The Relationship among Metacognitive Awareness, Self-Efficacy toward the Teaching Profession and the Problem-Solving Skills of Teacher Candidates*

Mehmet BARS[1] Behcet ORAL[2]

A R T I C L E I N F O	A B S T R A C T
	Purpose: This research is conducted for the purpose of examining the perceptions of teacher candidates regarding their metacognitive awareness, self-efficacy for the teaching profession and problem-solving skills. **Method:** The research has been conducted using a correlational research design. The sample group of the study comprised 1,475 teacher candidates randomly selected from the participants in a pedagogical formation program and senior students of Ziya Gokalp Faculty of Education in the spring semester of the academic year 2014-2015. In the research, a personal information form, a metacognitive awareness inventory, a teacher self-efficacy scale and a problem-solving inventory were used as the data collection tools.

Findings: It was found that the metacognitive awareness of teacher candidates is a significant predictor of their self-efficacy perception regarding the teaching profession. It was concluded that the metacognitive awareness of teacher candidates has significantly predicted their perception levels regarding their problem-solving skills. It was further determined that the perceptions of teacher candidates regarding their problem-solving skills have significantly predicted their perception levels regarding the teaching profession.

Implications for Research and Practice: The result of the research affirms the following suggestions. First, activities developing metacognitive awareness should be included in teacher training programs so that the metacognitive awareness of teacher candidates can be developed further. In this way, they will be able to comprehend the importance of metacognitive awareness. Second, instructors should use methods and techniques that will improve the metacognitive awareness of teacher candidates in their courses.

---

* This article has been produced from Mehmet Bars's PhD thesis
[1] Corresponding author: Dicle University, TURKEY, mehmetbars21@gmail.com, ORCID: orcid.org/0000-0002-8695-2648
[2] Dicle University, TURKEY, oralbehcet@gmail.com, ORCID: orcid.org/0000-0002-6885-1683

Introduction

Developments in daily life and their accompanying changes cause individuals to feel the necessity for a new type of learning. Since the term of education in school is limited to a certain time in order to meet the requirements of their future work, individuals are in need of lifelong learning to gain the knowledge and skills that they need in every part of their lives. The need for lifelong learning also creates the requisite for the individuals to gain the skill of learning how to learn. Individuals who are able to learn have the knowledge of accessing information, they are aware of learning activities, and by directing these activities they control the learning process. In this regard, it is extremely important to be able to educate individuals so they learn how to learn.

The individual's awareness and orientation of their learning skills can lead to easy and permanent learning. This situation increases the importance of metacognition that comprises phases such as the learning process of learners as well as watching, controlling and evaluating themselves during this process. Metacognition induces students to learn how to learn. Flavell (1979) defined metacognition as "knowledge and cognition about cognitive phenomena" and conceptualized this term as the knowledge a student possesses about his cognition (p.906-911). Metacognition is considered important due to its effects on acquisition, comprehension, retaining and recalling the learned material as well as learning efficiency, critical thinking and problem-solving (Hartman, 1998).

Metacognition affects a learner by helping him not only to focus on the learning material but also to recognize his cognitive power and weaknesses while deciding how to study. It makes the learner aware of his own thinking style (Celikoz, Erisen & Sahin, 2012). Metacognition comprises two interrelated types of information. The first type describes the knowledge a person should possess about what kind of source and tactics a duty requires. The second type of information refers to the knowledge a person should have about how and when to use these skills, this source and these tactics to achieve the duty with success (Schunk, 2009). It can be said that the cognitive skills of individuals who have these two types of information will develop and therefore they will confidently be able to solve the problems they face at a high level. From this aspect, we can see that the terms metacognition and self-efficacy are related to each other. In support of this suggestion, Yavuz (2009) states that there is a moderate relationship between metacognition and self-efficacy.

Self-efficacy is the key concept of social cognitive theory (Wood & Bandura, 1989), which states that people should first have self-confidence in the field before they can effectively use their existing skills. Bandura and Adams (1977) point out that as one's self-efficacy strengthens, the ability to cope with difficulties becomes stronger. The perception of the individual regarding self-efficacy affects the effort he expends on his activities, the amount of patience he shows to solve the problems that arise and the level of his trust and anxiety (Aydin & Demir, 2014). Korkmaz (2013) states that individuals whose self-efficacy is high can overcome their problems. In

that case, it is seen that individuals' self-efficacy and their problem-solving skills are related to each other.

Problem solving is the effort to reach the goal when there is no automated solution. It can be said that we are in a struggle to solve problems in almost every aspect of our lives when the effort and time spent to solve the difficulties in daily life are accepted as problem-solving efforts. It is thought that one's problem-solving skills can be improved, regardless of his intelligence and socioeconomic position (Duman, 2012). Referred to by Miller & Nunn (2003) it has been said that problem solving is learned from childhood and problem-solving skills are developed during the school years (as cited in Cam & Tumkaya, 2008, p.4).

Problem solving means how the individual feels, what he thinks, how he behaves and how he overcomes the daily problems he faces (Heppner, 1987). Shewchuck, Johnson and Elliott (2000) define problem-solving skills as the cognitive and affective-borne behaviors people show in order to accommodate changes in their social life. Problem-solving skill is the ability to comprehend and understand a problem one encounters, choosing a suitable strategy for a solution, using the chosen solution and interpreting the results thereof. Briefly, this can be called "reasoning" (Altun, 2005).

Referred to by Flavell (1987) as "metacognitive development nests", good schools provide a self-conscious learning environment (as cited in Akin & Abaci, 2011, p.26). This notion indicates the importance of teachers being qualified to create such learning environments in the schools. The teaching profession plays an important role in establishing the quality of educational services. It is an everlasting adage that the better the quality of the teacher, the better the quality of the education service (Mahiroglu, 2012), as teachers have a crucial impact on the developmental characteristics of learners. However, teachers must first develop their own metacognitive awareness and problem-solving skills so they can help their students with theirs. It can be said that teachers with high metacognitive awareness, improved problem-solving skills and high self-efficacy regarding their perception of the teaching profession can contribute to the development of metacognitive awareness and problem-solving skills in their students. Therefore, it is very important for the teachers to develop themselves within these aspects.

Gunstone and Northfield (1994) state that the education of teachers should be centered on metacognition training. Since teacher candidates have an important role in the future as well, the perceptions of this group should be examined from various perspectives. This study aims to examine the perception of teacher candidates with a focus on their problem-solving skills, self-efficacy levels for the teaching profession and their metacognitive awareness. This study focuses on the relationship among these variables. As a result, it is important to increase metacognitive awareness, to determine the self-efficacy level for the teaching profession and the perception levels of developing problem-solving skills. In this regard, the perceptions about metacognitive awareness of teacher candidates, their problem-solving skills and

teaching profession self-efficacy levels are examined according to some variables. For this purpose, responses were sought for the following research questions:

1. What is the level of teacher candidates' self-efficacy toward metacognitive awareness, the teaching profession and their perception in relation to problem-solving skills?

2. Does teacher candidates' metacognitive awareness significantly predict the level of their self-efficacy toward the teaching profession?

3. Does teacher candidates' cognitive awareness significantly predict their perception regarding problem-solving skills?

4. Do teacher candidates' metacognitive awareness and their perception regarding problem-solving skills together significantly predict their self-efficacy toward the teaching profession?

5. Do teacher candidates' perceptions regarding problem-solving skills significantly predict their self-efficacy perception level toward the teaching profession?

Method

Research Design

A correlational research design model was used in this study. Correlational research design is a research model that aims to determine the existence and/or degree of covariance between two or more variables (Karasar, 2009).

Research Sample

The universe of the research consisted of 2,883 teacher candidates enrolled in the Ziya Gokalp Education Faculty of Dicle University in spring semester of 2014-2015. Of this total, 1,115 were senior class students and 1,768 were candidates in the teaching certification program. The sample set of the research, chosen randomly from these two groups, consisted of 1,475 teacher candidates, with 871 of them (59%) female and 604 (41%) male.

Data Collection

In the research, a 52-item cognitive awareness inventory, which was transcribed by Akin et al. (2007) into Turkish, was used to identify the level of teacher candidates' cognitive awareness. Akin et al. (2007) calculated the compliance validity of the scale as .95 and said that after item analysis, item-test correlations of subscales varied between .35 and .65. In addition, internal consistency and test-retest reliability coefficients of the inventory were calculated as .95. In our present research, reliability coefficients in relation to all scale and subscales are given in Table 1.

Table 1

Reliability Coefficients Calculated with Cognitive Awareness Scale by the Internal Consistency Method

Subscales	Internal Consistency (Cronbach's alpha)
Explanatory information	.68
Procedural information	.55
Situational information	.60
Planning	.66
Watching	.70
Evaluating	.62
Debugging	.59
Managing information	.68
For the total scale	.93

In Table 1, it is seen that the overall reliability coefficient for the scale is .93 and the subscale reliability coefficient varies between .55 and .70. In general, scales with a reliability coefficient of .70 and over are accepted as reliable (Leech, Barrett & Morgan, 2005; Domino & Domino, 2006; Fraenkel, Wallen & Hyun, 2012). But it is determined that reliable coefficients over .50 can be a criterion for scales that have few items (Nunnaly & Bernstein, 1994; Raines-Eudy, 2000). In this direction, although the reliability coefficient of the scale consisting of 52 items at full dimension is calculated as .93, the reliability coefficient of the procedural information subdimension consisting of four items is .55 and the reliability coefficient of the debugging subdimension consisting of five items is .59. The main reason for this result can be that the number of items is less in these subdimensions. Therefore, it can be said that all values obtained from reliability studies either at overall dimensions of the cognitive awareness scale or within its subdimensions are acceptably reliable considering the criteria of the reliability coefficient.

The self-efficacy scale toward the teaching profession was developed by using confirmatory factor analysis (CFA). Because having the knowledge of the underlying latent variable structure of self-efficacy toward the teaching profession (Byrne, 1989), CFA was used to confirm the theoretically driven item set of self-efficacy of the teaching profession. The self-efficacy scale toward the teaching profession was applied as 25 items with a 5-point Likert-type gradation. The applied scale consisted of three subdimensions. These subdimensions were "class management", "providing student participation" and "teaching strategies". In light of the analysis made after the application, 4 items of the scale with high error rates have been removed, so that the final scale consisted of 21 items. The factor loads and subdimensions are indicated in Figure 1.
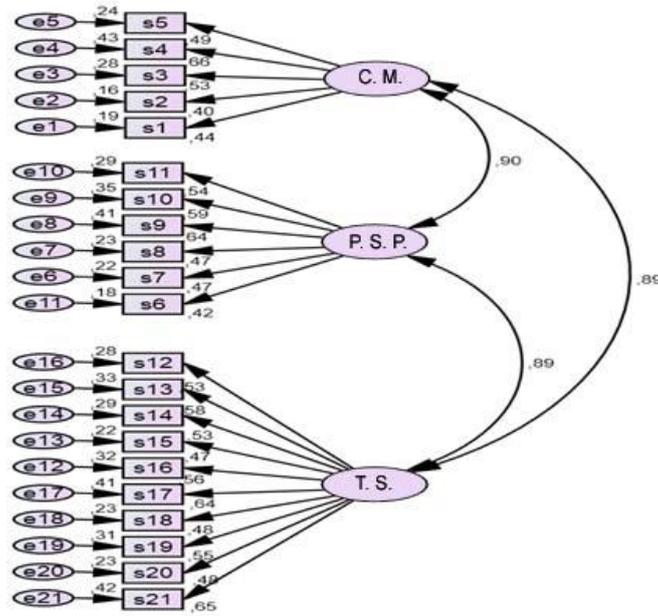
Figure 1. *Conformatory Factor Analysis of the Self-Efficacy Scale toward the Teaching Profession*

According to the cut-off values indicated in the literature (Meydan ve Sesen, 2011), CFA yielded indications of a good fit for the proposed model CFA (X2=356.953, df=186, X2/df=1.91, GFI=0.92 AGFI=0.91, IFI=0.92, RMSEA=0.46).

To put forth compliance validity of the self-efficacy scale toward the teaching profession, the teacher self-efficacy perception scale developed by Tschannen-Moran and Woolfolk-Hoy (1998) and the reliability and validity studies conducted by Kose (2007) have been used. Two scales were applied at the same time to 129 students of the teaching certification program in Ziya Gokalp Education Faculty of Dicle University, in the first semester of academic year 2014-2015. According to the subsequent findings of Pearson's Product Moment Correlation, a powerful and significant relation (r=.80) was found between the two scales (p<.01). The reliability of self-efficacy toward the teaching profession was calculated using internal consistency and test-retest methods. The developed scale was administered two weeks apart to the same 129 students. In light of the data obtained, the test-retest and internal consistency (Cronbach's alpha) reliability coefficient of the scale was calculated. The results toward the studies in relation to the overall scale and its subdimensions are given in Table 2.

Table 2

Reliability Coefficients of the Self-Efficacy Scale toward the Teaching Profession Calculated by the Internal Consistency and Test-Retest Methods

Subscales	Internal Consistency (Cronbach's alpha)	Test-Retest
Classroom management	.62	.71
Providing student participation	.69	.78
Teaching strategies	.81	.76
For the total scale	.88	.83

According to data obtained as a result of Pearson's Product Moment Correlation (r=.80 (p<0.1)), a powerful and significant relation was determined for compliance validity of the self-efficacy scale toward the teaching profession. Factor loads were included within the scope of item discrimination of the scale. It was determined that factor loads of the scale items were between .40 and .66 at primary level CFA. As a result of all of these analyses, it was concluded that the self-efficacy scale toward the teaching profession is a highly reliable and valid measurement tool.

The values obtained from the reliability studies conducted for this research on collected data of the self-efficacy scale toward the teaching profession are given in Table 3.

Table 3

Reliability Coefficients of Self-Efficacy toward the Teaching Profession Calculated by the Internal Consistency Method

Subscales	Internal Consistency (Cronbach's alpha)
Classroom management	.79
Providing student participation	.86
Teaching strategies	.90
For the total scale	.94

As can be seen in Table 3, the findings obtained with the self-efficacy scale toward the teaching profession were found to be reliable for both the overall scale and the subscales.

To determine the perceptions of the teacher candidates regarding their problem-solving skills, a problem-solving inventory (Sahin, Sahin & Heppner, 1993) was used. The scale consists of 6 subdimensions. In this research, Cronbach's alpha coefficients obtained for the overall scale of problem solving and for subdimensions are given in Table 4.

Table 4

The Reliability Coefficient of Problem-Solving Inventory Calculated by the Internal Consistency (Cronbach's alpha) Method

Subscales	Internal Consistency (Cronbach's alpha)
Hasty approach	.79
Thoughtful approach	.80
Avoiding approach	.76
Evaluating approach	.76
Self-Confident approach	.75
Planned approach	.76
For the total scale	.89

When Table 4 is reviewed, it is seen that the results obtained from the overall scale of problem solving and the subscales thereof are found reliable in this research.

Data Analysis

Regression analysis was used for data analysis. The Metacognitive Awareness Inventory is a 5-point Likert-type scale. It consists of these five options: strongly agree, agree, partly agree, disagree and strongly disagree. Scale span was found as 5-1=4, 4/5=0.80. The option limits of the scale are as follows: 1.00-1.80: very low; 1.81-2.60: low; 2.61-3.40: medium; 3.41-4.20: high; 4.21-5.00: very high.

A second data collecting tool, the Self-Efficacy Scale toward the Teaching Profession, is also a 5-point Likert-type scale and consists of these five options: never, rarely, frequently, often and always. Scale span was found as 5-1=4, 4/5=0.80. The option limits of the scale are as follows: 1.00-1.80: very low; 1.81-2.60: low; 2.61-3.40: medium; 3.41-4.20: high; 4.21-5.00: very high.

A third data collecting tool, Problem-Solving Inventory, is a 6-point ikert-type scale and consists of these six options: always, often, frequently, sometimes, rarely and never. Scale span was found as 6-1=5, 5/5=1. The option limits of the scale are as follows: very low:1.00-2; low:2.01-3; medium:3.01-4; high:4.01-5; very high:5.01-6

When option limits regarding the problem-solving inventory are considered, it is seen that the low score obtained from this inventory indicates that the perception regarding problem-solving skills is high.

Results

The level of teacher candidates' self-efficacy toward metacognitive awareness, the teaching profession and their perception in relation to problem-solving skills are showed in Table 5.

Table 5

Average and Standard Deviation Values Regarding Total and Subdimension Scores of Teacher Candidates' Metacognitive Awareness, Self-Efficacy toward the Teaching Profession and Problem-Solving Skills

		n	M	Sd
Metacognitive awareness	Explanatory information	1475	3.85	.52
	Procedural information	1475	3.52	.65
	Situational information	1475	3.83	.58
	Planning	1475	3.64	.60
	Watching	1475	3.58	.59
	Evaluating	1475	3.66	.60
	Debugging	1475	3.69	.66
	Information management	1475	3.75	.54
	Total	1475	3.70	.46
Self-efficacy toward teaching profession	Classroom management	1475	3.95	.65
	Providing student participation	1475	4.09	.67
	Teaching strategies	1475	4.07	.64
	Total	1475	4.05	.59
Problem-solving inventory	Hasty approach	1475	3.96	.93
	Thoughtful approach	1475	2.54	.99
	Avoiding approach	1475	4.56	1.12
	Evaluating approach	1475	2.65	1.13
	Self-confident approach	1475	2.56	.92
	Planned approach	1475	2.50	1.03
	Total	1475	2.70	.67

In Table 5, it is seen that the highest score obtained from the total scale and subdimensions is at the "explanatory information" subdimension, while the lowest one is at the "procedural information" subdimension. All total and subdimension score averages are between 3.52 and 3.85. These values show that the total and subdimension scores of teacher candidates' metacognitive awareness are "high".

When Table 5 is examined, it can be seen that the total and subdimension scores regarding teacher candidates' self-efficacy toward the teaching profession are between 3.95 and 4.09. This situation indicates that teacher candidates' self-efficacy perception toward the profession is high for both the overall scale and the subdimensions.

In the same table, teacher candidates' perceptions regarding problem solving and the averages regarding total and subdimension scores vary between 2.50 and 4.55. Among these subdimensions, "planned approach" is the subdimension with the lowest average score, whereas "avoiding approach" has the highest score. When the scoring form of the problem-solving scale is considered, an increase of the average score means a decrease of the perception in the related subdimension. Therefore, among the perceptions of these subdimensions regarding problem-solving skills,

"avoiding approach" has the lowest score and "planned approach" has the highest score.

The analysis results about prediction of teacher candidates' metacognitive awareness to the level of their self-efficacy toward the teaching profession are depicted in Table 6.

Table 6

Regression Analysis Results Regarding Predicting the Level of Self-Efficacy toward the Teaching Profession

	B	Standard Error $_B$	β	t	p
Fixed	2.119	.112	-	18.853	.000
Metacognitive Awareness	.522	.030	.411	17.318	.000

R=.411   R²=.169
F$_{(1,1473)=}$299.908   p=.000

When Table 6 is examined, it is seen that the correlation value between metacognitive awareness scores and self-efficacy scores of teacher candidates is .411. That value suggests a significant relation between these two variables in a positive direction.

In Table 7 the correlation between metacognition and problem-solving skills was determined as -.410. This means problem-solving skills scores decrease while metacognitive awareness scores are increasing. However, the decrease of problem-solving skills scores means the increase of perception regarding problem-solving skills. Therefore, it can be suggested that the increase in the level of metacognitive awareness also increases the perception regarding problem-solving skills.

Table 7

Regression Analysis Results about Predicting the Perception Level of Problem-Solving Skills

	B	Standard Error B	β	t	p
Fixed	4.876	.127	-	38.263	.000
Metacognitive Awareness	-.590	.034	-.410	17.254	.000

R=.410   R²=.168
F(1,1473)=297.718   p=.000

In another analysis whether the teacher candidates' metacognitive awareness and their perception regarding problem-solving skills together significantly predict their self-efficacy toward the teaching profession is examined in Table 8.

Table 8

Standard Multiple Regression Analysis Results about Predicting the Level of Self-Efficacy toward the Teaching Profession with Metacognitive Awareness and Problem-Solving Skills

	B	Standard Error B	β	t	p	rBinary	rPartial
Fixed	3.442	.151	-	22.790	.000	-	-
Metacognitive awareness	.362	.031	.285	11.506	.000	.411	.287
Problem-solving skills	-.271	.022	-.308	12.410	.000	-.425	-.308

R=.498   R2=.248

F(2,1472)=242.538   p=.000

When Table 8 is examined, it is seen that metacognitive awareness and problem-solving skills together become an important predictor for self-efficacy perception. Finally the correlation between problem-solving skills and self-efficacy perception level of the teacher candidates is examined in the Table 9.

Table 9

Regression Analysis Results about Predicting the Level of Self-Efficacy toward the Teaching Profession

	B	Standard Error $_B$	β	t	p
Fixed	5.060	.058	-	87.562	.000
Problem-solving skills	-.375	.021	-.425	-17.994	.000

R=.425   R2=.180

F$_{(1,1473)}$=323.794   p=.000

When table 9 is examined, the correlation between problem-solving skills and self-efficacy perception level is determined as -.425. This situation shows that the self-efficacy score increases when the problem-solving skill score decreases.

Discussion and Conclusion

Let us return to the first question asked in this research: What is the level of teacher candidates' self-efficacy toward metacognitive awareness, teaching profession and their perception regarding problem-solving skills? When the results of the analysis were examined, it was determined that teacher candidates had a high level of metacognitive awareness both in the total score and in the subdimensions. Akin et al. (2007) and Yavuz (2009) determined in their own studies that the total and subdimension points of metacognitive awareness of teacher candidates reached a

high level. The results of that research parallel the results of this research. It can be said that the education and major training courses taken by the teacher candidates make their level of metacognitive awareness high. It was found that the average of the procedural information subdimension is lower in comparison to other subdimensions although the metacognitive awareness of teacher candidates is high in general. Procedural information is defined as knowing the answer to "how" questions about something and the information about doing something (Kyllonen & Woltz, 1989). It is most likely that the average for the procedural subdimension is lower because the teacher candidates' awareness about choosing the best strategy for themselves during their studying and learning process did not develop as much as the other facets of awareness regarding metacognition. When the results of the perceptions of teacher candidates regarding self-efficacy toward the teaching profession are examined, it is seen that the levels of both the total score and the subdimension scores are high. Another study supports this result: Mutlu Bozkurt (2013) determined that the self-efficacy level of teacher candidates is high. Similarly, in their study, Tschannen-Moran and Woolfolk Hoy (2001) determined that teachers perceived themselves highly sufficient in the subdimensions of efficiency in student participation, educational strategies and classroom management of the general self-efficacy dimension. This can be interpreted as saying the teaching education given to teacher candidates improves their self-efficacy regarding their profession. Nevertheless, the average scores obtained from the total scale and subdimensions are at the "high" level, so these should possibly be accelerated toward the "very high" level. This is because the self-efficacy perception of people who perform a profession like teaching, which can direct the development of a community, should be as high as possible. "Classroom management" was determined as the subdimension with the lowest average among all the subdimensions. This situation probably originates from the lack of classroom management practice during teaching education.

The findings about the perceptions regarding the problem-solving skills of teacher candidates show that the scores for the subdimensions of "thoughtful approach", "evaluating approach", "self-confident approach" and "planned approach" are high, "hasty approach" is medium, and "avoiding approach" is low. Among these findings, "hasty approach" should be explained at more length. When the behaviors of this subdimension are considered, it is seen that items like "When I think about solutions for a problem, I can't find very many options" are included. Due to the average level of this subdimension being medium, it can be interpreted as saying that teacher candidates prefer to use familiar solutions when they face a problem instead of generating a number of possible ideas to solve that problem. When this situation is considered, teacher candidates should face more situations in their training where they can generate more ideas and alternatives. However, we have said that the perception level of teacher candidates regarding problem-solving skills was determined to be high, so the perception score 2,69 should be pushed up to the "1-2" range which is expressed as a very high level.

Turning to the second question of the research, teacher candidates' metacognitive awareness is found to be a significant predictor for self-efficacy perception toward

the teaching profession. In addition, it was determined that there is a medium-level correlation between the perception regarding metacognitive awareness and the perception toward the teaching profession in a positive direction. This reveals that the self-efficacy perception level regarding the teaching profession increases when the perception regarding metacognitive awareness level also increases. Therefore, the perception level regarding metacognitive awareness enables making estimations about the self-efficacy perception level regarding the teaching profession. It is believed that metacognition enables thinking strategically while a duty is being fulfilled and this increases the trust to fulfill the relevant duty. This can also be the reason for the positive correlation between metacognition and self-efficacy. Yavuz (2009) determined that there is a positive relation at medium level between the levels of general self-efficacy and general metacognitive awareness. Cikrikci (2012) determined that there is a significant positive correlation between metacognitive awareness and its subdimensions, self-efficacy and life satisfaction. Furthermore, in the same study, metacognitive awareness levels were determined to be an important predictor for self-efficacy perceptions. Vadhan and Stander (1994) determined that the more university students' metacognitive skills increase, the more realistic their expectations. It is thought that an individual's realistic expectations are related to his awareness regarding self-efficacy. In this regard, it can be said that there is a positive correlation between metacognitive skills and self-efficacy. Landine and Stewart (1998) determined that there is a positive correlation between metacognition and self-efficacy. All of these results support the results obtained in this research.

Our fourth question was this: Does teacher candidates' cognitive awareness significantly predict their perception regarding problem-solving skills? Considering the regression analysis about perceptions regarding teacher candidates' metacognitive awareness and problem-solving skills, it is seen that the correlation value between metacognition and problem-solving skills are in contrary directions and at a medium level. This means that the perception score regarding problem-solving skills decreases when the metacognitive awareness score increases. However, based upon the format of scale scoring, the decrease of problem-solving skills perception score means that the perception level regarding problem-solving skills will increase. In this regard, it can be said that the correlation between the perception level regarding metacognitive awareness and the perception level regarding problem-solving skills is in a positive direction and at a medium level. Moreover, it was determined that metacognitive awareness is a significant predictor of problem-solving skills. When these are taken into consideration, the perception level of problem-solving skills will increase when metacognitive awareness increases; additionally, it can be suggested that the perception level regarding metacognitive awareness will enable us to predict the perception level regarding problem-solving skills. It is thought that metacognition effects problem solving in terms of providing means to get knowledge, to preserve it and to use it when needed. In parallel with this thought, Guss and Wiley (2007) determined that metacognition has an important role for all approaches to problem solving, envisaging the problem with its various aspects, forming the new combinations of substantial knowledge, comparative thinking, generating new ideas and producing a special way toward a solution.

Kiskir (2011) determined that there is a negative correlation between teacher candidates' metacognitive awareness and problem-solving skills. He found that the score increase from the problem-solving inventory will mean a decrease of the perception due to the format of the problem-solving skill inventory. This means, that in Kiskir's research, the two perception levels – metacognitive awareness and problem-solving skills – show a change in the same direction, thus supporting the results of this study. Teong (2003) determined that knowing how and when to use metacognitive strategies is an important determinant for successful problem-solving skills. Yildirim (2010) said there is a stronger relation between problem types requiring more skill for the solution and the metacognitive awareness level compared to the problem types solving require less skill for the solution. Kiremitci (2012) determined that the use of the problem-solving method will be conducive to the development of the metacognitive awareness level.

Reaching the fourth question – Do teacher candidates' metacognitive awareness and their perception regarding problem-solving skills significantly predict their self-efficacy toward the teaching profession?, it was determined that the answer was a strong affirmative. Altogether metacognitive awareness and problem-solving skills have explained approximately one-fourth of the total variance in the perception regarding self-efficacy level. When Korkmaz (2013) sorts the characteristics of the individuals who have high self-efficacy, he highlights that they can also overcome complex cases and problems. It is thought that metacognitive awareness is very important to be able to overcome complex cases. Therefore, Korkmaz's emphasis on the metacognitive awareness and problem-solving skills of the individuals who have high self-efficacy overlap with the results of this research. This also suggests that the development of teacher candidates' metacognitive awareness and problem-solving skills boosts their self-efficacy regarding the teaching profession, too.

The analysis also determined that the fifth research question – Do teacher candidates' perceptions regarding problem-solving skills significantly predict their self-efficacy perception level toward the teaching profession? – was answered positively. Besides, it was determined that there is a negative correlation between the problem-solving skills score and the self-efficacy perception score at a medium level. When the problem-solving inventory is considered, it is seen that the high score obtained from this inventory indicates low-level problem-solving skills. Therefore, the problem-solving skill level and the self-efficacy perception level toward the teaching profession display a change in the same direction, which means the increase in the level of problem-solving skills is accompanied by the increase of self-efficacy level at the same time. Similarly, a decrease in the level of problem-solving skills causes a decrease in the self-efficacy level toward the teaching profession. Bayraktar (2014) determined that there is a positive significant correlation between problem-solving skills, teaching profession knowledge and total scores of the self-efficacy trust level at a medium level toward general cultural knowledge. Similarly, Donmez (2010) found a positive and significant correlation between teacher candidates' self-efficacy and problem-solving skills in his research. The results of his study and the current research parallel each other. When all these results are considered, it can be

said that the teaching profession is not just a matter of organizing teaching activities. It also requires teachers to overcome the problems they face during the teaching process.

In conclusion, the process of preparing teacher candidates should involve them in more cases where they will need to generate ideas and alternatives to improve their problem-solving skills. The ability of teacher candidates to find alternative solutions can be improved by using such techniques as problem solving, brainstorming, and de Bono's six thinking hats during their training. One way or the other, teacher training programs should bring applications based on developing teacher candidates' problem-solving skills to the forefront.

References

Akin, A. & Abaci, R. (2011). *Bilis otesi.* Ankara: Nobel Yay.

Akin, A., Abaci, R., & Cetin, B. (2007). The validity and reliability study of the Turkish version of the Metacognitive Awareness Inventory. *Educational Science: Theory & Practice,* 7 (2), 655-680.

Altun, M. (2005*). İlkogretim ikinci kademede (6,7 ve 8. siniflarda) matematik ogretimi* (4. Baski). Bursa: Aktuel Yay.

Aydin, S. & Demir, T. (2014). *Oz-duzenlemeli ogrenme.* Ankara: Pegem Akademi Yay.

Bandura, A. & Adams, E.N. (1977). Analysis of self-efficacy theory of behavioral change. *Cognitive Therapy and Research, 1 (4),* 287-310

Bayraktar, A. (2014). *İlahiyat egitiminin ogrencilerin ogretmenlik meslegine yonelik oz yeterlik inanc duzeyleri ve problem cozme becerilerine katkisi.* [The contribution of theology education to the self-efficacy belief levels of students towards the teaching profession and the skills of problem solving]. Yayimlanmamis Yuksek Lisans Tezi. Ataturk Universitesi. Egitim Bilimleri Enstitusu. Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Byrne, B. M. (1989). *A primer of LISREL:Basic applications and programming for confirmatory factor analytic models.* New York: Springer-Verlag.

Cam, S., & Tumkaya, S. (2008). Kisiler arasi problem cozme envanteri lise ogrencileri formu'nun gecerlik ve guvenirlik calismasi [Development of interpersonal problem solving inventory for high school students: The validity and reliability process]. *Uluslararasi İnsan Bilimleri Dergisi,* 5 (2), 1-17

Celikoz, N., Erisen,Y., & Sahin, M. (2012). Bilissel ogrenme kuramlari. In Kaya, Z. (Ed.), *Ogrenme ve ogretme kuramlar, yaklasimlar, modeller* (pp. 49-74). Ankara: Pegem Akademi Yay.

Cikrikci, O. (2012). *Ustun yetenekli ogrencilerin bilis otesi farkindalik duzeyleri ile oz yeterlik algilarinin yasam doyumunu yordama gucu.* [The predictive strength of metacognitive awareness and self efficacy beliefs on life satisfaction among gifted students].Yayimlanmamis Yuksek Lisans Tezi. Karadeniz Teknik Universitesi. Egitim Bilimleri Enstitusu. Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Domino, G., & Domino, M. L. (2006). *Psychological testing: An introduction.* Cambridge: Cambridge University Press.

Donmez, K.H. (2010*). Beden egitimi ve spor ogretmenligi bolumu ogrencilerinin (1., 2., 3., ve 4. sinif) sosyal oz yeterlikleri ile problem cozme becerileri arasindaki iliskinin incelenmesi.* [relationship between social efficacy and problem solving abilities of students in Department of Physical Education and Sports Teaching.(1st,2nd,3rd and 4 th grades)]. Yayimlanmamis Doktora Tezi. Gazi Universitesi Egitim Bilimleri Enstitusu. Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Duman, B. (2012). *Neden beyin temelli ogrenme. (3.Baski).* Ankara: Pegem Akademi Yay.

Flavell, J.H. (1979). Metacognitive and cogntive monitoring: A new area of cogniive-developmental ınquiry. *American Psychologyst,* 34 (10), 906-911.

Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2012*). How to design and evaluate research in education.* New York: McGraw Hill.

Gunstone, R. F. & Northfield, J. (1994). Metacognition and learning to teach. *International Journal of Science Education, 16 (5)*, 523-537.

Guss, C.D., & Wiley, B. (2007). Matacognition of problem-solving strategies in Brazil, India, and the United States. *Journal of Cognition and Culture,* 7, 1-25.

Hartman, J. H. (1998). Metacognition in teaching and learning: *An introduction. Instructional Science,* 26, 1–3,

Heppner, P.P. (1987). Introduction: Broadening the conceptualization of problem solving within career planning. *Journal of Career Development,* 14(1), 3-7.

Karasar, N. (2009). *Bilimsel arastirma yontemi* (20. Baski). Ankara: Nobel Yayin Dagitim.

Kiskir, G. (2011*). Ogretmen adaylarinin bilis otesi farkindalik duzeyleri ile problem cozme becerileri arasindaki iliskinin incelenmesi.* [Investigation of the relationship betwen metacognitive awareness levels and problem solving skills of prospective teachers]. Yayimlanmamis Yuksek Lisans Tezi. Ataturk Universitesi. Egitim Bilimleri Enstitusu. Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Kiremitci, O. (2012). *Problem cozme yontemiyle duzenlenmis beden egitimi derslerinin problem cozme becerilerine etkisi ve ustbilissel farkindalik duzeyleriyle ilişkisi.*

[The effects of physical educations classes designed with problem solving method on problem solving abilities and its relationship with the levels of meta-cognitive awareness]. Yayimlanmamis Yuksek Lisans Tezi. Ege Universitesi Saglik Bilimleri Enstitusu. Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Korkmaz, I. (2013). Sosyal ogrenme kurami. In Yesilyaprak, B. (Ed.), *Egitim psikolojisi* (10.Baski) (pp. 246-269). Ankara: Pegem Akademi Yay.

Kose, I.A. (2007). *Ogretmen oz yeterlik algisi olceginin farkli gruplarda yapi gecerliginin sinanmasi.* [Investigating construct validity of teachers? sense of efficacy scale across common groups]. Yayimlanmamis Yuksek Lisans Tezi. Ankara Universitesi. Egitim Bilimleri Enstitusu. Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Kyllonen, P. C., & Woltz, D. J. (1989). Role of cognitive factors in the acquisition of cognitive skill. In R. Kanfer, P. C. Ackerman, & R. Cudeck (Ed.), *Abilities, motivation, and methodology: The Minnesota Symposium on learning and individual differences* (pp. 239-280). Hillsdale, NJ: Lawrence Erlbaum.

Landine, J., & Stewart, J. (1998). Relationship between metacognition, motivation, locus of control, self-efficacy, and academic achievement. *Canadian Journal of Counselling,* 32 (3), 200-212.

Leech, N.L., Barrett, K.C., & Morgan, G.A. (2005). *SPSS for intermediate statistics; use and interpretation.* Mahwah, NJ: Lawrence Erlbaum Associates.

Mahiroglu, A. (2012). Ogretmenlik meslegi ve ogretmen yetistirmede gelismeler ve yenilikler. In Demirel, O. & Kaya, Z. (Ed.), *Egitim bilimine giris* (7.Baski) (pp. 373-419). Ankara: Pegem Akademi Yay

Meydan, C.H., & Sesen, H. (2011). *Yapisal esitlik modellemesi Amos uygulamalari.* Ankara: Detay Yay.

Mutlu Bozkurt, T. (2013). *Beden Egitimi ogretmeni adaylarinin ogretmenlik oz yeterliklerinin incelenmesi.* [investigation of physical education teacher candidates teaching self efficiency]. Yayimlanmis Yuksek Lisans Tezi. Gazi Universitesi. Egitim Bilimleri Enstitusu. Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Nunnaly, J., & Bernstein, I. (1994). *Psychometric theory.* New York: McGraw-Hill.

Raines-Eudy, R. (2000). Using structural equation modeling to test for differential reliability and validity: An empirical demonstration. Structural Equation Modeling: *A Multidisciplinary Journal,* 7 (1), 124-141.

Schunk, H.D. (2009). *Ogrenme teorileri.* (Translate: Sahin, M.) Ankara: Nobel Yay.

Shewchuck, R.M., Johnson, M.O., & Elliott, T.R. (2000). Self-appraised social problem solving abilities, emotional reactions and actual problem solving performance. *Behaviour Research and Therapy*, 38, 727-740.

Sahin, N., Sahin, N. H., & Heppner, P. P. (1993) Psychometric properties of the problem solving inventory in a group of Turkish university students. *Cognitive Therapy and Research,* 17 (4), 379-396.

Teong, S. K. (2003). The effects of metacognitive training on mathematical word-problem solving. *Journal of Computer Assisted Learning,* 19, 46-55.

Tschannen-Moran, M., & Woolfolk Hoy, A. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education, 17,* 783–805.

Vadhan, V., & Stander, P. (1994). Metacognitive ability and test performance among college students. *The Journal of Psychology,* 128 (3), 307-309.

Wood, R., & Bandura, A., (1989). Social cognitive theory of organizational managenment. *Academy of Management Review, 14 (3),* 361-384.

Yavuz, D. (2009). *Ogretmen adaylarinin oz yeterlik algilari ve ustbilissel farkindaliklarinin cesitli degiskenler acisindan incelenmesi.* [Study on preservice teachers? self-efficacy perceptions and metacognitive awareness in terms of different variablesYayimlanmamis]. Yuksek Lisans Tezi. Karaelmas Universitesi. Sosyal Bilimler Enstitusu. Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Yildirim, S (2010). *Universite ogrencilerinin bilis otesi farkindaliklari ile benzer matematiksel problemleri cozmeleri arasindaki iliski.* [The relationship between university students? metacognitive awereness and solving similar type of mathematical problems]. Yayimlanmamis Yuksek Lisans Tezi. Gaziosmanpasa Universitesi Sosyal Bilimler Enstitusu. Retrieved from https://tez.yok.gov.tr/UlusalTezMerkezi/

Öğretmen Adaylarının Üstbilişsel Farkındalıkları, Öğretmenlik Mesleğine Yönelik Öz Yeterlikleri ve Problem Çözme Becerileri Arasındaki İlişki

Atıf:

Özet

Problem Durumu: Günümüz dünyasında; gerek iş yaşamında, gerek kişiler arası ilişkilerde, gerekse bilim ve teknolojide hayata dair çok hızlı gelişmeler yaşanmaktadır. Bu gelişmeler beraberinde hızlı bir değişimi de meydana getirmektedir. Meydana gelen bu değişimlere uyum sağlayabilmek için yeni öğrenmelerin oluşması gerekmektedir. Okullarda gerçekleşen öğrenmeler zaman bakımından sınırlı olduğundan hayatın her evresinde gerek duyulan öğrenmeler yaşam boyu öğrenme ihtiyacını ön plana çıkarmaktadır. Bu ihtiyacın giderilebilmesi için öğrenmeyi öğrenme becerilerini kazanmak son derece önem taşımaktadır.

Öğrenmeyi öğrenme, bireyin bilgiye ulaşmayı öğrenmesi bakımından çok önemlidir. Birçok öğrenci bir göreve dair bilgi ve beceriye sahip olmasına rağmen ilgili bilgi ve beceriyi nasıl kullanacağını bilmediğinden söz konusu beceriler durağanlaşmaktadır (Akın & Abacı, 2011). Üstbilişsel becerilerin gelişmemesinin de bu durumun sebepleri arasında olduğu düşünülmektedir. Çünkü üstbilişsel becerileri gelişmiş bireyler nasıl öğrendiklerinin farkındadırlar ve öğrenme süreçlerini yönlendirerek daha kolay öğrenirler. Bu durum öğrenme süreçlerinde üstbilişin ne denli önemli olduğunu göstermektedir.

Öğrenmenin yaşam boyu devam ettiği göz önünde bulundurulduğunda, nasıl öğrendiğinin farkında olan, öz yeterlilik algısı yüksek ve problem çözme becerileri gelişmiş bireylerin yetişmesinin öğrenmeyi öğrenme açısından büyük önem taşıdığı söylenebilir.

Araştırmanın Amacı: Bu araştırma öğretmen adaylarının üstbilişsel farkındalıklarına, öğretmenlik mesleğine yönelik öz yeterliklerine ve problem çözme becerilerine ilişkin algılarını incelemek amacıyla yapılmıştır.

Bu amaç doğrultusunda yanıt aranan sorular şunlardır.

1- Öğretmen adaylarının öğretmenlik mesleğine yönelik öz yeterliklerine, üstbilişsel farkındalıklarına ve problem çözme becerilerine ilişkin algıları hangi düzeydedir?

2- Öğretmen adaylarının üstbilişsel farkındalıkları, öğretmenlik mesleğine yönelik öz yeterlik düzeylerini anlamlı bir şekilde yordamakta mıdır?

3- Öğretmen adaylarının üstbilişsel farkındalıkları, problem çözme becerilerine ilişkin algılarını anlamlı bir şekilde yordamakta mıdır?

4- Öğretmen adaylarının üstbilişsel farkındalıkları ve problem çözme becerilerine ilişkin algıları birlikte öğretmenlik mesleğine yönelik öz yeterlik düzeylerini anlamlı bir şekilde yordamakta mıdır?

5- Öğretmen adaylarının problem çözme becerilerine ilişkin algıları, öğretmenlik mesleğine yönelik öz yeterlik algı düzeylerini anlamlı bir şekilde yordamakta mıdır?

Araştırmanın Yöntemi: Araştırma, ilişkisel tarama modeli ile gerçekleştirilmiştir. Araştırmanın evreni Dicle Üniversitesi Ziya Gökalp Eğitim Fakültesinde 2014-2015 öğretim yılı bahar yarıyılında son sınıfta öğrenime devam eden öğrenciler ile aynı dönemde pedagojik formasyon sertifika programına devam eden 2883 öğretmen adayından, örneklemi ise bu öğretmen adaylarından seçkisiz örnekleme yöntemi ile belirlenen 1475 öğretmen adayından oluşmuştur. Araştırmada veri toplama aracı olarak "kişisel bilgi formu", "üstbilişsel farkındalık envanteri", "öğretmenlik mesleğine yönelik öz yeterlik ölçeği" ve "problem çözme envanteri" kullanılmıştır. Öğretmen adaylarının üstbilişsel farkındalık düzeylerini belirlemek amacıyla Akın, Abacı ve Çetin'in (2007) Türkçeye uyarladığı 52 maddeden oluşan "üstbilişsel farkındalık envanteri" kullanılmıştır. Öğretmenlik mesleğine yönelik öz yeterlik algılarını belirlemek amacıyla kullanılan ölçek, araştırmacı tarafından geliştirilmiştir. Öğretmen adaylarının problem çözme becerilerine ilişkin algılarının belirlenmesi amacıyla Türkçeye Şahin, Şahin ve Heppner'ın (1993) uyarladığı "problem çözme envanteri" kullanılmıştır.

Araştırmanın Bulguları: Araştırmada öğretmen adaylarının gerek üstbilişsel farkındalıklarının, gerek öğretmenlik mesleğine ilişkin öz yeterliklerinin ve gerekse problem çözme becerilerine dair algı düzeylerinin "yüksek" olduğu belirlenmiştir.

Öğretmen adaylarının üstbilişsel farkındalıklarının, öğretmenlik mesleğine yönelik öz yeterlik algısını anlamlı bir şekilde yordadığı bununla beraber üstbilişsel farkındalık düzeyine ilişkin algı ile öğretmenlik mesleğine yönelik algı düzeyi arasında pozitif yönde orta düzeyde bir ilişkinin olduğu belirlenmiştir. Öğretmen adaylarının üstbilişsel farkındalıklarının, problem çözme becerilerine ilişkin algı düzeyini anlamlı şekilde yordadığı, üstbilişsel farkındalığın artması durumunda, problem çözme becerileri algı düzeyinin de arttığı sonucuna varılmıştır. Öğretmen adaylarının problem çözme becerilerine ilişkin algılarının, öğretmenlik mesleğine yönelik öz yeterlik algı düzeyini anlamlı bir şekilde yordadığı saptanmıştır.

Araştırmanın Sonuçları ve Önerileri: Öğretmen adaylarının üstbilişsel farkındalık düzeylerinin ve problem çözme becerilerinin geliştirilmesi durumunda öğretmenlik mesleğine ilişkin öz yeterliklerinin de büyük ölçüde gelişeceği sonucuna varılmıştır.

Öğretmen adaylarının üstbilişsel farkındalıklarını geliştirmek amacıyla öğretim programlarında üstbilişsel becerilere dair etkinliklere yer verilmelidir. Öğretim programına düşünme becerilerini geliştirmeye yönelik bir ders eklenerek bu dersin içeriği kapsamında üstbilişsel becerileri geliştirmeye yönelik stratejilerin öğretimi

sağlanabilir. Bu durumun öğretmen adaylarının üstbilişsel becerilerini geliştirerek beraberinde mesleğe dair öz yeterlik algı düzeyini ve problem çözme becerilerine ilişkin algı düzeyini de yükselteceği öngörülmektedir.

Öğretmen adaylarının öğretmenlik mesleğine yönelik öz yeterlik algılarında "sınıf yönetimi" en düşük ortalamaya sahip alt boyut olarak belirlendiğinden, öğretmen adaylarının sınıf yönetimine dair deneyimleri artırılmalı ve genişletilmelidir. Bu amaç doğrultusunda öğretmen adaylarının dönem boyunca aynı okulda öğretmenlik uygulamalarını yapmaları yerine birden fazla okulda uygulama yaparak daha zengin deneyim kazanmaları sağlanmalıdır. Ayrıca öğretmenlik uygulaması için öğretmen adaylarının farklı sosyokültürel çevrelerden seçilen okullarda deneyim yaşamaları sağlanmalıdır.

Öğretmen adaylarının problem çözme becerilerini geliştirmek için daha çok fikir ve alternatif üretebilecekleri durumlarla karşılaşması gerektiği düşünülmektedir. Öğretim sürecinde problem çözme, beyin fırtınası ya da altı şapka gibi teknikler kullanılarak öğretmen adaylarının alternatif çözümler sunmalarına dair özellikleri geliştirilebilir. Ayrıca öğretmen yetiştirme programlarının, öğretmen adaylarının problem çözme becerilerini geliştirmeye yönelik uygulamaları özellikle ön plana çıkarması gerektiği düşünülmektedir.

Öğretmen yetiştiren kurumlarda görev yapan öğretim elemanları yürüttükleri derslerde üstbilişsel farkındalıkları geliştirecek uygulamalara yer vermelidir. Bu durum öğretmen adaylarının üstbilişsel farkındalıklarını geliştirebilir. Böylelikle öğretmen adayları öğretmenlik mesleğine başladıklarında mevcut deneyimlerini kendi sınıf ortamlarına da aktararak öğrencilerinin üstbilişsel farkındalıklarını geliştirmelereini sağlayabilirler. Tüm bu hususların üstbilişsel becerileri yüksek nesillerin yetişmesine katkı sunacağı düşünülmektedir.

Anahtar Kelimeler: Üstbiliş, öz yeterlik, problem çözme, öğretmen adayı, öğretmenlik mesleği