



## The Relationship between Pre-Service Teachers' Cognitive Flexibility and Interpersonal Problem Solving Skills

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### ABSTRACT

**Purpose:** In this study, the aim was to investigate pre-service teachers' cognitive flexibility in terms of specific variables and determine the relationship between pre-service teachers' cognitive flexibility and interpersonal problem solving skills. **Research Methods:** The study was designed in descriptive correlation model. Data were collected via the Cognitive Flexibility Inventory and Interpersonal Problem Solving Inventory from 531 pre-service teachers who studied in the Primary Teacher Training Departments during the fall semester of the 2017-2018 academic years. **Findings:** The findings indicated that there were significant differences according to gender and maternal education status, while there were no significant differences according to class level, department, and fathers' education status, socio-economic and socio-cultural status. In addition, there was a relationship between pre-service teachers' cognitive flexibility and interpersonal problem solving skills.

**Implications for Research and Practice:** It has been shown that pre-service teachers, who are cognitively flexible, are able to solve problems constructively and persistently. It is thought that an important characteristic of the professional and personal development and success of pre-service teachers who are trained to educate future generations to use their cognitive flexibility skills effectively in the solution of interpersonal problems. Based on the findings, it is recommended to take measures within the scope of teacher training in order to develop the capacities of cognitive flexibility of pre-service teachers.

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## Introduction

With the participation of independent learners in the production process of knowledge, information is perceived as a process rather than a product (Kilic & Demir, 2012). The new point of view that has emerged in knowledge production requires skills such as planning, controlling behaviours and ways of thinking (Dogonay, 1997; Kilic & Demir, 2012). This view of information has redefined learning as a flexible adaptability in the process of acquiring knowledge (Kehagia, Murray, & Robbins, 2010). Based on these explanations, it is understood that this perspective of producing and learning information has been called cognitive flexibility by researchers.

It has been seen that different researchers emphasize different features to explain the concept of cognitive flexibility, which expresses the process of using information. For example, Spiro (1992) defined cognitive flexibility as the ability to choose the most effective or appropriate alternative strategy for a subject or problem, focusing on the attention of the individual. Similarly, Batting (1979) defined cognitive flexibility as the ability to use the most effective learning strategies related to the topic studied or to determine the steps to solve a problem. It is understood that researchers describe cognitive flexibility as choosing the right way to solve the problem that is encountered. On the other hand, Martin and Anderson (1998), as opposed to the above definitions, define cognitive flexibility as the ability to see all options before making a choice, rather than choosing the right path. Spiro, Feltevich, Jacobson and Coulson (1991) define cognitive flexibility as the ability to think at different angles to use knowledge in the future where it is likely to be encountered by the individual. By this definition, it is understood that the aim is to reach the level of expert learner. In contrast to these definitions, Karadeniz (2008) defined cognitive flexibility, as the knowledge of the individual, and the capacity to use cognitive building independently of the situation. Based on the common features of the definitions that researchers have made regarding the concept of cognitive flexibility, it is understood that cognitive flexibility is the ability of the individual to choose the best way by evaluating all options against new present and possible situations.

Based on the knowledge gained from the definition of cognitive flexibility, it appears that individuals with cognitive flexibility have the following characteristics:

- Confident in their own capacity and behave accordingly (Bandura, 1977)
- Being willing to adapt to a new situation (Martin, & Anderson, 1998),
- Being aware of alternative ways and options (Martin, & Anderson, 1998, Martin, & Rubin, 1995),
- Using information and cognition flexibly and transferring this information in different ways according to the content given (Karadeniz, 2008),
- Being able to make decisions on their own and with high self-esteem, looking at events from different views, providing internal control, being less depressed and optimistic (Sapmaz, & Dogan, 2013),

- Being open to analysts and innovators (Jonassen, & Grabowski, 1993), controlling self-learning, doing self-learning more and preferring deductive learning.

It is noteworthy that the characteristics of cognitively flexible individuals, which express the way they acquire and use information, resemble those of advanced individuals in problem solving skills. Because, one of the personal characteristics that is effective in problem solving skills is the capacity of cognitive flexibility (Alper, & Deryakulu, 2008). Problem-solving skill is a comprehensive and complex cognitive process involving meta-cognitive thinking, including determining the most effective solution and deciding on the solution (D'Zurilla, & Nezu 2001; Evin-Gencil, 2015; Greiff, Wüstenberg, Csapó, Demetriou, Hautamäki, Graesser, & Martin, 2014; Sahin-Taskin, 2017; Saracaloglu, Altay, & Eken, 2016). In this respect, individuals with problem solving skills are defined as successful individuals who understand the source of the problem, who are systematic and determined, who use various decision making techniques, and who produce alternative solutions. According to Isen (2002), creative problem solving skills are influenced by flexible thinking capacity. This shows the importance of cognitive flexibility in situations such as producing new solutions to problem solving, probing different approaches, using old knowledge. Based on this information, it is thought that individuals with cognitive flexibility skills are thought to be more productive than problem solving. Problem solving skills are an important skill area both in academic life and in everyday life (Kennedy, Tipps, & Johnson, 2004). When teachers' professional competencies are examined, it is expected that teachers should prepare flexible curricula appropriate to different learning professions, encourage their students to think meta-cognitively and bring analytical thinking skills (Ministry of Education [MoNE], 2017). It is thought that these qualifications, defined as professional skills by the General Directorate of Teacher Training and Development, should be acquired within the scope of teacher training. For this reason, problem solving and cognitive flexibility skills in teacher education are at the forefront. In the light of this information, it is understood that pre-service teachers, who are responsible for educating future generations of students, should have problem solving skills. In this direction, this research was aimed at determining the relationship between cognitive flexibility levels of pre-service teachers and interpersonal problem solving skills. When studies of problem solving skills in Turkey were examined, it was understood that there were not many studies focusing on the relationship between interpersonal problem solving skills and cognitive flexibility. However, cognitive flexibility capacity is at the forefront of the features that affect the way in which individuals deal with problems. Due to the fact that, it is thought that cognitive flexibility levels of advanced individuals with interpersonal problem solving skills will also improve. For the first time, this study examined the relationship between cognitive flexibility capacity and interpersonal problem solving skills in Turkey. In this respect, it was thought that the pre-service

teachers who will be working in the future would shed light on the ongoing work on the subject of cognitive flexibility skills.

The sub-problems of the study were determined as follows:

1. Is there a significant difference between the gender of the pre-service teacher and the levels of cognitive flexibility?
2. Is there a significant difference between the departments of the pre-service teacher and the levels of cognitive flexibility?
3. Is there a significant difference between the class level of the pre-service teacher and the levels of cognitive flexibility?
4. Is there a significant difference between the socio-economic status of the pre-service teacher and the levels of cognitive flexibility?
5. Is there a significant difference between the socio-cultural status of the pre-service teacher and the levels of cognitive flexibility?
6. Is there a significant difference between maternal (e.g., Mother) educational status of the pre-service teacher and the levels of cognitive flexibility?
7. Is there a significant difference between paternal (e.g., Father) educational status of the pre-service teacher and the levels of cognitive flexibility?
8. Is there a relationship between cognitive flexibility levels of the pre-service teacher and interpersonal problem solving skills?

## Method

### *Research Design*

This research was designed in the descriptive correlation model. Studies designed in the descriptive correlation model are investigations aimed at determining the characteristics of large groups considering relation between variables (Buyukozturk, Kilic-Cakmak, Akgun, Karadeniz, & Demirel, 2012; Field, 2009; Fraenkel, & Wallen, 2006; Karasar, 2006). In this context, cognitive flexibility levels of pre-service teachers and interpersonal problem solving skills were determined in this study.

### *Research Sample*

The sample of this research was the pre-service teachers who were studying at the Teacher Training Department of a university in the Marmara Region of Turkey during the fall semester of the 2017-2018 academic years. It is mostly pre-school teachers or classroom teachers who meet in the school for the first time (Oktay, 1999). Although the pre-school education participation rate is high in Turkey, some children start primary school directly. Accordingly, it is thought that the first

welcoming role of the child is shared by pre-school teachers and primary school teachers. Children who spend most of their time in school with a single teacher tend to adopt and imitate the teacher as a role model (Argun & Ikiz, 2003). Therefore, it is thought that the role of pre-school and classroom teachers is important in providing children examples of cognitive flexibility skills. A total of 531 pre-service teachers participated in the study, including 316 from the Department of Elementary Education Teacher Training and 215 from the Department of Preschool Education Teacher Training. In addition, participants consisted of 308 female pre-service teachers and 223 male pre-service teachers. The other features of the pre-service teachers are presented in Table 1.

**Table 1**

*Participants' Features*

School Type	Maternal Educationa l Status (N)	Paternal Educationa l Status (N)	Degree	Socio- Economic Status	Socio- Cultural Status
Primary School	287	192	Good	24	150
Secondary School	101	116	Middle	408	371
High School	111	165	Bad	99	10
University	34	58			
Total	531	531		531	531

*Research Instruments and Procedures*

In collecting research data, the Cognitive Flexibility Inventory which was developed by Dennis and Wal (2010) and adapted for the Turkish Language and Culture by Sapmaz and Dogan (2013) and the Interpersonal Problem Solving Inventory developed by Cam and Tumkaya (2007) were used.

The Cognitive Flexibility Inventory consists of two factors as Alternatives and Control. A total of 20 items are included in the measurement. Exploratory and confirmatory factor analysis was used in the provision of validity of the measuring tool. As a result exploratory factor analysis, it was understood that the items were collected in two factors. Alternatives sub-dimension consisted of 13 items while Control sub-dimension consisted of 7 items. The fit indices achieved as a result of confirmatory factor analysis indicated that the instrument was well adapted ( $\chi^2=406.98$ ,  $sd=167$ ,  $\chi^2/sd=2.44$ ,  $AGFI=0.90$ ,  $GFI=0.92$ ,  $NFI=0.96$ ,  $RFI=0.95$ ,  $CFI=0.98$ ,  $IFI=0.98$ ,  $RMR=0.052$ ,  $RMSEA=0.054$ ). This indicated that the validity of the structure of the inventory was confirmed. The Cronbach's alpha coefficient of the inventory was calculated as .90 for the whole scale, .90 for the Alternatives factor and .84 for the Control factor. In addition, test-repeat test coefficient CFI was calculated at .75 for whole of the scale, .78 for Alternatives sub-dimension and .73 for the Control sub-dimension. This indicated that the instrument was reliable.

The Interpersonal Problem Solving Inventory consisted of five factors, such as, Approaching Problems in a negative way, Constructive Problem Solving, Lack of Self-confidence, Unwilling to Take Responsibility, and Insistent-persevering Approach. Exploratory factor analysis was used to provide validity for the measurement tool. As a result of the exploratory factor analysis, 50 items reached a factor load of more than .40. Approaching Problems in a negative way consisted of 16 items, Constructive Problem Solving consisted of 16 items, Lack of Self-confidence consisted of 7 items, Unwilling to Take Responsibility consisted of 5 items and Insistent-persevering Approach consisted of 6 items. The Cronbach alpha coefficient of the inventory was calculated between .67 and .91. In addition, the test-retest reliability was calculated between .69 and .89. The information obtained indicated that the measuring tool was valid and reliable.

The results of this study, which examined the relationship between the levels of cognitive flexibility and problem solving skills of prospective teachers, were collected during the fall semester of the 2017-2018 academic years. Before the data were collected, permission was obtained from the relevant faculty members. Afterwards, the students of the Teacher Training Department were given necessary explanations about the study and the data were collected based on volunteerism.

#### *Data Analysis*

558 pre-service teachers participated in the research. However, the answers of the pre-service teachers who were missing or misplaced their inventories were not included in the data set. Thus, the answers of 531 pre-service teachers' responses were statistically processed. First, the suitability of the normal distribution of the data set was investigated.

To decide for normality, skewness and kurtosis coefficients were calculated, and Kolmogorov Smirnov tests were also performed. The findings of the normality hypothesis are as follows:

**Table 2**

#### *Descriptive Statistic*

	Statistic	Standard Error
Mean	3.48	.01
Median	3.50	
Variance	.16	
Standard Deviation	.40	
Minimum	2.00	
Maximum	5.25	
Skewness	.16	.10
Kurtosis	.38	.21

The data set is normally distributed because the value obtained by dividing the skewness and kurtosis values by their standard error is in the range of 1.96 to + 1.96 (Tabachnick, & Fidell, 2001).

**Table 3**

*Kolmogorov-Smirnov Test Results*

Statistic	df	Sig.
.06	530	.28

The examined Kolmogorov-Smirnov Test results revealed that the  $p$  value was greater than 5%, and as a result, it was understood that the data had normal distribution (Field, 2009). The findings indicated that the data set was normal. In this respect, it was decided that parametric tests should be used in this study (Kalayci, 2010).

## Results

The findings related to pre-service teachers' cognitive flexibility level in terms of some variable is presented in this part of study. In this context, the findings are presented according to the order of the research questions.

Findings obtained within the scope of the first research question are as follows:

**Table 4**

*t-Test Results According to Gender for Cognitive Flexibility*

	N	Mean	Sd.	df	T	p
Female	308	3.50	.39	530	2.04	.04
Male	223	3.40	.46			

When the answers for cognitive flexibility of pre-service teachers in Table 1 were examined, it was seen that there is a significant difference in favour of female students according to gender  $t(530) = 2.04$ ,  $p < .041$ .

Findings obtained within the scope of the second research question are as follows:

**Table 5**

*T-Test Results According to Department for Cognitive Flexibility*

	N	Mean	Sd.	df	T	p
Elementary Education	306	3.47	.41	530	.73	.44
Pre-School Education	225	3.50	.39			

When the answers for cognitive flexibility of pre-service teachers in Table 2 were examined, it was seen that there was no significant difference according to the department  $t(530) = .73$ ,  $p < .44$ . However, when the mean scores of the answers were examined, it is seen that the cognitive flexibility levels ( $\bar{x} = 3.50$ ) of the pre-service

teachers who were educated in Preschool Education are more positive than the pre-service teacher ( $\bar{x}=3.47$ ) who studied Elementary Education.

Findings obtained within the scope of the third research question are as follows:

**Table 6**

*Test of Homogeneity of Variances*

Levene Statistic	df1	df2	Sig.
.31(a)	2	529	.72

Table 6 presented the homogeneity of variances. When the data set was examined closely, it was understood that the variances were homogeneous, Sig. (.72) > .05. Accordingly, an Anova test can be employed.

**Table 7**

*Anova Results According to Class Level for Cognitive Flexibility*

	Sum of Squares	df	Mean Square	F	p
Between Groups	.78	4	.19	1.18	.31
Within Groups	78.91	527	.16		
Total	79.70	531			

When the answers for cognitive flexibility of pre-service teachers in Table 3 were examined, it was seen that there was no significant difference according to the class level  $F(531) = 1.18$ ,  $p < .316$ . Nevertheless, when the means of answers were examined, the cognitive flexibility levels ( $\bar{x} = 3.55$ ), the first grade ( $\bar{x} = 3.48$ ), the second grade ( $\bar{x} = 3.49$ ) and the third grade ( $\bar{x} = 3.44$ ) of the pre-service teachers from the fourth grade, it was understood that it was more positive.

Findings obtained within the scope of the fourth research question are as follows:

**Table 8**

*Test of Homogeneity of Variances*

Levene Statistic	df1	df2	Sig.
.31(a)	2	529	.78

Since the  $p$ -value was more than .05 (.78), the basic assumption of the Anova test is provided.

**Table 9**

*Anova Results According to Socio-Economic Status for Cognitive Flexibility*

	Sum of Squares	df	Mean Square	F	p
Between Groups	.23	4	.07	.46	.70
Within Groups	82.89	527	.17		
Total	83.13	531			

When the answers for cognitive flexibility of pre-service teachers in Table 4 were examined, it was seen that there was no significant difference according to their



socio-economic status  $F(531) = .46, p < .70$ . However, when the averages of the answers were examined, it was found that the cognitive flexibility levels of the pre-service teachers indicated that the socio-economic income level of the family, in the Good ( $\bar{x} = 3.52$ ) condition, were more positive than the pre-service teachers who were in the Middle ( $\bar{x} = 3.47$ ) and Bad ( $\bar{x} = 3.46$ ) conditions.

Findings obtained within the scope of the fifth research question are as follows:

**Table 10**

*Test of Homogeneity of Variances*

Levene Statistic	df1	df2	Sig.
.23	2	529	.79

As seen in table 10 because the  $p$ -values were more than .05 (.79), the basic assumption of the Anova test is provided.

**Table 11**

*Anova Results According to Socio-Cultural Status for Cognitive Flexibility*

	Sum of Squares	df	Mean Square	F	p
Between Groups	.68	4	.34	2.07	.12
Within Groups	80.83	527	.16		
Total	81.51	531			

When the answers for cognitive flexibility of pre-service teachers in Table 5 were examined, it was seen that there was no significant difference according to the socio-cultural level  $F(531) = 2.07, p < .12$ . However, when the averages of the answers were examined, it was found that the cognitive flexibility levels of the pre-service teacher ( $\bar{x} = 3.52$ ) indicated that the socio-cultural status level of the family in the Good state were more positive than the pre-service teachers who were in the Middle ( $\bar{x} = 3.46$ ) and Bad ( $\bar{x} = 3.46$ ) states.

Findings obtained within the scope of the sixth research question are as follows:

**Table 12**

*Test of Homogeneity of Variances*

Levene Statistic	df1	df2	Sig.
.89	3	528	.44

It was seen that because the  $p$ -values were more than .05 (.44), the basic assumption of the Anova test is provided.

**Table 13**

*Descriptive Statistics*

	N	Mean	Std. Deviation	Std. Error
Primary School	287	3.50	.41	.02
Secondary School	101	3.43	.41	.04
High School	111	3.44	.36	.03
University	32	3.68	.45	.09
Total	531	3.48	.41	.01

The mean and standard deviation are presented in Table 13.

**Table 14***Anova Results According to Maternal Education Status for Cognitive Flexibility*

	Sum of Squares	df	Mean Square	F	p
Between Groups	1.38	4	.46	2.76	.04
Within Groups	81.62	527	.16		
Total	83.00	531			

When the answers for cognitive flexibility of pre-service teachers in Table 14 were examined, it was seen that there was a significant difference according to the maternal education status,  $F(531) = 2.76, p < .04$ .

**Table 15***Multiple Comparisons*

	Maternal Education Status	(J) Maternal Education Status	Mean Difference (I-J)	Std. Error	Sig.
			Lower Bound		
Tukey HSD	Primary School (PS)	SS	.06	.04	.55
		HU	.05	.04	.62
		U	-.18	.08	.16
	Secondary School (SS)	PS	-.06	.04	.55
		HS	-.00	.05	.99
		U	-.24(*)	.09	.04
	High School (HS)	PS	-.05	.04	.62
		SS	.00	.05	.99
		U	-.24	.09	.05
	University (U)	PS	.18	.08	.16
		SS	.24(*)	.09	.04
		HS	.24	.09	.05
Bonfer roni	Primary School (PS)	SS	.06	.04	1.00
		HU	.05	.04	1.00
		U	-.18	.08	.22
	Secondary School (SS)	PS	-.06	.049	1.00
		HS	-.00	.05	1.00
		U	-.24	.09	.05
	High School (HS)	PS	-.05	.04	1.00
		SS	.00	.05	1.00
		U	-.24	.09	.06
	University (U)	PS	.18	.08	.22
		SS	.24	.09	.05
		HS	.24	.09	.06

According to Table 15, it seems that pre-service teachers ( $\bar{x} = 3.68$ ) whose mother is a university graduate differ significantly compared to the pre-service teachers who graduated from primary school ( $\bar{x} = 3.50$ ), middle school ( $\bar{x} = 3.43$ ) and/or high school ( $\bar{x} = 3.44$ ).

Findings obtained within the scope of the seventh research question are as follows:

**Table 16**

*Test of Homogeneity of Variances*

Levene Statistic	df1	df2	Sig.
.81(a)	3	528	.48

According to Table 16, because the  $p$ -value was more than .05 (.48), the basic assumption of the Anova test is provided.

**Table 17**

*Anova Results According to Paternal Education Status for Cognitive Flexibility*

	Sum of Squares	df	Mean Square	F
Between Groups	.47	4	.11	.70
Within Groups	81.89	527	.16	
Total	82.37	531		

When the answers for cognitive flexibility of the pre-service teachers in Table 7 were examined, it was seen that there was a significant difference according to the paternal education status,  $F(531) = .70$ ,  $p < .59$ .

Findings obtained within the scope of the last research question are as follows:

**Table 18**

*Results of Correlation Analysis of Interpersonal Problem Solving Skills with Cognitive Flexibility Level*

		Interpersonal Problem Solving
Interpersonal Problem Solving	Pearson Correlation	1
	Sig. (2-tailed)	
	N	531
Cognitive Flexibility	Pearson Correlation	.41(**)
	Sig. (2-tailed)	.00
	N	531

When Table 11 was examined, it was seen that the answers from the pre-service teachers about the Cognitive Flexibility Inventory and the Interpersonal Problem Solving Inventory were related. When the findings were evaluated in relation to each other, it was understood that there was a positive weak correlation between the level of cognitive flexibility of pre-service teachers and the level of problem solving skills,

$r = .41$ . The results of the correlation analysis for the sub-factors of both instruments are as shown in Table 19.

**Table 19**

*Results of Correlation Analysis of Sub-Scale of Interpersonal Problem Solving Skills with Sub-Scale of Cognitive Flexibility Level*

		PNA	CPS	SD	I	PA
Alternatives	Pearson Correlation	.21(**)	.74(**)	.26(**)	.25(**)	.43(**)
	Sig. (2-tailed)	.00	.00	.00	.00	.00
	N	531	531	531	531	531
Control	Pearson Correlation	.70(**)	.15(**)	.53(**)	.41(**)	.09(*)
	Sig. (2-tailed)	.00	.00	.00	.00	.03
	N	531	531	531	531	531

Table 19 shows that pre-service teachers had a higher positive correlation ( $r = .74$ ) between the sub-factors of Alternatives in Cognitive Flexibility and the answers they gave to the Constructive Problem Solving sub-factors within problem solving skills; it was also seen that there was a low correlation ( $r = .43$ ) in the positive direction with the sub-factor of Insistent-Persevering Approach. When the data related to the Control sub-factor within the cognitive flexibility were examined, it was seen that there was a high level of relationship between the Approaching Problems sub-dimension in a negative way and the Lack of Self-confidence sub-dimension ( $r = .70$ ), as well as, a mid-level relationship was understood as a low level of correlation in the positive direction between the Unwilling to Take Responsibility sub-dimension ( $r = .53$ ).

### Discussion, Conclusion and Recommendations

The results of this study, in which the cognitive flexibility levels of pre-service teachers were examined in terms of the relationship between specific variables and cognitive flexibility and interpersonal problem solving skills, reveal that the cognitive flexibility levels of pre-service teachers were good, though not very high. This finding was similar to the results of related studies (Cuhadaroglu, 2013; Kilic, & Demir, 2012). Taking into account the effects of the teaching profession on the development of the individual, it is understood that the cognitive flexibility levels of the pre-service teachers are positive in terms of professional development (Cuhadaroglu, 2013; MoNE, 2017; Ocak, 2016; Simsek, 2017). Considering cognitive flexibility is influenced by the self-efficacy belief (Ates-Cobanoglu & Yurdakul, 2014; Shimogori, 2013), it is thought that it is important to have cognitive flexibility in terms of the professional competence perceptions of teachers. Cognitive flexibility is essential for helping humans cope with complicated tasks (Ionescu, 2012). Thus, it is

thought that teachers who face dozens of children's problems every day should be cognitively flexible. Research has drawn attention to the link between cognitive flexibility and communication (Bandura, 1977; Martin, & Anderson, 1998). Based on this, the development of cognitive flexibility capacities of teacher candidates, in terms of healthy communication with the students, is believed to positively contribute to the teaching profession. It is also known that the level of cognitive flexibility is a factor in making responsible decisions (Bilgic & Bilgin, 2016).

When the data related to cognitive flexibility was examined by gender, it was understood that the cognitive flexibility levels of female pre-service teachers differ significantly from males. When relevant studies in the literature were examined, in contrast to the findings of this study, it was seen that the male pre-service teachers were cognitively more flexible in some study results (Altunkol, 2011; Cuhadaroglu, 2013; Kilic, & Demir, 2012) while there is no significant difference in gender in some other studies (Bilgin, & Bilgic, 2016; Cuhadaroglu, 2011; Diril, 2011; Gokcen, Lacin, & Yalcin, 2015; Martin, & Rubin, 1995; Oz, 2012). Therefore, it was understood that the result obtained from this study differed from other studies. This can be explained by differences in the functioning of the male and female brains. Accordingly, this finding can be explained by their gender roles and the fact that women are more elaborate than men (Bilgin, & Bilgic, 2016). For example, Gur, Turetsky, Matsui, Yan, Bilker, Hughett and Gur (1999) revealed that gender-specific biological differences affect cognitive functions of the male and female brains. In another study, it was emphasized that the maturation of the brains of adolescent girls is more advanced than that of males (Celik, Tahiroglu, & Avci, 2008). Similarly, when studies of brain functioning were examined, it was seen that the brains of females in adolescence are developed two years ahead of males (Brizendine, 2006). Although researchers point out the ages of 12-18 years old when describing adolescence (Gul, & Gunes, 2009; Senemoglu, 2011), adolescence can last even further to 19-21 years of age (Derman, 2008). When the sample of this study was taken into consideration, it was understood that the vast majority of the participants were in the 18-22 age group. This can be interpreted as the continuing effects of adolescence. For this reason, it was thought that in this study, the cognitive flexibility levels of female pre-service teachers were higher than those of the male pre-service teachers because of the biological differences in the functioning of the brain, so that the cognitive functions were more advanced and therefore cognitively more flexible.

When the cognitive flexibility levels of the pre-service teachers were examined by considering the part they were studying, it was understood that the cognitive flexibility levels of the pre-service teachers in Preschool Education and Elementary Education Departments did not show any significant difference. Taking into consideration the baseline scores for the years 2014-2017, the majority of the pre-service teachers participating in the study, which were in their early years of university, it was understood that the scores of the pre-service teachers were close to each other (<http://universite.taban-puanlari.com/>). Although the concepts of academic achievement and cognitive flexibility are different from each other, the researches draw attention to the link between cognitive awareness and academic

achievement (Demir, & Doganay, 2010; Yucel, 2011). In this research, Pre-school and Elementary Education can be interpreted as the fact that the cognitive flexibility skills of the pre-service teachers were not different from each other because their academic achievements were similar to each other. In summary, it is thought that the cognitive functions of the pre-service teachers in these departments are similar.

Another variable examined in the study was whether the class level of the pre-service teachers was significantly different from the cognitive flexibility skills. When the findings were evaluated in this context, it was understood that the cognitive flexibility skills of the pre-service teachers did not show any significant difference according to class level. It was seen that this finding was supported by the findings of other studies in which cognitive flexibility skills of pre-service teachers were researched (Kilic, & Demir, 2012). One of the biggest obstacles to the development of cognitive flexibility skills is automation (Cuhadaroglu, 2013). Automation occurs as the level of expertise and knowledge increases, yet the individual is not willing to adapt to new situations (Cuhadaroglu, 2011). In this direction, it was thought that the capacities of cognitive flexibility did not change much in the following years of learning experiences as a result of pre-service teachers' adaptation to the teaching profession and automatic thinking.

In this study, it was assumed that the socio-cultural and socio-economic status of the parents of the pre-service teachers, were related to the capacity for cognitive flexibility. However, research findings indicated that there was no significant difference in the socio-economic and socio-cultural status of the pre-service teachers' families and their cognitive flexibility skills. It was understood that this result obtained was similar to the results of other past studies in the field (Diril, 2011; Oz, 2012).

When the cognitive flexibility levels of the pre-service teachers were examined considering the educational status of the parents, it was understood that there was no meaningful difference according to the education level of the father while there was a significant difference in favour of the mother being a university graduate. When the relevant research literature was examined, it was noticed that parental attitudes were not related to cognitive flexibility skills (Bilgin, 2009), but parental attitudes can be effective on cognitive flexibility skills (Diril, 2011). While the findings on gender variables above have been interpreted, it has been stated that the cognitive functions of females are more advanced than males in adolescence, but also in the following years; the use communication, emotional memory and anger management, sensitivity, stress, decision making and emotional control in terms of traits, are more advanced in female brains than males (Brizendine, 2006). For this reason, in this study, it was thought that while the paternal (e.g., father's) educational status for the pre-service teachers was not a variable explaining cognitive flexibility, the maternal education status did explain the cognitive flexibility skill levels of the participating pre-service teachers. On the other hand, although the importance of parents in the development of the individual is great, the mother-child relationship was one step ahead of the father-child dynamic (Kaya, 1997; Ozensel, 2004; Sanlı, & Ozturk, 2012). It was known that the mother's approach to the child affects the whole life of the

child (Ciftci, 1991). Nevertheless, as the level of education in mothers increases, children seem to support their development positively in terms of more attention to education, more research, richer learning environments and healthy communication skills (Erkan & Kirca, 2010). In addition, it has been known that the level of maternal education status does play a role in a child's cognitive development (Butun-Ayhan & Aral, 2007). In this respect, it was thought that the better cognitive flexibility levels of the pre-service teachers who were the students of mother's who were university-graduates was due to the fact that the mothers were more likely to be biologically cognitive flexible as mentioned above and that the mothers were more effective in child development.

Finally, in this study the relationship between pre-service teachers' cognitive flexibility levels and interpersonal problem solving abilities were investigated. It is thought that teachers who face dozens of undesirable behaviours in the classroom each day are important in learning more about the prevention of the unwanted behaviour related to the problem-solving skills of teachers and the quality management of the learning-teaching process. Research has emphasized that the level of cognitive flexibility and problem solving skills are interrelated (Canas, Quesada, Antolí, & Fajardo, 2003; Isen, 1999; Fitzgerald, 1997; Krems, 1995; Walker, Liston, Hobson, & Stickgold, 2002; Yucel, 2011). In this research, it was understood that pre-service teachers have a weak positive relationship between their cognitive flexibility skills and their interpersonal problem solving skills. However, when the findings from the sub-factors of the measurement tools were examined, it was understood that there was a high positive correlation between the Alternative Dimension of cognitive flexibility and the Constructive Problem Solving factor of problem solving skill; there was also a high positive correlation between the Alternative Factor of cognitive flexibility and the Insistent-Persevering Approach factor of problem solving skill. On the other hand, it was understood that there was a positive high correlation between the Control factors of cognitive flexibility and Approaching problems in a negative way factor of problem solving; there was also a positive modest correlation between Control factor of cognitive flexibility and the Lack of self-confidence factor of problem solving. In addition, there was a positive weak correlation between the Control factor of cognitive flexibility and Unwilling to take responsibility factor of problem solving. When the findings were closely examined, it appeared that there were such things as; "Considering many options before deciding on a topic", "Taking all possible facts and information into consideration while trying to understand the causes of behaviours", which involves producing alternative solutions to the new situations of the Alternatives factor of cognitive flexibility. On the other hand, while the Constructive Problem Solving factor, which is related to Alternatives factor, has items such as; "I try to find more solutions for solving a problem", "I have a problem, I search for what I need for a successful solution". The Insistent-Persevering approach factor included; "I try to solve it if I have a problem with my interpersonal relationships", "I try to solve it, but I try to solve it". As understood from the items on both measuring instruments, it was thought that individuals who were cognitively flexible and able to produce alternatives from these items were determined to try various solutions as well as

solve the problem. When examining the items related to the control factor, which was another sub-factor of cognitive flexibility, the items such as; "I have difficulty deciding when I face difficult situations", "I feel like losing control when I encounter difficult situations", "I do not know exactly what to do when I encounter difficult situations". Approaching problems in a negative way, Lack of self-confidence, and Unwilling to take responsibility factors which were related to the Control factor includes items, such as, "When I have a problem, what I do for a solution is that I cannot change the situation I'm in", "In the event of a problem, whatever happens, I expect the first step to be taken from the other side" and "I feel desperate when I have a problem". When examined, cognitive flexibility was related to interpersonal problem solving, it was understood that individuals who can produce creative and effective solutions to solve a problem are successful in constructive problem solving and are persistence. On the contrary, it was understood that the individuals who were concerned about losing control in a difficult situation were also pessimistic about the solution to the problem, were not trusting of themselves and at the same time avoided taking responsibility. The information obtained from this study suggested that cognitive flexibility skills will improve the ability of the advanced pre-service teachers to solve problem solving skills.

It was thought that the success of pre-service teachers who were trained to instruct future generations in the effective use of their cognitive flexibility skills in the solution of interpersonal problems is an important characteristic of their professional and personal development. Thus, it is suggested to give importance in teacher training programs to the goal of increasing cognitive flexibility and individuals' problem solving skills. Especially, it is thought that cognitive flexibility should be emphasized in Classroom Management and Effective Communication courses to deal with students' routine problems, and additionally, it should be taken into consideration in pedagogy and professional knowledge courses in order to satisfy students academically because cognitive flexibility can guide instruction (Boger-Mehall, 1996). Findings obtained from this research provided important information regarding the level of cognitive flexibility of pre-service teachers, but the findings were limited to the pre-service teachers who were educated in the Primary Education Department. For this reason, it is recommended to apply the study to different sample groups. Thus, the generalizability of this relationship between cognitive flexibility and problem-solving skills will be expected to increase. In addition, this research focused on interpersonal problems solving. For future research, it is recommended focus be placed on different aspects of problem solving. In this direction, the relationship between problem-solving skills and cognitive flexibility is thought to be more inclusive.

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### Öğretmen Adaylarının Bilişsel Esneklik Düzeyleri ile Kişilerarası Problem Çözme Becerileri Arasındaki İlişkinin İncelenmesi

#### Atıf:

- Esen-Aygun, H. (2018). The relationship between pre-service teachers' cognitive flexibility and interpersonal problem solving skills. *Eurasian Journal of Educational Research, 77*, 105-128, DOI: 10.14689/ejer.2018.77.6

#### Özet

*Problem Durumu:* Bağımsız öğrenenlerin bilginin üretimi sürecine katılımıyla birlikte bilgi bir üründen ziyade bir süreç olarak algılanmaktadır. Bilgi edinmeye ilişkin bu görüş öğrenmeyi de bilgi edinme sürecinde esnek bir şekilde uyum sağlama becerisi olarak yeniden tanımlamaktadır. Bilgiyi üretme ve öğrenmeye ilişkin bu bakış açısının araştırmacılar tarafından bilişsel esneklik olarak adlandırıldığı anlaşılmaktadır. Alanyazın incelendiğinde, bilişsel esnekliğin, bireyin mevcut ve muhtemel yeni durumlar karşısında tüm seçenekleri değerlendirerek en

iyi yolu seçme becerisi olduğu anlaşılmaktadır. Bilişsel olarak esnek bireylerin bilgiyi edinme ve kullanma şeklini ifade eden özelliklerin problem çözme becerisi gelişmiş bireylerin özelliklerine benzediği dikkati çekmektedir. Çünkü problem çözme becerisinde etkili olan kişisel özelliklerden biri de bilişsel esneklik kapasitesidir. Problem çözme becerisine sahip bireyler, problemin kaynaklarını anlayan, sistematik ve kararlı, çeşitli karar verme tekniklerini kullanan, alternatif çözüm yolları üretmede başarılı kişiler olarak tanımlanmaktadır. Problem çözme becerisi üst düzey düşünme ile birlikte en etkili çözüm yollarının belirlenmesi ve çözüm yoluna karar vermeyi içeren geniş kapsamlı ve karmaşık bilişsel süreci ifade etmektedir. Bu bilgilerden hareketle, bilişsel esneklik becerisine sahip bireylerin problem çözmede daha üretken oldukları düşünülmektedir. Öğretmen eğitiminde, üst düzey düşünme becerileri gelişmiş ve yeni durumlar karşısında etkili karar verebilen bireyler yetiştirmek açısından problem çözme ve bilişsel esneklik becerileri ön plana çıkmaktadır. Ülkemizde problem çözme becerileri ile çalışmalar incelendiğinde çeşitli öğrenim düzeylerinde pek çok çalışma bulunmakla birlikte kişilerarası problem çözme becerileri ile bilişsel esneklik arasındaki ilişkiye odaklanan bir çalışmanın olmadığı anlaşılmaktadır. Oysa bireylerin problemi ele alış biçimini etkileyen özelliklerin başında bilişsel esneklik kapasitesi gelmektedir. Bu nedenle, kişilerarası problem çözme becerisi gelişmiş bireylerin bilişsel esneklik düzeylerinin de gelişmiş olacağı düşünülmektedir. Bu çalışma ile ilk kez ülkemizde bilişsel esneklik kapasitesi ile kişilerarası problem çözme becerisi arasındaki ilişki ele alınacaktır. Bu doğrultuda, çalışmanın öğretmen adaylarının bilişsel esneklik becerileri konusundaki gelecek çalışmalara ışık tutacağı düşünülmektedir.

*Araştırmanın Amacı:* Bu çalışmada öğretmen adaylarının bilişsel esneklik düzeylerinin çeşitli değişkenler açısından incelenmesi ve kişilerarası problem çözme becerileri ile ilişkinin belirlenmesi amaçlanmaktadır. Araştırma soruları aşağıdaki gibidir:

1. Öğretmen adaylarının cinsiyetleri ile bilişsel esneklik düzeyleri arasında anlamlı farklılık bulunmakta mıdır?
2. Öğretmen adaylarının öğretim gördükleri bölüm ile bilişsel esneklik düzeyleri arasında anlamlı farklılık bulunmakta mıdır?
3. Öğretmen adaylarının öğrenim gördükleri sınıf düzeyi ile bilişsel esneklik düzeyleri arasında anlamlı farklılık bulunmakta mıdır?
4. Öğretmen adaylarının sosyo-ekonomik durumu ile bilişsel esneklik düzeyleri arasında anlamlı farklılık bulunmakta mıdır?
5. Öğretmen adaylarının sosyo-kültürel durumu ile bilişsel esneklik düzeyleri arasında anlamlı farklılık bulunmakta mıdır?
6. Öğretmen adaylarının anne eğitim durumu ile bilişsel esneklik düzeyleri arasında anlamlı farklılık bulunmakta mıdır?
7. Öğretmen adaylarının baba eğitim durumu ile bilişsel esneklik düzeyleri arasında anlamlı farklılık bulunmakta mıdır?

8. Öğretmen adaylarının bilişsel esneklik düzeyleri ile kişilerarası problem çözme becerileri arasında bir ilişki bulunmakta mıdır?

*Araştırmanın Yöntemi:* Bu araştırma betimsel tarama modelinde tasarlanmıştır. Araştırmanın örneklemini 2017-2018 eğitim-öğretim yılı güz yarısında Marmara Bölgesi'nde bir üniversitenin Temel Eğitim Bölümü'nde öğrenim görmekte olan öğretmen adayları oluşturmaktadır. Araştırma verilerinin toplanmasında, Bilişsel Esneklik Envanteri ile Kişilerarası Problem Çözme Envanteri kullanılmıştır.

*Araştırmanın Bulguları:* Öğretmen adaylarının bilişsel esnekliğe ilişkin cevapları cinsiyete göre incelendiğinde, kadın öğretmen adaylarının lehine anlamlı farklılık olduğu görülmektedir  $t(530) = 2.047, p < .041$ . Öğretmen adaylarının bilişsel esneklik kapasitesi ile öğrenim gördükleri bölüm ve sınıf arasındaki ilişki dikkate alındığında, bölüme  $t(530) = .73, p < .44$  ve sınıf düzeyine göre anlamlı farklılık olmadığı anlaşılmaktadır  $F(531) = 1.18, p < .31$ . Öğretmen adaylarının bilişsel esnekliğe ilişkin cevapları sosyo-ekonomik gelir düzeyi ve sosyo-kültürel duruma göre incelendiğinde, sosyo-ekonomik gelire göre  $F(531) = .46, p < .70$  ve sosyo-kültürel duruma göre  $F(531) = 2.07, p < .12$  anlamlı farklılık olmadığı görülmektedir. Öğretmen adaylarının bilişsel esneklik düzeyleri ile ebeveynlerin eğitim durumları arasındaki ilişki incelendiğinde, anne eğitim durumuna göre anlamlı farklılık bulunurken  $F(531) = 2.76, p < .04$ ; baba eğitim durumuna anlamlı farklılık olmadığı görülmektedir  $F(531) = .70, p < .59$ . Son olarak öğretmen adaylarının bilişsel esnekliğe ilişkin cevapları incelendiğinde, öğretmen adaylarının bilişsel esneklik kapsamındaki Alternatifler alt faktörü ile problem çözme becerisi kapsamındaki Yapıcı Problem Çözme alt faktörlerine vermiş oldukları cevaplar arasında pozitif yönde yüksek ilişki ( $r = .74$ ) bulunduğu; Isırcı-Sebatkar Yaklaşım alt faktörü ile arasında da pozitif yönde düşük ilişki ( $r = .43$ ) olduğu görülmektedir. Bilişsel esneklik kapsamındaki Kontrol alt faktörüne ilişkin veriler incelendiğinde ise Probleme Olumsuz Yaklaşma alt faktörü ile pozitif yönde yüksek düzeyde ilişki ( $r = .70$ ), Kendine Güvensizlik alt faktörü ile pozitif yönde orta düzeyde ilişki ( $r = .53$ ) ve Sorumluluk Almama alt faktörü ile de pozitif yönde düşük düzeyde ilişki olduğu anlaşılmaktadır.

*Araştırmanın Sonuçları ve Önerileri:* Bu çalışmada, öğretmen adaylarının bilişsel esneklik düzeylerinin iyi olduğu anlaşılmaktadır. Bununla birlikte, bilişsel esnekliğe ilişkin veriler cinsiyete göre incelendiğinde, kadın öğretmen adaylarının bilişsel esneklik düzeylerinin erkek öğretmen adaylarından anlamlı düzeyde farklılık gösterdiği anlaşılmaktadır. Bu durumun beynin işleyişindeki biyolojik farklılıklardan kaynaklandığı, buna bağlı olarak bilişsel fonksiyonlarının daha ilerde olduğu, dolayısıyla bilişsel olarak daha esnek oldukları düşünülmektedir. Öğretmen adaylarının bilişsel esneklik düzeyleri öğrenim görmekte oldukları bölüm dikkate alınarak incelendiğinde, Okul Öncesi Eğitimi ve Sınıf Eğitimi Anabilim dallarında öğrenim gören öğretmen adaylarının bilişsel esneklik düzeylerinin anlamlı farklılık göstermediği anlaşılmaktadır. Bu bölümlerde öğrenim görmekte olan öğretmen adaylarının bilişsel fonksiyonlarının benzerlik gösterdiği düşünülmektedir. Elde edilen bulgulardan hareketle, öğretmen adaylarının bilişsel esneklik becerilerinin sınıf düzeyine göre anlamlı farklılık göstermediği anlaşılmaktadır. Bu doğrultuda, öğretmen adaylarının öğretmenlik mesleği eğitimine uyum sağlamaları ile birlikte

otomatik düşünmeye başlamaları sonucunda bilişsel esneklik kapasitelerinin öğrenim yaşantılarının ilerleyen yıllarında çok fazla değişmediği düşünülmektedir. Öğretmen adaylarının bilişsel esneklik becerileri ile yetişmiş oldukları ailelerin sosyo-ekonomik ve sosyo-kültürel durumları arasında anlamlı bir farklılık olmadığına işaret etmektedir. Veriler anne-baba eğitim durumuna göre incelendiğinde annesi üniversite mezunu olan öğretmen adaylarının lehine anlamlı farklılık bulunduğu anlaşılmaktadır. Bireylerin gelişiminde anne-çocuk ilişkisi bir adım öne çıkmaktadır. Bununla birlikte, annelerde öğrenim düzeyi yükseldikçe, çocukların eğitimi ile daha fazla ilgilenme, zengin öğrenme ortamları sunma ve sağlıklı iletişim kurma gibi özellikler bakımından çocuklarının gelişimini olumlu yönde destekledikleri görülmektedir. Alt faktörlere ilişkin bulgular incelendiğinde, alternatif üretebilen öğretmen adaylarının Yapıcı Problem Çözme ve Israrcı-Sebatkar Yaklaşım olma özellikleri dikkati çekmektedir. Buna ek olarak; bilişsel esnekliğin Kontrol alt boyutu ile problem çözenin Probleme Olumsuz Yaklaşma Kendine Güvensizlik ve Sorumluluk Almama faktörü ile de ilişkili olduğu anlaşılmaktadır. Gelecek nesilleri yetiştirmekle görevli öğretmen adaylarının bilişsel esneklik becerilerini etkili olarak kullanmaları sonucunda kişilerarası problemlerin çözümünde başarıya ulaşmalarının, onların hem mesleki hem de kişisel gelişimleri bakımından önemli bir özelliği olduğu düşünülmektedir. Bu nedenle öğretmen yetiştirme programlarında bilişsel açıdan esnek ve problem çözme becerisi gelişmiş bireyler yetiştirme hedefine önem verilmesi önerilmektedir. Bu araştırmadan elde edilen bulgular öğretmen adaylarının bilişsel esneklik düzeyleri ile önemli bilgiler sunuyor olsa da elde edilen bulgular Temel Eğitim Bölümü'nde öğrenim gören öğretmen adayları ile sınırlıdır. Bu nedenle, çalışmanın farklı örneklem gruplarına uygulanması önerilmektedir. Böylece, bilişsel esneklik ve problem çözme becerisi arasındaki bu ilişkinin genellenebilirlik niteliğini arttıracakları düşünülmektedir.

*Anahtar Sözcükler:* Bilişsel esneklik, problem çözme, öğretmen eğitimi, öğretmen adayı.