

CY-ICER 2012

The relationship between teacher self-efficacy and competency perceptions of chemistry teacher candidates

Fatma Alkan^{a*}, Emine Erdem^a

^a Faculty of Education, Department of Chemistry Education, Hacettepe University, Beytepe, Ankara, 06800, Turkey

Abstract

In this study, the relationship between teacher self efficacy and special field competency of chemistry teacher candidates will be examined. The study group of the study is composed of teacher candidates of chemistry. Chemistry Special Field Competency Scale developed by Güneş, Kavak and Yamak (2011) has been used in order to determine chemistry special field competency of teacher candidates. The data of self efficacy of teacher candidates have been collected by “Teachers’ Sense of Efficacy Scale” developed by Tschannen-Moran and Hoy (2001) and of which study of validity and reliability of Turkish form is being done by Çapa, Çakıroğlu and Sarıkaya (2005). It has been found out that there is a positive and medium relationship between chemistry special field competency and teacher self efficacy beliefs of chemistry teacher candidates.

© 2012 Published by Elsevier Ltd. Selection and/or peer review under responsibility of Prof. Dr. Hüseyin Uzunboylu

Open access under [CC BY-NC-ND license](https://creativecommons.org/licenses/by-nc-nd/4.0/).

Keywords: self-efficacy, teacher self-efficacy, chemistry special field competency, chemistry teacher candidates;

1. Introduction

Self efficacy is defined as a quality that is effective in behaviours and individual’s self judgment about himself regarding the capacity to organize necessary thing to carry out a performance and do it successfully (Bandura, 1997). Self efficacy has been explained as individual’s expectations about himself regarding level of success when he faces a new situation (Tschannen-Moran and Woolfolk Hoy, 2001), student’s level of success and (Dembo and Gibson) ability to teach about positive behaviours occurring from behaviours (Kiremit, 2006). One of the most important concepts regarding self efficacy is teachers’ self efficacy beliefs. Teachers’ self efficacy beliefs is defined as teachers’ perception of ability to affect students’ performance and showing necessary behaviours to do their duty successfully (Ashton 1984, Atıcı 2000). 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).

When studies have been examined, it is noteworthy that the content of knowledge that a teacher should know are classified into five categories: field knowledge, programme knowledge, teaching knowledge, personal knowledge and school-environment knowledge. During the studies, it has been thought that there is relationship between teachers’ field knowledge and presenting it to students, and knowledge that a teacher should know has been reconstructed in the form of “subject field knowledge”, “curriculum knowledge” and “pedagogical knowledge” (Shulman, 1986). This knowledge that the teacher should know determines competencies of the teacher. Special field competency is knowledge, skill, attitude and values related to field that teachers should have to carry out their duty efficiently and fruitfully in their field (Demirelli, Yürük and Kavak, 2008). It is thought that there is a

* Corresponding author. Tel.: +90-312-2976787

E-mail address: alkanf@hacettepe.edu.tr

relationship between teachers' special field competency and teachers' self efficacy beliefs. Therefore, in this study, it has been tried to determine chemistry special field competency of chemistry teacher candidates and teachers' self efficacy beliefs, and the relationship between chemistry special field competency and teachers' self efficacy beliefs has been examined.

2. Method

In the study survey model has been used. The aim of survey model is to define the relationship between chemistry special field competency and teachers' self efficacy beliefs of chemistry teacher candidates. Study group is composed of 122 chemistry teacher candidates studying at Hacettepe University, Faculty of Education. Scale of chemistry special field competency and scale of teachers' self efficacy beliefs have been used in the study for data collection.

In the study, "Scale of Chemistry Special Field Competency" has been used in order to determine chemistry special field competency of chemistry teacher candidates developed by Güneş, Kavak and Yamak (2011). Scale is composed of three sub dimensions which are field knowledge, information training 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 40 and 60 means "partly sufficient" and scores between 70 and 100 means "sufficient".

"Teachers' Sense of Efficacy Scale" developed by Tschannen-Moran and Woolfolk Hoy (2001) has been used in the study to determine teacher candidates' self efficacy beliefs. 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. Turkish adaptation of the scale has been made by Çapa, Çakıroğlu and Sarıkaya (2005). Reliability co-efficient 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.

3. Results

Chemistry special field competency of chemistry teacher candidates;

Descriptive analysis of the data from scale of chemistry special field competency has been done in order to determine chemistry special field competency of chemistry teacher candidates. The results of the analysis and arithmetic scores diagrams of sub scale scores of chemistry special field competency are presented in Table 1.

Table 1: Analysis Results of Chemistry Special Field Competency of Chemistry Teacher Candidates

	N	\bar{X}	S
Field Knowledge	112	77,8546	10,91977
Field Knowledge Education	112	79,8782	11,93367
Chemistry Literacy	112	81,8129	11,33292
Chemistry Special Field Competency	112	79,8486	10,55946

When Table 1 is examined, it can be seen that chemistry special field competency of chemistry teacher candidates with 79,85 is sufficient. When competency of teacher candidates in sub dimension of scale of chemistry

special field competency is examined, it is considered to be sufficient field knowledge with 77,86, field knowledge education with 79,88 and chemistry literacy with 81,81. According to Table 1 and results in the diagram, it is seen that chemistry special field knowledge of teacher candidates is sufficient with 79,85 and when the averages in sub dimensions of scale of chemistry special field competency is examined, their competency is high.

Self efficacy beliefs of chemistry teacher candidates;

Descriptive analysis of the data from scale of teacher self efficacy has been done to determine self efficacy beliefs of teacher candidates. Arithmetic average diagrams of sub scale scores of teacher self efficacy scale and analysis results are presented in Table 2.

Table 2: Analysis Results of Teacher Self Efficacy of Chemistry Teacher Candidates

	N	\bar{X}	S
Efficacy Student Engagement	112	7,3259	,75884
Efficacy for Instructional Strategies	112	7,3683	,75632
Efficacy for Classroom Management	112	7,4688	,86659
Teacher Self Efficacy Beliefs	112	7,3876	,69413

Sub-dimension	Average Score
Efficacy Student Engagement	7,33
Efficacy for Instructional Strategies	7,39
Efficacy for Classroom Management	7,47

When Table 2 is examined, it can be seen that teacher self efficacy beliefs of teacher candidates is 7,38. When the data regarding sub dimensions of teacher self efficacy scale is examined, it is seen that averages of teacher candidates for student engagement efficacy is 7,33, instructional strategies efficacy is 7,39 and classroom management efficacy is 7,47. According to results in Table 2, it can be concluded that teacher self efficacy perception of teacher candidates is quite sufficient, teacher candidates are quite sufficient in student engagement and instructional strategies when sub dimensions of scale is examined, they are very sufficient in classroom management.

The relationship between chemistry special field competency and teacher self efficacy beliefs;

The relationship between chemistry special field competency and teacher self efficacy beliefs of chemistry teacher candidates has been examined. Correlation analysis has been done to determine the relationship between chemistry special field competency and teacher self efficacy beliefs of chemistry teacher candidates. Analysis results are given in Table 3.

Table 3: The Relationship between Chemistry Special Field Competency and Teacher Self Efficacy Beliefs of Chemistry Teacher Candidates

		Chemistry Special Field Competency	Teacher Self Efficacy Beliefs
Chemistry Special Field Competency	Correlation Coefficient	1,000	,496**
	Sig. (2-tailed)	.	,000
	N	112	112
Teacher Self Efficacy Beliefs	Correlation Coefficient	,496**	1,000
	Sig. (2-tailed)	,000	.
	N	112	112

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

When Table 3 is examined, it is seen that there is a positive and medium level statistically meaningful relationship between scores of chemistry special field competency and teacher self efficacy beliefs of teacher candidates ($r=0,461$; $p<0,01$).

4. Conclusion and Discussion

The aim of this study is to determine chemistry special field competency and teacher self efficacy beliefs of chemistry teacher candidates and to examine the relationship between chemistry special field competency and teacher self efficacy beliefs.

According analysis results of data from scale of chemistry special field competency applied to chemistry teacher candidates, it has been determined that chemistry special field competency of teacher candidates is sufficient. In a study in which teacher competency emotion is researched, it is detected that most of the teacher from different fields feel themselves very sufficient in professional field competency and improving themselves (Karacaoğlu 2008). In a study related to special field competencies, it is stated that level of special field competency and self efficacy beliefs of pre-school teachers quite high (Yılmaz, Koç, Gönen and Üstün, 2010). In a study conducted by chemistry teacher candidates, it is found out that teacher candidates find themselves sufficient in chemistry special field competencies (Güneş, 2011). Studies carried out support the result of the research.

According to analysis result of the data from scale of teacher self efficacy beliefs applied to chemistry teacher candidates, it has been determined that level of self efficacy beliefs of teacher candidates is sufficient. When studies are examined, it is found that teacher candidates feel themselves quite sufficient (Aktağ and Walter, 2005), high school teachers feel themselves normally sufficient (Üstüner, Demirtaş, Cömert and Özer, 2009). In a study carried out in primary schools it is stated that teachers' level of idea in terms of teaching efficacy is "completely agree", in terms of personal efficacy is "partly agree" (Bökeoğlu and Yılmaz, 2008), self efficacy beliefs of social science, pre-school and primary school teachers is quite sufficient (Yavuz, 2009), self efficacy beliefs of teachers of physical education regarding teaching profession is quite sufficient (Seçkin 2011). These results support the results obtained from the study.

As for teacher self efficacy beliefs chemistry teacher candidates in sub dimensions of the scale, they have high competency in student engagement, teaching strategies and classroom management. When literature is examined, studies supporting the results can be summarized as: while teacher candidates find themselves sufficient in creating a classroom atmosphere, they find themselves less sufficient in keeping order in the classroom and applying teaching strategies and methods (Kahyaoglu and Yangin, 2007). It has been found out that level of teacher candidates is high in terms of teaching-learning self efficacy, teacher self efficacy beliefs of female students have higher scores than male students' in terms of general teaching competency and personal teaching competency (Derman, 2007), self efficacy beliefs of teacher candidates for learning fields is average (Zayimoğlu-Öztürk, 2011).

It has been found out that there is a positive and medium relationship between chemistry special field competency and teacher self efficacy beliefs of chemistry teacher candidates. Therefore, it can be concluded that as chemistry special field competency of teacher candidates increase, teacher self efficacy beliefs increase as well. When determination coefficient ($r=0,25$) is taken into consideration, it can be said that %25 of total variance in teacher self efficacy beliefs results from chemistry special field competency. Oğuz and Topkaya (2008) have stated in their study that there is a positive and significant relationship between teacher self efficacy beliefs and attitudes towards teaching. In his study, Şahin (2010) has stated that there is a positive relationship between self efficacy scores and professional competency scores of primary school teachers. Akay and Boz (2011) have found out that there is positive statistically significant relationship between scores of self efficacy beliefs towards mathematics and scores of teacher self efficacy of teacher candidates. The result obtained from this study in which the relationship

between chemistry special field competency and teacher self efficacy beliefs of chemistry teacher candidates has been examined, supports the result from researches on teacher self efficacy beliefs and special field competency.

References

- Akay, H. and Boz N. (2011). The relationship between pre-service elementary school teachers' self-efficacy perceptions and attitudes towards mathematics. *Journal of Turkish Educational Sciences*, 9 (2), 281-312.
- Akpınar, B., Turan, M. & Tektaş, H. (2004). The competence of classroom teachers in the opinions of prospective-teachers. XIII. National Educational Sciences Conference, İnönü University, Faculty of Education, Malatya.
- Aktaş, I. and Walter J. (2005). Teacher efficacy of pre-service teachers. *Sportmetre Journal of Physical Education and Sport Science*.3(4) 127-131.
- Ashton, P. (1984). "Teacher efficacy: A motivational paradigm for effective teacher education. *Journal of Teacher Education*", 35, 28-32.
- Atıcı, M. (2000). "İlkokul öğretmenlerinin sınıf yönetiminde yetkinlik beklentisi rolünün İngiltere ve Türkiye'de seçilen bir araştırma grubu üzerinde incelenmesi". 11.03.2002 www.yok.gov.tr/egfak/meral.htm.
- Bandura, A. (1997). *Self-Efficacy: The exercise of control*. New York: Freeman
- Çapa, Y., Çakıroğlu, J., & Sarıkaya, H. (2005). The development and validation of a Turkish version of teachers' sense of efficacy scale. *Education and Science*, 30(137): 74-81.
- Demirelli, H., Kavak ve Yürük, N. (2008). Özel alan yeterlikleri kimya komisyonu 1. dönem raporu. MEB. Öğretmen Yetiştirme ve Eğitimi Genel Müdürlüğü.
- Derman, A. (2007). Chemistry student teachers' self efficacy beliefs and attitudes toward teaching profession. (Unpublished Master Thesis), Konya: Seçluk University.
- Güneş, S. (2011). The investigation of the levels of specific field competencies of chemistry teachers candidates. (Unpublished Master Thesis), Ankara: Gazi University.
- Kahyaoğlu, M. ve Yangın, S. (2007). Attitudes of candidate teachers in primary teaching, mathematics teaching and science teaching departments towards science teaching. *Zonguldak Karaelmes University Journal of Social Sciences*. 3(6) 203-220.
- Kan, A. (2007). Developing a scale towards pre-service teachers' self-efficacy beliefs and assessing pre-service teachers' self-efficacy beliefs (The Mersin University Sample). *Mersin University Journal of The Faculty of Education*, 3(1) 035-050.
- Karacaoğlu, Ö. C. (2008). The perceptions of teachers' sufficiency. *Yüzüncü Yıl University Journal of Education*, 5(1), 70-97.
- Kiremit, H.Ö. (2006). Preservice science teachers' self efficacy beliefs in teaching biology. (Unpublished Master Thesis), İzmir: Dokuz Eylül University.
- Midgley, C., Feldlaufer, H. and Eccles, J. (1989). Change in teacher efficacy and student self- and task-related beliefs in mathematics during the transition to junior high school. *Journal of Educational Psychology*, 81, 247-258.
- Oğuz, A. and Topkaya, N. (2008). Teacher self efficacy beliefs and attitudes towards teaching of secondary school preservice teachers. *Akademik Sığır*, 14.
- Öztürk-Zayımoğlu, F. (2011). Investigation of social studies teachers' and social studies teacher candidates' self efficacy in the learning strands of the primary school social studies curriculum (Unpublished Dissertation Thesis), Ankara: Gazi University.
- Seçkin, A. (2011). Investigate of teacher' self efficacy beliefs of physical education and sport teacher candidate's. (Unpublished Master Thesis), İzmir: Ege University.
- Shulman, L.S. (1986). Those who understand; knowledge growth in teaching. *Educational Researcher*, 15(2), 4-14.

- Şahin, E. (2010). Effects of elementary school classroom teachers' teaching style preferences, genders, lengths of professional service, self-efficacy perceptions and selfdirected learning readiness levels on their professional competency (Unpublished Dissertation Thesis), İstanbul: Yıldız Technical University.
- Tschannen-Moran, M. and Woolfolk Hoy, A. (2001). "Teacher efficacy: capturing an elusive construct", *Teaching and Teacher Education*, 17, 783-805.
- Üstüner, M., Demirtaş, H., Cömert M. and Özer, N. (2009). Secondary school teachers' self-efficacy beliefs. *Mehmet Akif Ersoy University Journal of Education Faculty*, 9 (17). 1-16.
- Yavuz, D. (2009). Study on preservice teachers' self-efficacy perceptions and metacognitive awareness in terms of different variables. (Unpublished Master Thesis), Zonguldak Karaelmes University Graduate School of Social Sciences.
- Yılmaz, A., Koç, K., Gönen, M. and Üstün, E. (2010). Examination of knowledge, skills, and competencies of early childhood education alumni. *Proceedings of II International Symposium on Teacher Education Policies and Issues*. 673-682.
- Yılmaz, K. and Bökeoğlu-Çokluk, Ö. (2008). Primary school teachers' belief of efficacy. *Ankara University, Journal of Faculty of Educational Sciences*. 41 (2). 143-167.