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The Relationship Between Metacognitive Awareness, Teacher Self-Efficacy and Chemistry Competency Perceptions

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Abstract

In this study, the metacognitive awareness, teachers self-efficacy and chemistry competency perceptions of teacher candidates is determined and the relationship between metacognitive awareness, teacher self efficacy and chemistry competency perceptions of teacher candidates is examined. Research tools of this study are “Metacognitive Awareness Inventory”, “Teachers’ Sense of Efficacy Scale” and “Chemistry Field Competency Scale”. Metacognitive awareness inventory is developed by Schraw and Dennison (1994). Teachers’ sense of efficacy scale is developed by Tschannen-Moran and Hoy (2001). Chemistry field competency scale is developed by Güneş, Kavak and Yamak (2011). It has been found out from the study that there is a relationship between metacognitive awareness, chemistry competency perceptions and teacher self-efficacy beliefs of teacher candidates.

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Keywords: metacognitive awareness, self-efficacy, teacher self-efficacy beliefs, chemistry competency perceptions;

1. Introduction

Metacognitive awareness is defined as ability of individual to control his own cognitive process and direct them (Reeve and Brown, 1985). Self-efficacy has been explained as individual’s expectations about himself regarding level of success when he faces a new situation (Tschannen-Moren and Woolfolk Hoy, 2001). As concept of metacognition includes that individual is aware of his own learning and learning process and can give feedback to himself regarding them (Çakıroğlu, 2007), the individual should have these abilities. Metacognition takes part

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between cognition and emotion, plays a key role in self-regulation which is necessary for reaching success in learning (Lucangeli and Cornoldi, 1997) and affects a lot of elements such as knowledge acquisition, comprehension, recollection and application (Hartman, 1998). Teachers' self-efficacy belief increases students' motivation to learn, affects forming higher perception of personality (Midgley, Feldlaufer and Eceles, 1989) and their efforts to teach, aims and level of demand changes depending on self-efficacy belief (Tschannen-Moran and Hoy, 2001). It is thought that there is a relationship between metacognitive awareness, teachers' self-efficacy beliefs and chemistry competency perceptions. Therefore, in this study it has been tried to determine metacognitive awareness, chemistry competency perceptions and teachers' self-efficacy beliefs of teacher candidates and the relationship between metacognitive awareness, chemistry competency perceptions and teachers' self-efficacy beliefs has been examined.

2. Method

In the study survey model has been used. In this study primarily have been examined metacognitive awareness level, chemistry competency perceptions and teachers' self-efficacy beliefs of teacher candidates. In addition it has been aimed to define the relationship between metacognitive awareness, chemistry competency perceptions and teachers' self-efficacy beliefs of teacher candidates.

2.1. Sampling

The study group of research is composed of 246 teacher candidates who study at Hacettepe University, Faculty of Education. The data in the study is collected metacognitive awareness inventory, chemistry field competency and teachers' sense of efficacy scale.

2.2. Data Collection Tools

2.2.1. Metacognitive Awareness Inventory: Metacognitive awareness inventory was developed by Schraw and Dennison (1994). The Turkish adaptation of the scale was done by Akın, Abacı and Çetin (2007). Metacognitive awareness inventory which is five point likert type instruments is composed of 52 articles. The scale consists of 2 sub-dimensions: there are knowledge of cognition and regulation of cognition. Cronbach alpha reliability coefficient and test-retest reliability coefficient for the whole scale is 0.95.

2.2.2. Teachers' Sense of Efficacy Scale: Teachers' sense of efficacy scale who is developed by Tschannen-Moran and Woolfolk Hoy (2001) has been used in the study to determine teacher candidates' self-efficacy beliefs. Turkish adaptation of the scale has been made by Çapa, Çakıroğlu and Sarıkaya (2005). Scale is composed of three sub-dimensions: efficacy in student engagement, efficacy in instructional strategies and efficacy in classroom management. Scale consists of 24 articles with the type Likert scale. Reliability coefficient for the whole scale is 0,93, for efficacy in student engagement is 0,82, for efficacy in instructional strategies is 0,86 and for efficacy in classroom management is 0,84.

2.2.3. Scale of Chemistry Field Competency: The scale has been developed by Güneş, Kavak and Yamak (2011). Scale is composed of three sub-dimensions which are field knowledge, field knowledge education and chemistry literacy, and 119 articles. During application process, teacher candidates have been asked to consider on the rate of their showing indicator of performance by reading indicator of performance carefully and score themselves between 0 and 100. It is stated in the scale that scores between 0 and 30 means "not sufficient", scores between 31 and 60 means "partly sufficient" and scores between 61 and 100 means "sufficient".

3. Results

Descriptive analysis of data obtained from the metacognitive awareness inventory, teacher self-efficacy beliefs and chemistry competency perceptions to determine the levels of metacognitive awareness, chemistry competency perceptions and teacher self-efficacy beliefs of teacher candidates has been done. The result of the analysis and scores diagrams of sub-dimensions is given in Table 1.

Metacognitive awareness of teacher candidates; when Table 1 is examined, it can be seen that metacognitive awareness of teacher candidates is substantially sufficient. In knowledge of cognition and regulation of cognition sub-dimensions of inventory the teacher candidates is substantially sufficient.

Teacher self-efficacy beliefs of teacher candidates; analysis results have show that teacher self-efficacy beliefs of teacher candidates is substantially sufficient. When the sub-dimensions results is examined it is seen that teacher candidates are substantially sufficient in efficacy for student engagement, they are very sufficient in efficacy for instructional strategies efficacy for classroom management.

Chemistry competency perceptions of teacher candidates; when Table 1 is examined, it can be seen that chemistry competency perceptions of teacher candidates is sufficient and the mean scores in the sub-dimensions of the scale is high and sufficient.

Table 1. Analysis results of metacognitive awareness of teacher candidates

Subscales of Metacognitive Awareness	N	\bar{X}	S	Mean Scores Diagram
Knowledge of Cognition	246	3.87	.453	
Regulation of Cognition	246	3.85	.431	
Metacognitive Awareness	246	3.85	.418	
Subscales of Teacher Self-Efficacy Beliefs				
Efficacy for Student Engagement	246	7.31	.783	
Efficacy for Instructional Strategies	246	7.39	.806	
Efficacy for Classroom Management	246	7.44	.907	
Teacher Self Efficacy Beliefs	246	7.38	.743	
Subscales of Chemistry Competency Perceptions				
Field Knowledge	246	75.02	12.67	
Field Knowledge Education	246	78.94	13.01	
Chemistry Literacy	246	81.07	11.91	
Chemistry Competency Perceptions	246	78.34	11.46	

The relationship between metacognitive awareness, chemistry competency perceptions and teacher self-efficacy beliefs;

Correlation analysis has been done to detect the relationship between metacognitive awareness, teacher self-efficacy beliefs and chemistry competency perceptions of teacher candidates. The results of analysis are given in Table 2.

Table 2: The relationship between metacognitive awareness, chemistry competency perceptions and teacher self efficacy beliefs of teacher candidates

	Metacognitive Awareness	Chemistry Competency Perceptions	Teacher Self Efficacy Beliefs
Metacognitive Awareness	1,000		
Chemistry Competency Perceptions	.200**	1,000	
Teacher Self Efficacy Beliefs	.253**	.513**	1,000

** Correlation is significant at the 0.01 level (2-tailed). (N:246)

When table 2 is examined, it is seen that there is a positive and low level statistically meaningful relationship between scores of metacognitive awareness and chemistry competency perceptions of teacher candidates ($r=0.200$; $p<0.01$), there is a positive and low level statistically meaningful relationship between scores of metacognitive awareness and teacher self-efficacy beliefs of teacher candidates ($r=0.253$; $p<0,01$), there is a positive and high level statistically meaningful relationship between scores of chemistry competency perceptions and teacher self-efficacy

beliefs of teacher candidates ($r=0.513$; $p<0,01$).

The relationship between sub-dimensions of metacognitive awareness, chemistry competency perceptions and teacher self-efficacy beliefs;

Correlation analysis has been done to detect the relationship between sub-dimensions of metacognitive awareness, chemistry competency perceptions and teacher self-efficacy beliefs of teacher candidates. The results are given in Table 3.

Table 3: The relationship between sub-dimensions of metacognitive awareness, chemistry competency perceptions and teacher self efficacy beliefs

	Knowledge of Cognition	Regulation of Cognition	Field Knowledge	Field Knowledge Education	Chemistry Literacy	Efficacy for Student Engagement	Efficacy for Instructional Strategies	Efficacy for Classroom Management
Knowledge of Cognition	1.000							
Regulation of Cognition	.832**	1.000						
Field Knowledge	.178**	.111	1.000					
Field Knowledge Education	.211**	.184**	.772**	1.000				
Chemistry Literacy	.216**	.183**	.656**	.832**	1.000			
Efficacy for Student Engagement	.251**	.244**	.360**	.443**	.524**	1.000		
Efficacy for Instructional Strategies	.293**	.250**	.377**	.464**	.587**	.748**	1.000	
Efficacy for Classroom Management	.147	.137	.273**	.353**	.433**	.674**	.672**	1.000

** Correlation is significant at the 0.01 level (2-tailed). (N:246)

When table 3 is examined, it is seen that there is a positive and low level statistically meaningful relationship between scores of knowledge of cognition and field knowledge, field knowledge education, chemistry literacy, efficacy for student engagement, efficacy for instructional strategies. There is a positive and low level statistically meaningful relationship between scores of regulation of cognition and field knowledge education, chemistry literacy, efficacy for student engagement, efficacy for instructional strategies. There is a positive and medium level statistically meaningful relationship between scores of field knowledge and efficacy for student engagement, efficacy for instructional strategies and positive and low level statistically meaningful relationship between scores of field knowledge and efficacy for classroom management. From the Table 3 it has been seen that there is a positive and medium level statistically meaningful relationship between scores of field knowledge education and efficacy for student engagement, efficacy for instructional strategies, efficacy for classroom management. There is a positive and medium level statistically meaningful relationship between scores of chemistry literacy and efficacy for student engagement, efficacy for instructional strategies, efficacy for classroom management.

4. Conclusion and Discussion

In this study, it is aimed to detect the metacognitive awareness, teacher self-efficacy beliefs and chemistry competency perceptions levels of teacher candidates, at the relationship between metacognitive awareness, teacher self-efficacy beliefs and chemistry competency perceptions.

According to the results obtained in the first part of study, it has been determined that metacognitive awareness levels and teacher self-efficacy beliefs of teacher candidates is substantially sufficient and their chemistry competency perceptions is substantially high. This finding obtained in the study is similar to other research results (Külekcı, 2011; Pendergast, Garvin and Keogh, 2011; Özder, 2011; Karacaoğlu, 2008; Güneş, 2011; Clark and Moulding, 2012).

In the second part of the study, the relationship between metacognitive awareness, teacher self-efficacy beliefs and chemistry competency perceptions has been examined. It has been found out that there is a low level relationship between metacognitive awareness and chemistry competency perceptions and teacher self-efficacy beliefs; and there is a high level relationship between chemistry competency perceptions and teacher self-efficacy beliefs. It is known that students who have higher self-efficacy beliefs use more frequent metacognitive strategies

(Pintrich and De Groot, 1990). When literature is examined, the studies supporting the relationship between metacognitive awareness and self-efficacy beliefs can be summarised as follows: Garvil, Compeau and Marcolin (2002) have revealed that there is a relationship between self-efficacy and metacognitive awareness. Coutinho (2008) has found out that there is a relationship between students' metacognitive awareness and self-efficacy beliefs and academic success. In his study, Kıran (2010) has detected that there is a positive relationship between science self-efficacy beliefs and high cognition. Alcı and Yüksel (2012) have stated in their study that there is a meaningful relationship between teacher self-efficacy beliefs and metacognitive awareness.

It has been detected that there is a positive and high level relationship between chemistry competency perceptions and teacher self-efficacy beliefs of teacher candidates. Şahin (2010) has stated in his study with teachers that there is a relationship between self-efficacy and professional self-efficacy. Akay and Boz (2011) have revealed that there is a relationship between self-efficacy beliefs towards mathematics and their self-efficacy. Alkan and Erdem (2012) have notified that there is a medium level relationship between chemistry competency perceptions and teacher self-efficacy. The results from the studies on support the result from this study on the relationship between chemistry competency perceptions and teacher self-efficacy beliefs of teacher candidates. It can be concluded from this finding that the more sufficient teacher candidates feel themselves in field knowledge, the more sufficient they feel in field education.

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