal control by considering the focus on the object and the will of the subject.

The other dimension of this article is reasoning styles. A style of reasoning is a pattern of inferential relations that are used to select, interpret, and support evidence for scientific results or specific phenomena. The reasoning styles model is a model developed by Duran (2019) classifying reasoning skills in the context of styles. According to this model, there is an inference plane consists of four dimensions as representations, assumptions, resemblances, and appearances. There is also an organization ax for inductive and deductive reasoning. As mentioned above the intersection of three axes as perception, disposition and organization result in different reasoner types. The reasoner types are clustered mainly in two different planes where deduction and induction are the centers of those opposite planes (Duran and Mertol, 2019).

Altough the reasoning styles model is a new concept, there are similar researches relating learning styles to attributions (Koçyiğit, 2019) to argumentation dispositions (Altun, Bağ and Paliç, 2011) to thinking styles (Çelik, 2016). Hence, it is thought that it can be useful to study reasoning styles in the context of attibutions since they are conceptually related.

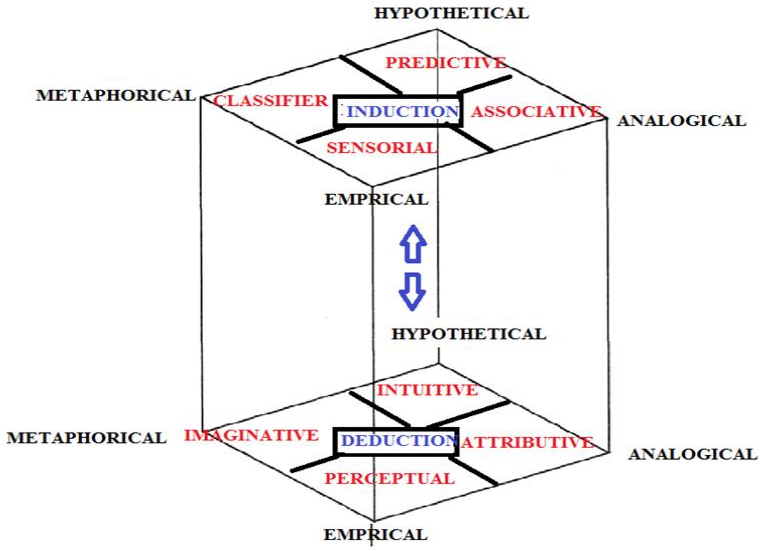

Figure 1. Reasoner Types According To Reasoning Styles Model (Duran and Mertol, 2019).

Method

Firstly, it should be indicated that we take the consent of ethical committee approval by Iğdır University as indicated in file number 44738881-200-E.722 on 26/06/2020. The study is a quantitative study based on correlational survey model. The Spearman correlation test was performed to investigate the relationship among the reasoning styles, and attributions. Mann Whitney-U test and Kruskal-Wallis were performed to investigate whether the reasoning styles, causal attributions differ according to gender, department, students' most liked course object of causal attribution. In the analysis of the data, artificial neural networks were also used. A neural network (NN) or an artificial neural network (ANN), on the other hand, is an inherently nonlinear classifier (Majumdar, 2018: 188-189). Therefore, it is aimed to investigate the relationships or importance levels of the reasoning styles and causal attributions through ANN. One might ask that can be done with some correlation analysis or other statistical methods. Indeed, it depends on the complexity of the structure of your data and the structure of. For instance, Güneri and Apaydın (2004) were performed artificial neural networks with logistic regression analysis to compare to identify the causes of students' failures and thus predict future failures. They found that the correct classification rate obtained from the artificial neural network was found to be equal to the correct classification rate obtained from the logistic regression method. Similar findings can be also reprted by Tepehan (2011). However, there is also researches literature favoring neural networks in this regard (Brown, 2007; Gonzalez and DesJardins, 2002; İbrahim ve Rusli, 2007; Lykourentzou et. all. 2009; Naik and Ragothaman, 2004; Schumacher et. all. 2010; Sujitparapitaya, 2006).

Population

The population of the study consists from 285 teacher candidates in Ondokuz Mayıs University. The sample was selected in terms of the convenience sampling technique. The sample group was chosen as the most available group of individuals in the 4'th grade students at Ondokuz Mayıs University. When the data are analyzed, 18 of 285 data are deleted and 267 data are

obtained after the elimantion of blank data and duplication data. The characteristics of the population in terms of gender and department can be given in Table 1.

Table 1.The characteristics of the population in terms of gender and department

gender * department Crosstabulation

Count

		Department				
		science and math	social science	language	arts and sports	Total
gender	Male	13	33	5	15	66
	female	24	98	27	52	201
Total		37	131	32	67	267

For correlational survey models, the number of sample size is taken into consideration as a result of the calculation made with the following formula (Tabachnick and Fidell, 2007):

N> 50 + 8m

N: Number of participants m: number of independent variables where m= 8 (4 independent variables from reasoning styles, 4 from causal attributions) N> 114 where The target sample size for this study is 267 which meets the requirement.

Measurement Tools

The causal dimension scale II developed by McAuley, Duncan, and Russell (1992) which is translated and adapted into Turkish by Koçyiğit (2011) was used in this study. Reasoning Styles Scale developed by Duran (2019) was used in order to examine the reasoning styles of the students.

Findings

Data needs to be cleared before analysis because duplication or unusual data will decrease the objectivity of the study. Therefore, firstly, whether duplication is observed in the data is examined. When the data are analyzed, 18 of 285 data are deleted and 267 data are obtained after the elimantion of blank data and duplication data. Before analyzing the data of 267 individuals participating in the research, the participants were not expected or deviated from the norms for each scale. Data screening method was performed in SPSS. Firstly, it is aimed to correct the lost data before analyzing the data. For this,

the lost data was compensated by using the serial average method. As a result of the loss data analysis, it was determined that the loss data was distributed randomly because the p value was greater than 0.05. The missing data are assigned according to the average of the series. o decide whether we should conduct parametric or non-parametric analysis, tests of normality were performed. According to Kolmogorov-Smirnov and Shapiro-Wilk tests as well as descriptive values, the data was found to be not normally distributed, hence non-parametric tests were performed.

The Result of the Test Statistics About Whether Causal Attributions and Reasoning Styles Differ According to Gender Variable

The result shows that there is no significant difference among the sub-dimensions of causal attributions and reasoning styles except metaphorical-deductive style of reasoning (Table 2). The significant difference in metaphorical-deductive reasoning styles show that this difference in favour of females in terms of their mean values (140, 72>113,53).

Table 2. Mann-Whitney U Test Result in Terms of Gender.

Test Statistics[a]								
	locus of causality	external-contral	perso-nalcont-rol	persiss-tance	metapho-ricalde-ductive	empiri-cal	analogica-linductive	hypothetical
Mann-Whitney U	6626,500	5987,500	6077,500	6517,000	5282,000	5816,000	6319,500	6629,000
Wilcoxon W	26927,500	26288,500	8288,500	8728,000	7493,000	8027,000	26620,500	8840,000
Z	-,012	-1,187	-1,024	-,213	-2,513	-1,517	-,580	-,007
Asymp. Sig. (2-tailed)	,990	,235	,306	,831	,012	,129	,562	,994
a. Grouping Variable: gender								

The Result of the Test Statistics About Whether Causal Attributions and Reasoning Styles Differ According to Department Variable

The result shows that there is no significant difference among the sub-dimensions of causal attributions and reasoning styles (Table 3). It means that both reasoning styles and causal attributions are independent of whether students are in the science and math department, social science department, language deparment, or sports and art departments.

Table 3. Kruskal-Wallis Test Result in Terms of Department.

Test Statistics[a,b]								
	locus of causality	external-contral	personal-control	persisstance	metaphoricalde-ductive	empirical	analogica-linductive	hypothetical
Kruskal-Wallis H	2,673	5,966	4,459	2,532	5,928	1,817	6,915	3,511
df	3	3	3	3	3	3	3	3
Asymp. Sig.	,445	,113	,216	,469	,115	,611	,075	,319
a. Kruskal Wallis Test								
b. Grouping Variable: department								

The Result of the Test Statistics About Whether Causal Attributions and Reasoning Styles Differ According to Most Liked Course Variable

The result shows that there is no significant difference among the sub-dimensions of causal attributions and reasoning styles (Table 4.). It means that both reasoning styles and causal attributions are independent of their most liked course.

Table 4. Kruskal-Wallis Test Result in Terms of Students' Most Liked Course.

Test Statistics[a,b]								
	locus of causality	external-contral	personal-control	persisstance	metaphorical-deductive	empirical	analogica-linductive	hypothetical
Kruskal-Wallis H	11,201	6,705	10,663	4,632	4,090	5,737	6,095	5,564
df	5	5	5	5	5	5	5	5
Asymp. Sig.	,048	,243	,058	,462	,537	,333	,297	,351
a. Kruskal Wallis Test								
b. Grouping Variable: mostlikedcourse								

The Result of the Test Statistics About Whether Causal Attributions and Reasoning Styles Differ According to Object Of Causal Attribution

The result shows that there is no significant difference among the sub-dimensions of causal attributions and reasoning styles except personal control and external control dimension in the causal attribution scale (Table 5). It means that both reasoning styles and causal attributions are independent of the object of causal attribution except for personal control and external control.

Table 5. Kruskal-Wallis Test Result in Terms of Students' Object of Causal Attribution

Test Statistics[a,b]								
	locus of causality	external-contral	Perso-nalcont-rol	persiss-tance	metapho-ricalde-ductive	empiri-cal	analogi-calin-ductive	hypothetical
Kruskal-Wallis H	19,224	31,090	27,538	12,277	11,894	13,498	9,444	9,942
df	11	11	11	11	11	11	11	11
Asymp. Sig.	,057	,001	,004	,343	,372	,262	,581	,536
a. Kruskal Wallis Test								
b. Grouping Variable: casualattribution								

When examining the mean ranks of the external control and personal control dimensions, it seems that the main differences in external control dimension from reading and ability dimensions but the number of participants are so scarce hence it can be negligible. A similar interpretation can be made about the personal control dimension, it seems that the number of individuals stating reading, the obligation to homeworks are scarce except loving to the teacher and none dimensions. Hence loving the teacher can be regarded as factor as well as "none" option.

Table 6. Mean Ranks of The Students in terms of External Control and Personal Contraol According to Their Object of Causal Attribution

Ranks	casualattribution	N	Mean Rank
externalcontrol	Time	1	110,50
	hardworking	60	133,73
	Reading	**3**	**94,67**
	interest in course	69	112,59
	curiosity	7	110,29
	obligation to do homeworks	3	126,17
	loving the teacher	29	192,10
	Ability	**2**	**48,50**
	None	11	141,55
	easy course	26	164,92
	personal characteristic	34	124,04
	Loving	22	123,16
	Total	267	
personalcontrol	Time	1	244,50
	hardworking	60	145,46
	Reading	**3**	**91,17**
	interest in course	69	140,72
	curiosity	7	180,57
	obligation to do homeworks	**3**	**96,17**
	loving the teacher	**29**	**87,81**
	Ability	2	184,50
	None	**11**	**94,55**
	easy course	26	114,81
	personal characteristic	34	138,50
	Loving	22	164,59
	Total	267	

The Result of the Test Statistics about Whether the Correllation Between Causal Attributions and Reasoning Styles as well as Neural Netwok Analysis

The result of the test statistics about whether the correllation between causal attributions and reasoning styles is given in Table 7.According to test results causality, focus sub-dimension is only significantly correlated analogical-inductive dimension at a low level. No correlation is found among the sub-dimensions of reasoning styles withh external control dimension. Personal control sub-dimension is significantly correlated with all sub-dimensions of reasoning styles at low level. Persistance sub-dimension is correlated with only sub-dimensions of analogical-inductive and hypothetica sub-dimensions of reasoning styles at low level.

Table 7. The Result of The Test Statistics About Whether the Correlation Between Causal Attributions and Reasoning Styles

		metaphoricaldeductive	empirical	Analogicalinductive	hypothetical
locus of causality	Correlation Coefficient	,112	,101	**,181****	,112
	Sig. (2-tailed)	,068	,101	,003	,067
	N	267	267	267	267
externalcontral	Correlation Coefficient	,077	,098	,040	,117
	Sig. (2-tailed)	,211	,109	,514	,057
	N	267	267	267	267
personalcontrol	Correlation Coefficient	**,129***	**,123***	**,186****	**,165****
	Sig. (2-tailed)	,035	,044	,002	,007
	N	267	267	267	267
persistance	Correlation Coefficient	,152*	,125*	**,165****	**,181****
	Sig. (2-tailed)	,013	,042	,007	,003
	N	267	267	267	267

Neural Network Analysis for the causal attributions sub-dimensions
Neural Network Analysis for the External Control Sub-Dimension

Case process summary of the neural network analysis for the external control sub-dimension can be given as in Table 8.

Table 8. Case Process Summary of The Neural Network Analysis for the External Control Sub-Dimension

Case Processing Summary			
		N	Percent
Sample	Training	196	73,4%
	Testing	71	26,6%
Valid		267	100,0%
Excluded		0	
Total		267	

Neural network structure of the neural network analysis for the external control sub-dimension can be given as in Figure 2.

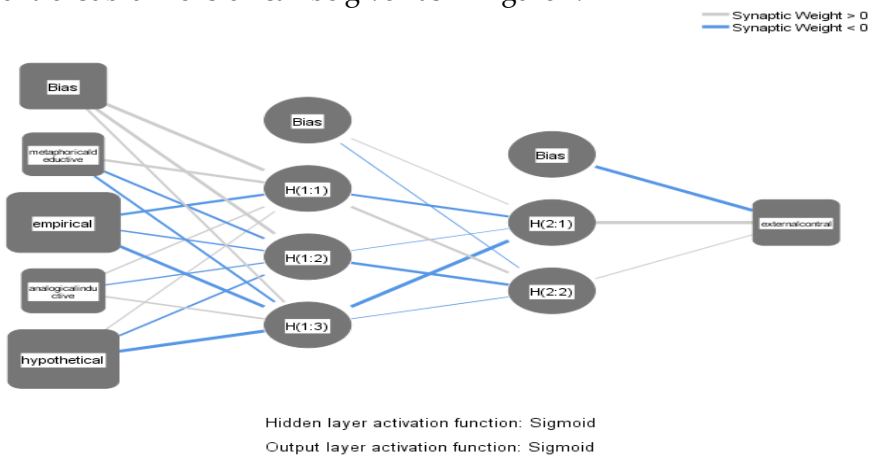

Figure 2. Neural Network Structure of The Neural Network Analysis for The External Control Sub-Dimension

Model summary of the neural network analysis for the external control sub-dimension can be given as in Table 3.9.

Table 9. Model Process Summary of The Neural Network Analysis for the External Control Sub-Dimension

Model Summary		
Training	Sum of Squares Error	7,060
	Relative Error	,992
	Stopping Rule Used	1 consecutive step(s) with no decrease in error[a]
	Training Time	0:00:00,06
Testing	Sum of Squares Error	2,709
	Relative Error	,988
Dependent Variable: externalcontral		
a. Error computations are based on the testing sample.		

Independent variable importance shows that most important factor for external control sub-dimension is empirical dimension (100,0%) and the second one is hypothetical dimension (95,5%). The third one is the analogical-inductive dimension (43,9%) the fourth one is the metaphorical-deductive dimension (39,9%) as given in Figure 3.

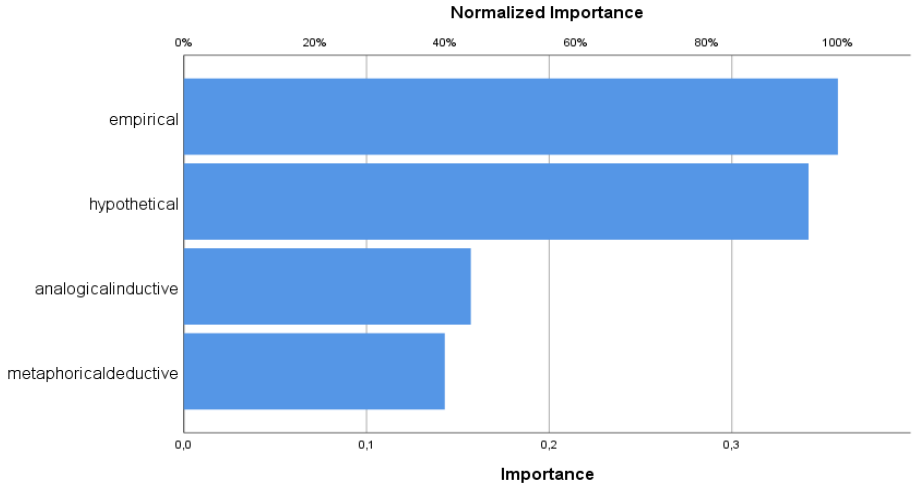

Figure 3. Independent Variable Importance for External Control Sub-Dimension

Neural Network Analysis for the Causality Focus Sub-Dimension

Case process summary of the neural network analysis for the causality focus sub-dimension can be given as in Table 10.

Table 10. Case Process Summary of the Neural Network Analysis for the Causality Focus Sub-Dimension

Case Processing Summary			
		N	Percent
Sample	Training	181	67,8%
	Testing	86	32,2%
Valid		267	100,0%
Excluded		0	
Total		267	

Neural network structure of the neural network analysis for the causality focus sub-dimension can be given as in Figure 4.

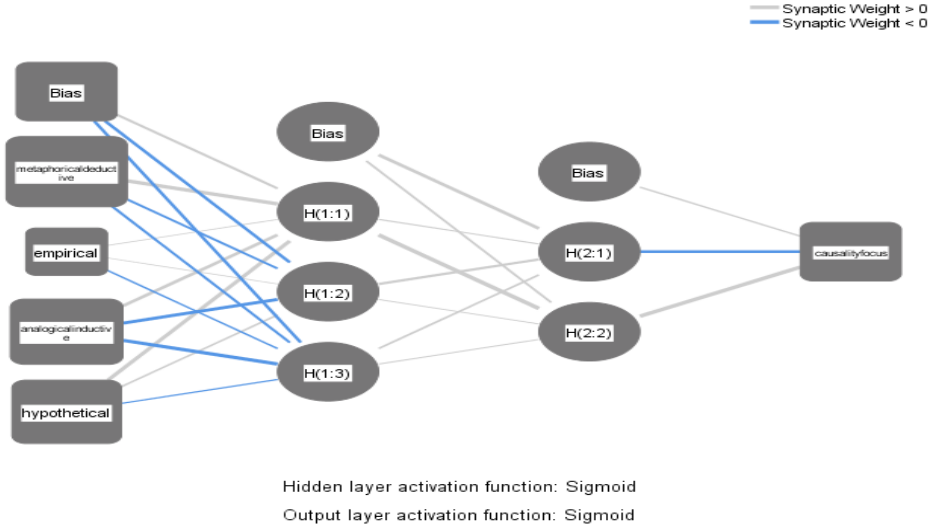

Figure 4. Neural Network Structure of The Neural Network Analysis for The Causality Focus Sub-Dimension

Model summary of the neural network analysis for the causality focus sub-dimension can be given as in Table 11.

Table 11. Model Summary of the Neural Network Analysis for the Causality Focus Sub-Dimension

Model Summary		
Training	Sum of Squares Error	7,022
	Relative Error	,986
	Stopping Rule Used	1 consecutive step(s) with no decrease in error[a]
	Training Time	0:00:00,07
Testing	Sum of Squares Error	3,407
	Relative Error	,994
Dependent Variable: locus of causality		
a. Error computations are based on the testing sample.		

Independent variable importance shows that most important factor for causality focus sub-dimension is metaphorical-deductive (100,0%) and the se-

cond one is analogical-inductive dimension (79,0%). The third one is hypothetical dimension (70,8%) the fourth one is empirical dimension (2,0%) as given Figure 5.

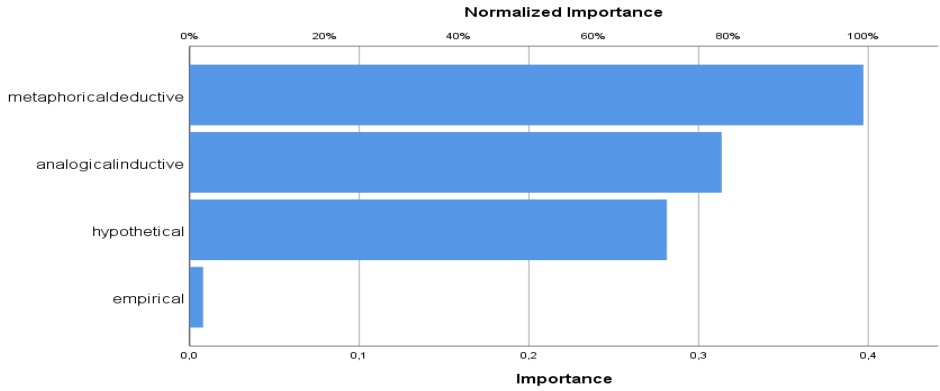

Figure 5. Independent Variable Importance for Causality Focus Sub-Dimension

Neural Network Analysis for the Personal Control Sub-Dimension

Case process summary of the neural network analysis for the personal control sub-dimension can be given as in Table 12

Table 12. Case Process Summary of The Neural Network Analysis for the Personal Control Sub-Dimension

Case Processing Summary			
		N	Percent
Sample	Training	180	67,4%
	Testing	87	32,6%
Valid		267	100,0%
Excluded		0	
Total		267	

Neural network structure of the neural network analysis for the personal control sub-dimension can be given as in Figure 6.

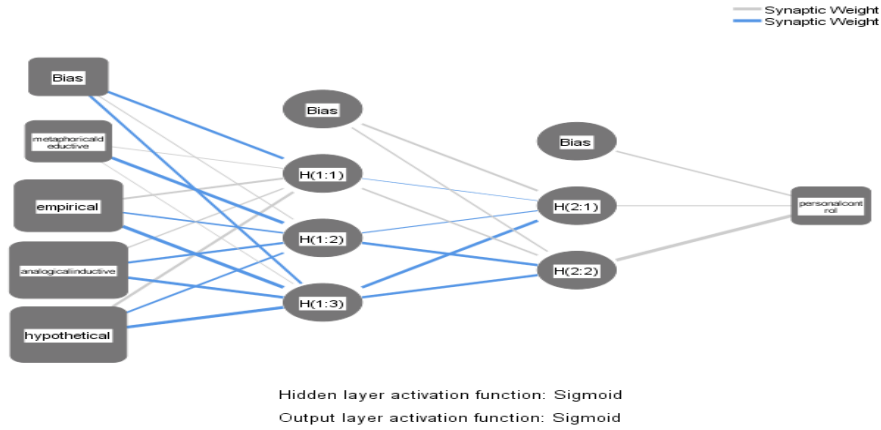

Figure 6. Neural Network Structure of The Neural Network Analysis for the Personal Control Sub-Dimension

Model summary of the neural network analysis for the personal control sub-dimension can be given as in Table 13.

Table 3.13. Model Summary of the Neural Network Analysis for the Personal Control Sub-Dimension

Model Summary		
Training	Sum of Squares Error	7,955
	Relative Error	,987
	Stopping Rule Used	1 consecutive step(s) with no decrease in error[a]
	Training Time	0:00:00,13
Testing	Sum of Squares Error	4,217
	Relative Error	,999
Dependent Variable: personalcontrol		
a. Error computations are based on the testing sample.		

Independent variable importance shows that most important factor for personal control sub-dimension is analogical-inductive dimension (100,0%) and the second one is hypothetical dimension (97,7%). The third one is the empirical dimension (87,3%) the fourth one is the metaphorical-deductive dimension (59,5%) as given in Figure 3.6.

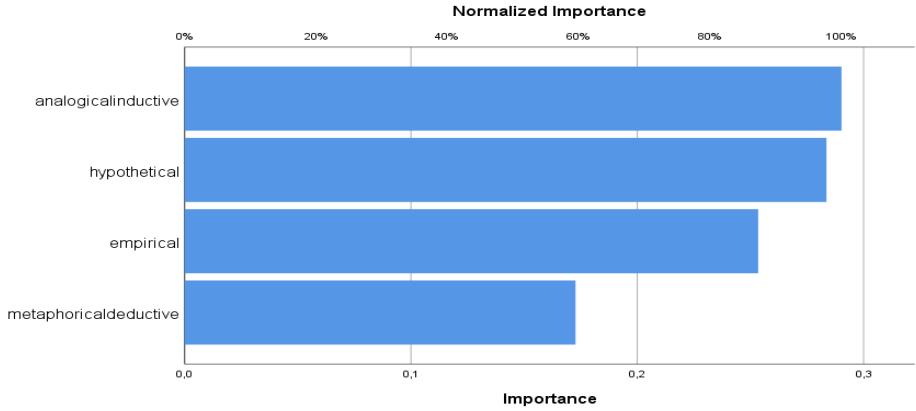

Figure 7. Independent Variable Importance for Personal Control Sub-Dimension

Neural Network Analysis for the Persitance Sub-Dimension

Case process summary of the neural network analysis for the persistance sub-dimension can be given as in Table 14.

Table 14. Case Process Summary of the Neural Network Analysis for the Persistance Sub-Dimension

Case Processing Summary			
		N	Percent
Sample	Training	183	68,5%
	Testing	84	31,5%
Valid		267	100,0%
Excluded		0	
Total		267	

Neural network structure of the neural network analysis for the persistance sub-dimension can be given as in Figure 8.

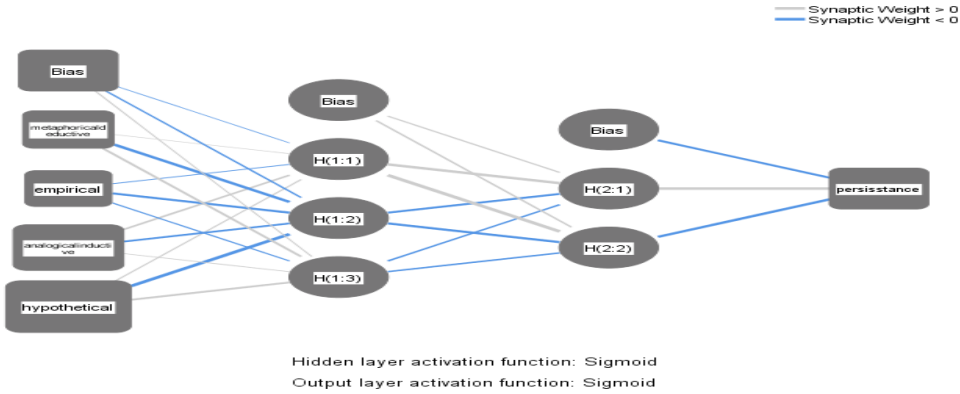

Figure 8. Neural Network Structure of the Neural Network Analysis for the Persistance Sub-Dimension

Model summary of the neural network analysis for the persistance sub-dimension can be given as in Table 15.

Table 15. Model Summary of the Neural Network Analysis for the Persistance Sub-Dimension.

Model Summary		
Training	Sum of Squares Error	5,418
	Relative Error	,953
	Stopping Rule Used	1 consecutive step(s) with no decrease in error[a]
	Training Time	0:00:00,13
Testing	Sum of Squares Error	2,754
	Relative Error	1,011
Dependent Variable: persisstance		
a. Error computations are based on the testing sample.		

Independent variable importance shows that most important factor for persistance sub-dimension is hypothetical dimension (100,0%) and the second one is analogical inductive dimension (71,6%). The third one is metaphorical-deductive dimension (34,1%) the fourth one is empirical dimension (26,2%) as given Figure 3.8.

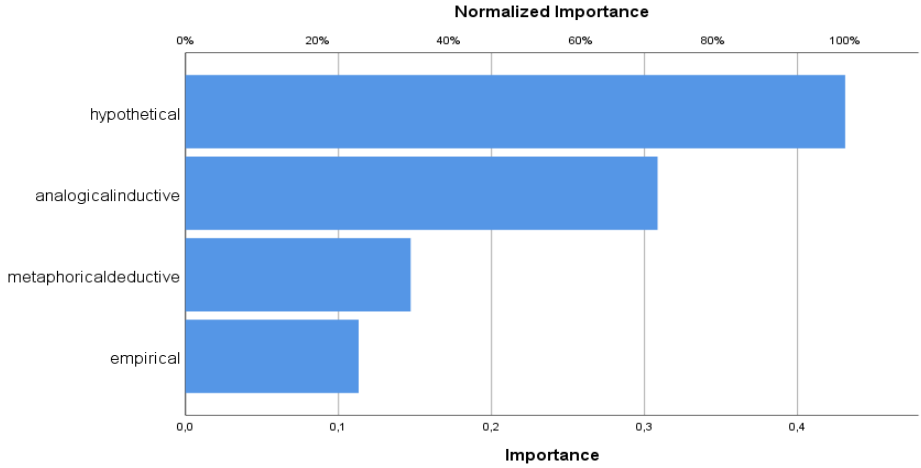

Figure 9. Independent Variable Importance for Persistance Sub-Dimension

General Examination of The Reasoning Styles in Terms of Causal Attributions

Case process summary of the neural network analysis for overall of reasoning styles for all causal atributions can be given as in Table 16.

Table 16. Case Process Summary of the Neural Network Analysis for Overall of Reasoning Styles for All Causal Atributions

Case Processing Summary			
		N	Percent
Sample	Training	181	67,8%
	Testing	86	32,2%
Valid		267	100,0%
Excluded		0	
Total		267	

Neural network structure of the neural network analysis for overall of reasoning styles for all causal atributions can be given as in Figure 10

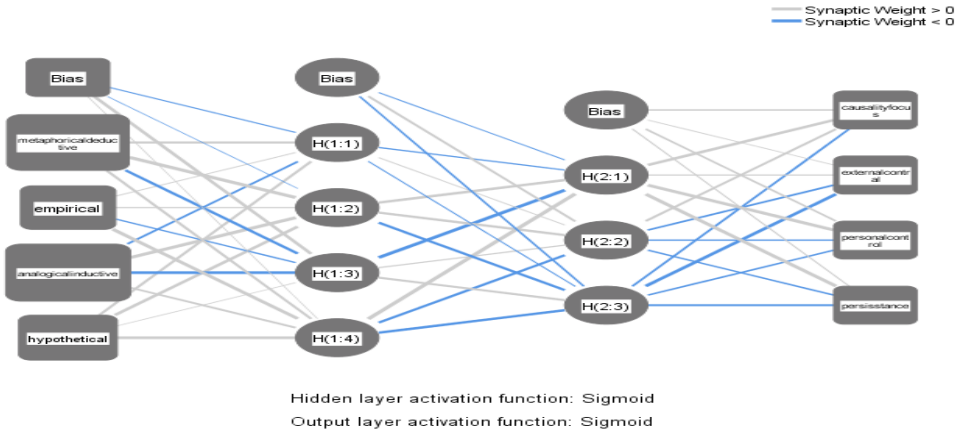

Figure 10. Neural Network Structure of The Neural Network Analysis for Overall of Reasoning Styles for All Causal Atributions

Model summary of the neural network analysis for overall of reasoning styles for all causal atributions can be given as in Table 17.

Table 17. Model Summary of The Neural Network Analysis for Overall of Reasoning Styles for All Causal Atributions.

Model Summary			
Training	Sum of Squares Error		27,369
	Average Overall Relative Error		,983
	Relative Error for Scale Dependents	locus of causality	,991
		externalcontral	,985
		personalcontrol	,984
		persisstance	,971
	Stopping Rule Used		1 consecutive step(s) with no decrease in error[a]
	Training Time		0:00:00,04
Testing	Sum of Squares Error		13,279
	Average Overall Relative Error		,993
	Relative Error for Scale Dependents	locus of causality	,993
		externalcontral	1,008
		personalcontrol	,972
		persisstance	1,008

a. Error computations are based on the testing sample.

Independent variable importance shows that most important factor for overall of reasoning styles for all causal atributions is anaogical-inductive dimension (100,0%) and the second one is metaphorical-deductive dimension (96,9%). The third one is hypothetical dimension (68,2,1%) the fourth one is empirical dimension (64,3%) as given Figure 11

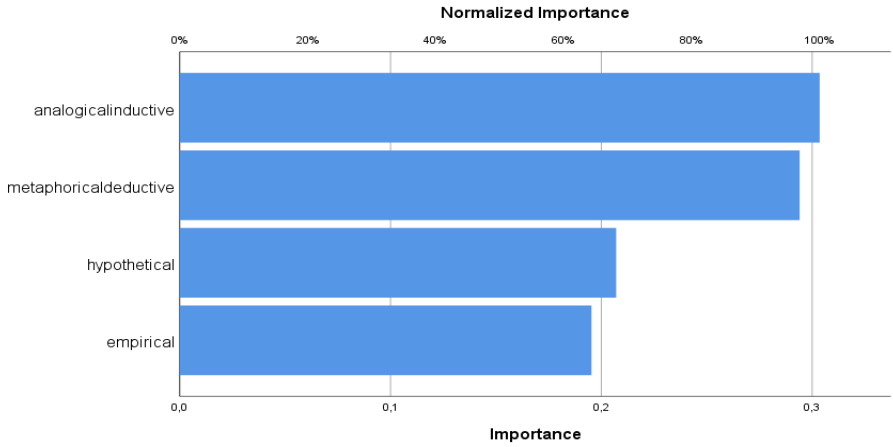

Figure 11. Independent Variable Importance for Overall of Reasoning Styles for All Causal Atributions

Discussion and Conclusion

The result of the test statistics shows that there is no significant difference among the sub-dimensions of causal attributions and reasoning styles except metaphorical-deductive style of reasoning. The significant difference in metaphorical-deductive reasoning styles show that this difference in favour of females in terms of their mean values. Can (2005) found significant differences in favour of females in terms of causal attributions. Similarly Kızgın and Dalgın 2012) and Özkardeş (2011) found significant differences in terms of gender. However, Campbell ve Henry (1999) found no significant difference in their population. Koçyiğit (2011) found no significant differences in terms of causal attributions for success except for locus of causality which significantly differs in favor of females. In terms of reasoning styles, Duran (2019) found no significant differences in reasoning styles except the empirical dimension. Duran and Mertol (2019) found no significant difference according to gender also. In the Duran, Barut, Bayram (2017), they found that reasoning

styles related do not differ by gender except for certain items. Turğut, Yenilmez and Uygan (2013) found that primary and secondary school mathematics teacher candidates' opinions about proof do not differ according to their gender. As it can be seen there is no common directon whether causal attributions and reasoning styles differ according to gender. Therefore, it can be argued that gender variable can be regarded as population dependent that is it is somehow related and changed according to sample characteristics. This might occur because different sampling techniques are used to select sample and population.

The result of the test statistics shows that both reasoning styles and causal attributions are independent of the branch of the students, social science department, language deparment or sports and art departments. Duran (2019) found similar findings that reasoning styles doesn't significantly differ in terms of departments. Similar findings are found in the studies related to similar subject with reasoning styles. Kurban (2015) found that the rational decision-making styles of school administrators (Principal and Deputy Principal) did not differ significantly at the level of 0.05 in terms of branches. In the study of decision making and thinking styles by Scutt and Bruce (1995),they did not find a significant difference between the branches. Perkins et al. (1991) concluded that the argumentation and reasoning created by students in different classes, at different levels of cognitive ability, is independent of the level of field knowledge. Ülker (2017) found that the levels of using logical / systematic decision-making styles did not differ statistically significantly according to the condition of doing sports. As can be seen, rational reasoning style does not differ in samples with similar demographic characteristics. It can be argued that reasoning styles doesn't significantly vary according to departments. Similar conclusions can be made for causal attibutions as well. Koçyiğit (2011) and Kızgın and Dalgın 2012) found no significant differences in terms of causal attributions for success according to faculty of the students.

The result of the test statistics that both reasoning styles and causal attributions are independent of their most liked course. It should be noted that this is contrary to attribution theory because according to the atribution theory, the tendency to undertake or avoid tasks that require success depends on what individuals think about their past life experiences and how they perceive and interpret these experiences (Arık, 1996: 316-317). However, it should be highlighted what we analyze is not compare the most liked courses of

students in their personal life but is to compare the results of students in terms of their most liked courses just as their departments. Therefore, it is natural expect that such a significant difference wasn't seen in their results. It means that all most liked course are alike in terms of their attributions.

The result of the test statistics shows that both reasoning styles and causal attributions are independent of the object of causal attribution except for personal control and external control. When examining the mean ranks of the external control and personal control dimensions, it seems that the main differences in external control dimension from reading and ability dimensions but the number of participants are so scarce hence it can be negligible. Similar interpretation can be made about the personal control dimension, it seems that the number of individuals stating reading, obligation to homeworks are scarce except loving to the teacher and none dimensions. Hence loving the teacher can be regarded as factor as well as "none" option. Therefore, the role of teacher might be an effective in personal control dimension.

Spearman correlation results are given in Table 4.1 by underying the crossections of relevant dimensions. According to test results causality focus subdimension is only significantly correlated analogical-inductive dimension at low level. This can be inferred as the cause of the attribution might be perceived based on analogical-inductive reasoning. No correlation is found among the sub-dimensions of reasoning styles with external control dimension. Personal control sub-dimension is significantly correlated with all sub-dimensions of reasoning styles at low level. It means that all reasoning styles can be related personal control to some extend. Persistance sub-dimension is correlated with only sub-dimensions of analogical-inductive and hypothetical subdimensions of reasoning styles at low level.This also implies those reasoning styles are more preferred fort his attribution style.

Table 18. Importance Level of Reasoning Styles for Causal Attributions

	Causality Focus	External Control	Personal Control	Persistance	Overall
Metaphorical	**100,0%**	39,9%	59,5%	34,1%	**96,9%**
Deductive					
Empirical	2,0%	**100,0%**	87,3%	26,2%	64,3%
Analogical	79,0%	43,9%	**100,0%**	71,6%	**100,0%**
Inductive					
Hypothetical	70,8%	95,5%	**97,7%**	**100,0%**	68,2%

Importance level of reasoning styles for causal attributions show that metaphorical-deductive reasoning style is the most important factor for causality focus, emprical dimension is the most significant dimension for external control, analogical inductive and hypothetical dimensions are the most important factors for personal control and hypothetical dimension is the most important factor for persistance dimension.

References

Altun, E. Bağ, H., and Paliç, G. (2011). İlköğretim öğrencilerinin öğrenme stilleri ile tartışma eğilimleri arasındaki ilişkinin incelenmesi. *2 nd International Conference on New Trends in Education and Their Implications*. 1917-1924.

Brown, J.D. (2007). *Neural network prediction of math and reading proficiency as reported in the educational longitudinal study: 2002 based on non-curricular variables*. Doctoral Thesis, Duquesne University, Pennsylvania, ABD. (ProQuest Digital Document ID: 1467886041).

Çelik, D. (2016). *11. sınıf öğrencilerinin düşünme stilleri, öğrenme stratejileri ve düşünme stilleri ile öğrenme stratejileri arasındaki ilişki*, Yayımlanmamış Yüksek Lisans Tezi, https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp retrieved from 07.07.20

Duran, V. and Mertol, H. (2019). Investigation of the reasoning styles of the teacher candidates in terms of decision making styles, learning modalities and gender: Süleyman Demirel University Education Faculty Case. *European Journal of Contemporary Education*, *8*(3), 489-505 2019.

Duran.V., Barut. Y., and Bayram. A. (2017). Öğretmen adaylarının mekan algılarının akıl yürütme stilleri açısından incelenmesi. *Toplumsal Cinsiyet ve Kent-Mekan-Sempozyumu Bildiriler Kitabı*. İçinde (s.510). TMMOB Şehir Plancıları Odası. Kadın Komisyonu.

Duran, V. (2019). *Investigations of reasoning styles, cognitive distortions and critical thinking tendencies of teacher candidates: Ondokuz Mayıs University Faculty of Education sample.* Unpublished Doctoral Dissertation, https://tez.yok.gov.tr/ retrieved from 08.07.2020

Gonzalez, J.M.B. and DesJardins, S.L. (2002). Artificial neural networks: A new approach to predicting application behavior. *Research in Higher Education*, *43*(2), 235-258.

Güneri, N. and Apaydın, A. (2004). Öğrenci başarılarının sınıflandırılmasında lojistik regresyon analizi ve sinir ağları yaklaşımı. *Ticaret ve Turizm Eğitim Fakültesi Dergisi*, 1, 170-188.

Feshbach, S., Weiner, B. (1991). Personality (3. Baskı). Heath and Company *Psychology Bulletin 18* (5), 566-573. A.B.D.: D. C

Ickes, W., and Layden, M. (1976). Attributional styles. In J. Harvey (Eds.), *New directions in attribution research*, (p. 119-152). Hillsdale, NJ: Erlbaum

İbrahim, Z. and Rusli, D. (2007). *Predicting students' academic performance: comparing neural network, decision tree and linear regression*. 21ST Annual SAS Malasia Forum, Kuala Lumpur, Malezya.

Kelley H.H., and Michela, J.L. (1980). Attribution theory and research. In M.R. Rosenzweig & L.W. Porter (Eds.), *Annual review of psychology* (Vol.31, p.457-501). Palo Alto, California: Annual Reviews.

Kızgın, Y. and Dalgın, T. (2012). Atfetme teorisi: Öğrencilerin bağarı ve bağarısızlıklarını değerlendirmedeki atfetme farklılıkları. *ZKU Journal of Social Sciences*, *8* (15), 61-78.

Koçyiğit, M. (2011*). Üniversite öğrencilerinin nedensel yüklemeleri ve öğrenme stilleri,* Yayımlanmamış Yüksek Lisans Tezi, https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp retrieved from 07.07.20

Kurban, C. (2015). *Bireysel algılarına göre okul yöneticilerinin karar verme stilleri.* Yüksek Lisans Tezi. https://tez.yok.gov.tr sayfasından erişilmiştir.

Lykourentzou, I., Giannoukos, I., Mpardis, G., Nikolopoulos, V. and Loumos, V. (2009). Early and dynamic student achievement prediction in e-learning courses using neural networks. *Journal of The American Society for Information Science and Technology*, *60* (2), 372-380.

Majumdar, K. (2018). *A brief survey of quantitative EEG*. USA: CRC Press.

McAuley, E., Duncan, T. E., and Russell, D. W. (1992). Measuring causal attributions: The revised Causal Dimension Scale (CDSII). *Personality and Social Psychology Bulletin, 18*(5), 566–573. https://doi.org/10.1177/0146167292185006

Naik, B. ve Ragothaman, S. (2004). Using neural networks to predict mba student success. *College Student Journal*, *38* (1), 143-149.

Özkardeş, A. (2011). *Achievement attributions of preparatory class learners at the School of Foreign Languages at Pamukkale University for their success or failure in learning English.* Yayımlanmamış Yüksek Lisans Tezi, https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp retrieved from 07.07.20

Perkins, D. N., Farady, M., and Bushey, B. (1991). Everyday reasoning and the roots of intelligence. In J.F. Voss, D.N. Perkins, & J.W. Segal (Eds.), *İnformal reasoning and education* (p. 83-105). Hillsdale, NJ: Erlbaum.

Schumacher, P., Olinsky, A, Quinn, J. and Smith, R. (2010). A comparison of logistic regression, neural networks, and classification trees predicting success of actuarial students. *Journal of Education for Business*, 85, 258-263.

Scott, S.G., and Bruce, R.A. (1995), Decision-making style: The development and assessment of a new measure. *Educational and Psychological Measurement, 55*(5), 818-831.

Sujitparapitaya, S. (2006). Considering student mobility in retention outcomes. *New Directions For Institutional Research,* 131, 35-51.

Tabachnick, B.G., and Fidell, L.S. (2007). *Using multivariate statistics*. 5. Ed. Boston: Pearson Education, Inc

Tepehan, T. (2011). *Performance comparison of artificial neural network and logistic regression model in predicting Turkish students? PISA success.* Unpublished Doctoral Dissertation, https://tez.yok.gov.tr/ retrieved from 08.07.2020

Turgut, M., Yenilmez, K., and Uygan, C. (2013). Ortaokul ve lise matematik öğretmeni adaylarının ispat yapmaya yönelik görüşleri. *Adıyaman Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, *6*(13), 227-252.

Ülker, M. (2017). *Spor yapan ve yapmayan ortaöğretim öğrencilerinin kişilik özellikleri, karar verme stilleri,stresle başa çıkma stratejilerinin karşılaştırılması*. Yüksek Lisans Tezi. https://tez.yok.gov.tr sayfasından erişilmiştir

Weiner, B. (2000). Intrapersonal and interpersonal theories of motivation from an attributional perspective. *Educational Psychology Review*. *12*(1), 2000.

Weiner, B. (1986). *An attributional theory of motivation and emotion.* Springer Verlag, New York.

Weiner, B. (1979). A theory of motivation for some classroom experiences. *Journal of Educational Psychology*, 71, 3-25.

Williams, M., Burden, RL. and Al-Baharna, S. (2001). Making sense of success and failure: The role the individual in motivation theory. In Z. Dörnyei and R. Schmidt (Eds.), *Motivation ans second language acquisition* (p. 171-184).Honlulu:University of Hawaii, Second Language Teaching and Curriculum Center.

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