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ANALYZING RELATIONSHIP BETWEEN CRITICAL THINKING AND PROBLEM SOLVING SKILLS OF CANDIDATE TEACHERS

ÖĞRETMEN ADAYLARININ ELEŞTİREL DÜŞÜNME VE PROBLEM ÇÖZME BECERİLERİ ARASINDAKİ İLİŞKİNİN İNCELENMESİ

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ABSTRACT
The aim of this research is to analyze relationship between critical thinking and problem solving skills of candidate teachers. 136 (86 female, 50 male) volunteer students who are getting pedagogical education at Süleyman Demirel University in 2015 attended the research. Problem Solving Skills Scale that was developed by Yaman (2003) and Turkish form of California Critical Thinking Tendency Scale that was adapted to Turkish by Kökdemir (2003) were used in the research as data collecting tool. Independent t test, one way ANOVA, correlation and descriptive statistics on the program SPSS 15 for Windows Pack were used, in the analysis of data. Findings of the research showed that pre-service teachers have medium level of problem solving skills and low level of critical thinking skills. While there is not any statistically significant differentiation among problem solving skills level of male and female attendants ($p>0,05$), there is a statistically significant differentiation among their critical thinking skills ($p<0,05$). Statistically significant differentiation was not found among their problem solving skills level and critical thinking skills level according to age groups ($p>0,05$). In addition, it was determined that there is a negative and low level correlation between problem solving skill and critical thinking skill but it was not at the significant level ($p>0,05$). As a result, it was determined that there was a significant differentiation only among critical thinking skills of candidate teachers according to gender and there were not any significant differentiations among other variables. Relationship between critical thinking levels and problem solving skills level should be analyzed in detail.
Anahtar kelimeler: Teaching profession, critical thinking skills, problem solving skills, candidate teacher

ÖZET
Öğretmen adaylarının eleştirel düşünme becerileri ve problem çözme becerileri arasındaki ilişkiyi incelemek amacıyla yapılan bu araştırmaya 2015 yılında Süleyman Demirel Üniversitesi'nde Pedagojik Formasyon eğitimi alan 136 (86 kadın, 50 erkek) öğrenci gönüllü olarak katılmıştır. Araştırmada veri toplama aracı olarak Yaman (2003) tarafından geliştirilen Problem Çözme Becerileri Envanteri ve Kökdemir (2003) tarafından Türkçeye uyarlanan Kaliforniya Eleştirel Düşünme Eğilimi Ölçeği Türkçe Formu kullanılmıştır. Elde edilen verilerin analizinde SPSS 15.0 for Windows paket programında bağımsız gruplar t testi, One Way ANOVA, Korelasyon ve tanımlayıcı istatistikler kullanılmıştır. Araştırma bulguları katılımcıların orta düzeyde problem çözme becerisine ve düşük düzeyde eleştirel düşünme becerisine sahip olduğunu göstermiştir. Kadın ve erkek katılımcıların problem çözme beceri düzeyleri arasında istatistiksel olarak anlamlı fark bulunmazken ($p>0,05$), eleştirel düşünme becerileri arasında istatistiksel olarak anlamlı fark bulunmuştur ($p<0,05$). Yaş gruplarına göre problem çözme beceri düzeyleri ve eleştirel düşünme beceri düzeyleri arasında istatistiksel olarak anlamlı fark bulunamamıştır ($p>0,05$). Aynı zamanda yapılan bu araştırmada problem çözme becerisi ile eleştirel düşünme becerisi arasında negatif ve düşük düzeyde bir korelasyon olduğu ancak bunun anlamlı düzeyde olmadığı tespit edilmiştir ($p>0,05$). Sonuç olarak öğretmen adaylarının sadece cinsiyet değişkenine göre eleştirel düşünme becerileri arasında anlamlı bir fark olduğu, diğer değişkenlerde anlamlı bir fark olmadığı bulunmuştur. Öğretmen adaylarının eleştirel düşünme düzeyleri ve problem çözme beceri düzeyleri arasındaki ilişkinin ayrıntılı olarak incelenmesi gerekmektedir.
Keywords: Eleştirel düşünme, problem çözme, öğretmenlik mesleği, aday öğretmen

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GİRİŞ

Critical thinking, essentially, is based upon obtaining information in an effective way and upon evaluating and using ability and tendency of it (Demirel, 2005). The aim of critical thinking is to understand the problem and to evaluate the goal well (Reinstein & Lander, 2008). An individual who thinks critically, makes an evaluation of existing information to understand the problem before deciding about it and distinguishes related and unrelated information (Özden, 2005). In this duration, he/she explains evidences and causes of the opinion he/she submitted (Şahinel, 2002). Therefore, critical thinking implies a process which is composed of analyzing, explaining, interpretation, regulation of him/her-self, evaluating and deducing (Facione, 1990). As to problem solving, it can be considered as handling problems and it expresses finding new solution ways related to problems (Heppner & Lee, 2002). Thus, an individual conducts the process of critical thinking when he/she finds a solution related to problem in problem solving process. So, the individual obtains a broad scanning in which s/he can see possible results of the events and can produce choices. Therefore, it can be said that solution producing approaches of people are widely affected by critical thinking styles.

Every type of trouble or condition which people face and seek a solution for, in daily life is a problem. Against these problems, every individual may present different attitudes. These attitudes are a result of mutual interaction between problem solving and critical thinking abilities of a person. Critical thinking ability which helps person to handle problems faced in the life, is a feature that provides better thinking of the person (Branch, 2000). Thus, it can be said that critical thinking abilities of people should be developed in order to be successful on solving the problems they face.

Critical thinking which helps people to look from different perspectives to problems and to think sophisticatedly, provides solving a faced problem more effectively. This relation between critical thinking abilities and problem solving skills shows that these skills should be investigated together, not separately. The relation between these two abilities was emphasized by many researchers (Chesla, 1999; Paul & Elder, 2006). Therefore, in the research, critical thinking and problem solving skills of candidate teachers and the relation between these two skills were investigated.

In this study which was conducted because of the idea that determining how much teacher candidates who are expected to increase thinking skills of individuals have these thinking abilities is a necessity, problem solving skills and critical thinking tendencies of candidate teachers who have taken pedagogical formation education were dealt with in terms of different variables. In this research which problem solving skills and critical thinking abilities have been investigated in detail, a profile related to problem solving and critical thinking levels of candidate teachers has been tried to be revealed. It is thought that this profile which has been prepared in the light of theoretic information and studies in literature, will contribute us to review our teacher education approach .

In the research, the followings have been aimed. To determine problem solving skills and critical thinking tendencies of candidate teachers, to detect the effect of gender and age variables on problem solving skills and critical thinking tendencies, to investigate the direction of relation between problem solving skills and critical thinking tendencies.

METHOD

Research Design

General survey model has been used in the study to determine problem solving and critical thinking skills of candidate teachers in the research (Karasar, 2005). The research is a descriptive study since it aims to reveal the existing condition and to explain it comprehensively (Çepni, 2005).

Study Group

The research has been conducted with the candidate teachers who took Pedagogical Formation education in Süleyman Demirel University in 2014-2015 education year. The research data has been collected from volunteer candidates. In this context, 136 candidate teachers have been included in the research, chosen by simple random sampling. Gender and age variations of the participants are shown in Table 1.

Table 1. Percentage Distributions of The Participants According To Their Genders

Variables	Sub-variables	f	%
Gender	Female	86	63,2
	Male	50	36,8
Age Groups	21-23	47	34,6
	24-26	47	34,6
	26 and higher	42	30,9
Total		136	100,0

Investigating Table 1 above, it is seen that of participants, 63,2% are female, 36,8% are male, 34,6% are between 21-23 ages, 34,6% are between 24-26 ages and 30,9% are upper ages of 26.

Data Collection

In order to determine problem solving skills of candidate teachers, “Problem Solving Skill Scale” prepared by Yaman (2003) has been used. In this scale, there are items about how candidate teachers behave against problems and how they struggle for solution. Cronbach Alpha (α) reliability coefficient of the scale which consists of thirty items prepared in five point likert type is .87. It can be said that the scale is highly reliable since it has the coefficient above .80 (Tavşancıl, 2002). The choices in likert type scale are determined as 1. Never, 2. Rarely, 3. Sometimes, 4. Often, 5. Always. The smallest possible grade of Problem Solving scale is 30, and the highest is 150.

“California Critical Thinking Tendency Scale” that was adapted to Turkish by Kökdemir (2003) has been used to determine critical thinking tendencies of candidate teachers. Cronbach Alpha (α) reliability coefficient of the scale which consists of 6 titles which are analyticalness, open mindedness, curiosity, self-confidence, seeking truth, systematicity, and 51 items, is .88. It can be said that the scale is highly reliable since it has the coefficient value above .80 (Tavşancıl, 2002). The smallest possible grade of the scale is 51, and the highest grade is 306. After the grading, the grades under 240 show low level of critical thinking skill, and the upper grades show that they have sufficient critical thinking skills (Kökdemir, 2003).

Data Analysis

For data analysis, SPSS 15.0 for Windows pack program was used. Whether the grades of candidate teachers in the scales used for determining problem solving and critical thinking levels, show normal distribution or not was checked by One-Sample Kolmogorov-Smirnov test. In case of showing an abnormal distribution, parametric tests cannot be used; nonparametric tests are used, instead (Yılmaz & Yılmaz, 2005). Since the obtained data through the research fits the normal distribution ($p>0,05$), independent samples t test was used to compare the averages belonging to females and males; One Way ANOVA was used to compare the averages according to ages; and correlation analysis was used for determining the relation between problem solving and critical thinking. Also, descriptive statistics were utilized and ($p<0,05$) level was based for significance level.

Findings of the research which has the aims to determine problem solving skills and critical thinking tendencies of candidate teachers, to detect the effect of gender and age variables on problem solving skills and critical thinking tendencies, to investigate the relation between problem solving skills and critical thinking tendencies are given in the tables and explained below.

FINDINGS

Table 3. "Problem Solving and Critical Thinking" Average Grades of the Participants

Variables	N	Lowest	Highest	X	Ss
Problem Solving	136	33	116	71,87	11,039
Critical Thinking	136	144	263	217,92	22,109

The average problem solving grade of the participants is 71,87 (with lowest 33, highest 116); and the average grade of critical thinking of the participants is 217,92 (with lowest 144, highest 263). Problem solving grades of the participants are at middle level; whereas, critical thinking grades of the participants are at low level.

Table 4. Comparison of "Problem Solving and Critical Thinking" Average Grades of the Participants in Terms of Their Gender

Variables	Gender	N	X	Ss	t	p
Problem Solving	Female	86	72,33	10,397	0,633	0,528
	Male	50	71,08	12,132		
Critical Thinking	Female	86	221,33	20,342	2,398	0,018*
	Male	50	212,06	23,948		

*$p<0,05$

Problem solving grades average of female participants was found as 72,33 and of males was found as 71,08. Critical thinking grades average of female participants was found as 221,33 and of males was found as 212,06. While there is not significant difference between averages of problem solving grades of female and male participants ($p>0,05$) statistically, there is significant difference between their critical thinking grades ($p<0,05$).

Table 5. Comparison of "Problem Solving and Critical Thinking" Average Grades of the Participants in Terms of Their Ages

Variables	Age Groups	N	X	Ss	t	p
Problem Solving	21-23	47	70,89	9,363	0,503	0,606
	24-26	47	73,13	12,241		
	26 and higher	42	71,55	11,477		
Critical Thinking	21-23	47	219,53	23,095	1,043	0,355
	24-26	47	219,96	19,390		
	26 and higher	42	213,83	23,758		

p>0,05

Problem solving grades average of 21-23 age group participants was found as 70,89; of 24-26 age group participants was 73,13; and of upper-26 age group participants was 71,55. Critical thinking grades average of 21-23 age group participants was 219; of 24-26 age group participants was 219; and of upper-26 age group participants was 213,83. There is some difference between problem solving and critical thinking skills in terms of ages; however those differences are not statistically significant (p>0,05).

Table 6. Correlation between Problem Solving and Critical Thinking

Correlation		Critical Thinking
Problem Solving	r	-,111
	p	,198
	n	136

There is a weak difference between problem solving scale grades and critical thinking scale grades in an opposite way and this difference is not significant statistically.

RESULT AND DISCUSSION

It was detected in this research that critical thinking tendencies of candidate teachers are at low level. In many researches which have been conducted to determine critical thinking tendencies of candidate teachers, the same results were reached (Akar, 2007; Dutoğlu & Tuncel, 2008; Kökdemir, 2003; Zayif, 2008). The condition that critical thinking skills of candidate teachers have not developed enough, shows that their pre-service education should be reviewed from the point of content and practices. In this context, the dominating idea about this subject is to give more courses aimed at developing critical thinking (Gülveren, 2007; Hager & Kaye, 1991; Saçlı & Demirhan, 2008).

It was determined in the research that female candidate teachers have higher critical thinking level than male candidates statistically. Also in other researches done in the literature, it was determined that women have higher critical thinking skills level than men (Gülveren, 2007; Gürleyük; 2008; Hamurcu et. al, 2005; Kökdemir, 2003; Kürüm, 2002; Zayif, 2008). The findings of this research have similarities with other researches' findings. However, in many researches done, it was determined that there is not a significant difference between female and male critical thinking levels (Akar, 2007; Korkmaz, 2009; Saçlı & Demirhan, 2008;

Tufan, 2008). This different results of the researches is a whole subject that should be investigated together with their causes; namely the researches which resulted women have higher critical levels and the researches which resulted there is not a significant difference between women and men.

In the research, critical thinking grades of candidate teachers from different age groups were investigated and it was determined that there is not a significant difference among critical thinking levels of the candidates in terms of age. In this context, Gülveren (2007), in the research done among education faculty students, also determined that there is not a meaningful relation between age and critical thinking. On the other hand, Kelly (2003) determined that as age increases, critical thinking levels also increase, as a result of the research done on candidate teachers. In addition to this, the researches which investigate critical thinking tendencies of candidate teachers in terms of class levels imply that as class level increases, critical levels of candidate teachers also increase (Kökdemir, 2003; Özden, 2005; Hamurcu et. al, 2005; Çubukçu, 2006; Gülveren, 2007; Zayif, 2008). On the other hand, the results of the researches which determined that as class level increases critical thinking levels decrease (Kürüm, 2002; Akar, 2007; Gülveren, 2007), make us think that these decreases and increases in critical thinking tendencies in terms of class level are a result of differences in education qualities, not ages. In this context, Semerci (2010) investigated critical thinking levels of candidate teachers in terms of university and branches comparatively and found that critical thinking tendencies of candidate teachers differ significantly in according to both universities and branches.

In this research, it was determined that the participants have a middle-level problem solving skills. This finding resemble to many researches done (Demirtaş & Dönmez, 2008; Yaman & Yalçın, 2005). When we investigate the relation between gender and problem solving skills, it was determined that both men and women have the same problem solving level. In the researches which investigated problem solving skills of candidate teachers in terms of gender variable (Altunçekiç Yaman & Koray, 2005; Aylar & Aksin, 2011; Bayraktar et. al, 2011; Çam, 1997; Genç and Kalafat, 2007; Kazu & Ersözü, 2008), the similar results were obtained. On the other hand, in some researches done, the result was obtained that implies there is a significant relation between gender and problem solving skills (Otacıoğlu, 2007; Selçuk, Çalışkan & Erol, 2007; Tümkaya & Polat, 2010). Therefore, new studies are needed in order to determine whether gender is an effective factor on problem solving skills or not.

In this research, it was determined that there is not a significant relation between age groups and problem solving skills of candidate teachers. In addition to this, the researches which investigated problem solving skill grade in terms of class level variable (Genç & Kalafat, 2007; Katkat, 2001; Tümkaya & İflazoğlu, 2000) revealed that as class level increases, problem solving skills also increase. This increase of candidate teachers on problem solving skills as class level increases, may be related to the education given in universities more than age. Therefore, the studies which are conducted comparatively on different sampling groups are needed. In this context, Otacıoğlu (2007) who investigated problem solving skills of candidate teachers comparatively among branches, stated that problem solving skills of candidate teachers differ according to branches. In this context, the factors which have effects on problem solving skill of candidate teachers should be investigated together with their reasons.

In the research done, a small and negative relation between critical thinking levels and problem solving skills of candidate teachers was determined, but this relation is not significant statistically. This result of the research is not consistent with the results of the study which was done by Tümkaya, Aybek & Aldağ (2009) about relation between critical thinking tendency and problem solving skill. It is considered that this condition may be a result of difference between sampling groups of two studies. In this context, more comparative studies on different sampling groups are needed to be done to determine the relation between problem solving skill and critical thinking tendency.

SUGGESTIONS

It is expected for this research in which a profile related to thinking skills of candidate teachers was tried to be revealed, to light the way for future researches. Because, there are both types of researches which are saying critical thinking tendency and problem solving skill change according to age and gender; and are saying critical thinking tendency and problem solving skill are independent from age and gender; and this condition creates a contradiction.
In this context, descriptive studies which deal effective factors on thinking skills of candidate teachers comprehensively and are aimed at determining the current case and needs are needed. On the other hand, it is regarded that especially experimental researches aimed at development of critical thinking and problem solving skills may be a guiding light in the related literature. Especially the results of the researches done to improve critical thinking levels (Aybek, 2006; Kökdemir, 2003; Mitchell, 2001; Semerci, 2003; Tok, 2008) show that critical thinking levels differ significantly. In a similar way, Yaman & Yalçın (2005) reached positive results for participants in their experimental research which was conducted to improve problem solving skills. Therefore, more descriptive and experimental researches are needed to contribute development of thinking skills of candidate teachers.

It is aimed to teach thinking skills to candidate teachers within the education period. In other words, it is expected that for candidate teachers to be sufficient in terms of thinking skills before they are graduated from their program. Some more studies aimed to determine goal-reaching levels of programs may be conducted to increase efficiencies of candidate teacher education programs.

Education periods and programs may be reviewed in a way that candidate teachers can improve their thinking skills more, for them in order to not only graduate from their universities as good teachers in terms of teaching, but also graduate as a successful teachers in terms of education.

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