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Investigating Predictors of Sense of Efficacy Beliefs of Classroom, Science, and Mathematics Teachers*

Sınıf, Fen ve Matematik Öğretmenlerinin Özyeterliklerini Yordayan Değişkenlerin İncelenmesi

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Abstract

The purpose of this study was to examine the predictors of teachers' sense of efficacy. Data were collected from 383 science, mathematics, and classroom teachers using *Teachers' Sense of Efficacy Scale* and additional items for assessing predictors including gender, teaching field, years of teaching experience, satisfaction with performance, support from colleagues, support from parents, support from administration, and teaching resources. Data were analyzed by utilizing hierarchical regression analysis. Results showed that satisfaction with performance made significant contribution to the efficacy of instructional strategies, efficacy of classroom management, and efficacy of student engagement, whereas gender, teaching field, and years of teaching experience variables were not significant predictors of any of the dependent variables. Parental support and teaching resources predicted the efficacy of student engagement only.

Keywords: Self-Efficacy, teacher self-efficacy, sources of self-efficacy

Öz

Bu çalışmanın amacı, öğretmenlerin özyeterlik inançlarını yordayan değişkenleri incelemektir. Veriler, Öğretmen Özyeterlik Ölçeği ve öğretmenlik tecrübesi, performanslarından yaşadıkları doyum, meslektaş, veli ve idari personelden aldıkları destek ve okul tarafından kendilerine sağlanan kaynaklar gibi değişkenleri belirlemek amacıyla sorulan sorular yardımıyla toplam 383 fen bilgisi, sınıf ve matematik öğretmeninden toplanmıştır. Veriler, hiyerarşik regresyon analizi kullanılarak incelenmiştir. Sonuçlar, performanslarından yaşadıkları doyumun öğretmenlerin öğretim stratejilerine, sınıf yönetimine ve öğrenci katılımına yönelik özyeterliklerini etkilediğini, fakat cinsiyetin, branşın ve öğretmenlik tecrübesinin özyeterliği etkilemediğini göstermiştir. Ayrıca, aile desteğinin ve okul tarafından sağlanan kaynakların öğrenci katılımına yönelik özyeterliğini etkilediği bulunmuştur.

Anahtar Sözcükler: özyeterlik, öğretmen özyeterliği, özyeterlik kaynakları

Introduction

Teacher self-efficacy belief took its basis from social cognitive theory which was developed by Bandura (1977) who defined self-efficacy as "beliefs in one's capabilities to organize and execute the courses of action required to manage prospective situations" (Bandura, 1986, p. 3). In line with this definition, Tschannen-Moran, Woolfolk Hoy, and Hoy (1998) defined teacher self-efficacy as "the teacher's belief in his or her capability to organize and execute course of action required to successfully accomplish a specific teaching task in a particular context" (p.

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22). Research studies supported that teacher efficacy affects both the teachers themselves and their students. According to Bandura (1997), if a teacher believes he or she will succeed in teaching a subject or lesson, he or she is more likely to do so. Based upon this idea, teachers' perceived efficacy in teaching plays a role in the activities chosen for instruction, classroom management styles, and effectiveness of lesson presentation. Therefore, improved teacher self-efficacy will result in improved student learning (Bandura, 1997). Research indicated that teachers with high efficacy tend to accept their students' ideas easier than less efficacious teachers and use those ideas in decision-making process in the classroom (Ashton, 1984). Teacher efficacy was also related to students' motivation (Midgley, Feldlaufer, & Eccles, 1989), achievement (Ashton & Webb, 1986; Ross, 1992), and students' efficacy beliefs (Anderson, Greene, & Loewen, 1988). Moreover, teacher efficacy belief influences the behavior of teachers in the classroom. Teachers with high sense of efficacy tend to implement innovations in the classroom (Guskey, 1988) and behave more humanistic than those with lower sense of efficacy (Enochs, Scharmann & Riggs, 1995; Hoy & Woolfolk, 1990). In addition, efficacious teachers are less critical toward their students (Gibson & Dembo, 1984) and work longer with difficult students (Gibson & Dembo, 1984).

According to Bandura (1997), there are four sources of efficacy beliefs: mastery experiences, vicarious experiences, verbal persuasion, and emotional states. Mastery experiences are the most powerful source of efficacy beliefs because these kinds of experiences depend on individual's own experiences (Mulholland & Wallace, 2001; Tschannen-Moran et al., 1998). When the number of successful experiences of the human increases, their self-efficacy beliefs also increase; whereas, repeating failures decrease their self-efficacy beliefs (Bandura, 1997). People do not rely only on their own experiences but also on experiences of other people. Vicarious experiences were gained by observing others' behavior who serve as the model. Observing this model accomplishing a specific task affects the efficacy level of the observer (Bandura, 1997). If the model performs well, the observer believes that he or she can do the same thing, so his or her efficacy level increases. If the model does not perform well, the efficacy of the observer is influenced negatively (Woolfolk Hoy, 2004). Self-efficacy is particularly affected by vicarious experiences if an individual has few experiences. Verbal or social persuasion is used to induce a person to believe his or her capabilities by giving feedback for a specific behavior (Woolfolk Hoy, 2004; Paulou, 2007). Persuasion may be limited to increasing self-efficacy beliefs. The effect of it depends on the credibility of the persuader. Positive feedbacks may increase the efficacy beliefs of an individual's, while self-efficacy beliefs can be decreased by negative feedback (Mulholland & Wallace, 2001). People can use their emotional states to make judgments about their capabilities. People can observe their capabilities in stressful situations. For example, people with high self-efficacy may judge that their high heart rates as the indicator of a possible good performance, while those with low sense of efficacy believe the same rate as the level of stress (Bandura, 1997). According to Bandura (1997), forming their efficacy judgments people weigh and integrate different sources of information. This integration process differs for each individual and differs in different contexts. Tschannen-Moran et al. (1998) proposed an integrated teacher efficacy model. The model is cyclical in nature. The sources of efficacy information, cognitive processes of a teacher, analyzing of teaching task and teaching competence, teacher efficacy beliefs, and performance interact and work in a cyclical nature. Although four sources have influence on efficacy beliefs, the assessment of the effects of these sources on efficacy beliefs depends on individual's cognitive process. In the model of Tschannen-Moran et al., cognitive process interacts with teaching tasks and its context and self-perception of teaching competence. Teaching tasks, the context and self-perception of teaching competence shape a teacher's efficacy beliefs. When teaching tasks and the context change, teacher efficacy may change as well. Analyzing teaching tasks includes the factors such as the assessment of students' abilities, instructional strategies, resources provided by school, and physical condition of teaching environment. Contextual factors include principal and collegial

support and school climate. Especially less experienced teachers use teaching task analysis and teaching competence assessment while shaping their efficacy beliefs. Then, teachers' sense of efficacy has an effect on teachers' performance and serves as new source of efficacy. Lower levels of efficacy cause lower level of effort and performance. Low performance and effort lead to lower level of efficacy.

Although in late 1990s Tschannen-Moran et al. emphasized the need for emprical research testing Bandura's hypothesized sources, relatively less number of research appears in the literature. For example, Tschannen-Moran and Woolfolk Hoy (2007) collected data from both novice teachers (n = 74) and career teachers (n = 181) and found that teachers' sense of efficacy was influenced by contextual factors (e.g, availability of resources, support from parents) more for novice teachers than for career teachers. Çapa Aydin and Woolfolk Hoy (2005) conducted a similar study with preservice teachers in which they found that perceived teaching support (from mentors in this context) and teaching experiences were significant predictors. Consistent findings have been obtained in different countries like Greece and Australia (O'Neill & Stephenson, 2012; Poulou, 2007).

There have been increasing numbers of studies related with efficacy in Turkey (e.g. Şahin-Taşkın & Hacıömeroğlu, 2010). These studies mostly focused on preservice teachers' efficacy beliefs regarding biology teaching (Savran & Çakıroglu, 2001; Yılmaz, Köseoglu, Gerçek, & Soran, 2006), science teaching (Savran - Gencer & Çakıroglu, 2005), and mathematics teaching (Çakıroğlu, 2008). In addition to these, there are other studies on adaptation of efficacy scales for measuring teachers' sense of efficacy beliefs (Çapa, Çakıroglu, & Sarıkaya, 2005; Ekici, 2005; Gerçek, Yılmaz, Köseoglu & Soran, 2004; Bıkmaz, 2002). As suggested by several researchers (e.g., Çakıroğlu, Çapa-Aydın & Woolfolk Hoy, 2012; Tschannen-Moran et al., 1998), more research studies are required examining the sources of teacher self-efficacy beliefs in different contexts.

The present study aimed to investigate the predictors of teachers' self-efficacy beliefs. The potential predictors examined in this study were mastery experiences, verbal persuasion (support from colleagues, administration and parents) and teaching resources provided by the school. Specifically, it was aimed to examine the predictors of teachers' sense of efficacy by a set of variables including gender, teaching field, years of teaching experience, satisfaction with performance, support from colleagues, support from parents, and support from administration, and teaching resources.

The research questions of the study were as follows:

a. How well do gender, teaching field, years of teaching experience, satisfaction with performance, support from colleagues, support from administration, parental support, and teaching resource predict the teacher efficacy for instructional strategies?
b. How well do gender, teaching field, years of teaching experience, satisfaction with performance, support from colleagues, support from administration, parental support, and teaching resource predict the teacher efficacy for classroom management?
c. How well do gender, teaching field, years of teaching experience, satisfaction with performance, support from colleagues, support from administration, parental support, and teaching resource predict the teacher efficacy for student engagement?

Method

Participants

A total of 383 teachers from 62 elementary schools in Ankara were involved in the study. Teachers had 4 to 43 years of teaching experience with a mean of 22.48 (SD = 7.80) and their age ranged from 28 to 64 years (M = 46.66, SD = 6.38). There were 279 female and 104 male teachers. Of these teachers, 16.7% were mathematics, 17% were science, and 66.3% were classroom teachers.

Instrument

In this study, the long and Turkish version of the Teachers' Sense of Efficacy Scale (TSES) (Tschannen-Moran & Woolfolk Hoy, 2001) was used as the instrument. The TSES is composed of 24 items, assessed a 9-point rating scale which ranges from 1-Nothing, 3-Very little, 5-Some influence, 7-Quite A Bit, and 9-A great deal. The instrument included three subscales with each including 8 items: efficacy for instructional strategies, efficacy for classroom management, and efficacy for student engagement.

Sample items forming each subscale were:
Efficacy for instructional strategies (EIS)
"How well can you implement alternative strategies in your classroom?"
Efficacy for classroom management (ECM)
"How much can you do to calm a student who is disruptive or noisy?"
Efficacy for student engagement (ESE)
"How much can you do to help your students value learning?"

The TSES was adapted into Turkish by Çapa, Çakiroglu, and Sarıkaya (2005). They confirmed the three-factor structure through confirmatory factor analysis (CFA) and Rasch analysis. The coefficient alpha values were .82 for ESE, .86 for EIS, and .84 for ECM.

Using the efficacy data of the current study, CFA was conducted as well to test the three-factor model (Figure 1). This analysis was performed using Analysis of Moment Structures 4.0 (AMOS; Arbuckle & Wothke, 1999). The following fit indices were used to evaluate the model fit: the comparative fit index (CFI), the non-normed fit index (NNFI), and root mean square error of approximation (RMSEA) along with its90% confidence intervals. The NNFI and CFI values higher than .95 show a good fit (Hu & Bentler, 1999). The NNFI and CFI of .98 showed a good fit of the oblique three-factor model to the efficacy data. Browne and Cudeck (1993) reported that values of RMSEA lower than .05 indicate a close fit of the model and values between .05 and .08 represent reasonable error of approximation. Values greater than. 10 indicate poor fit. RMSEA was found to be .08 with a 90% confidence interval of. 074-.086, indicating a mediocre fit. All of the parameters (including factor loadings and factor correlations) were statistically significant. Factor loadings were ranging from .49 to .81, deemed acceptable. These findings provided an evidence for the factorial validity of the TTSES scores with this sample of Turkish elementary teachers. In addition, the Cronbach's alpha coefficients were also generated. The reliabilities of the three subscales were .91 for instructional strategies, .90 for efficacy for classroom management, and .87 for efficacy for student engagement.

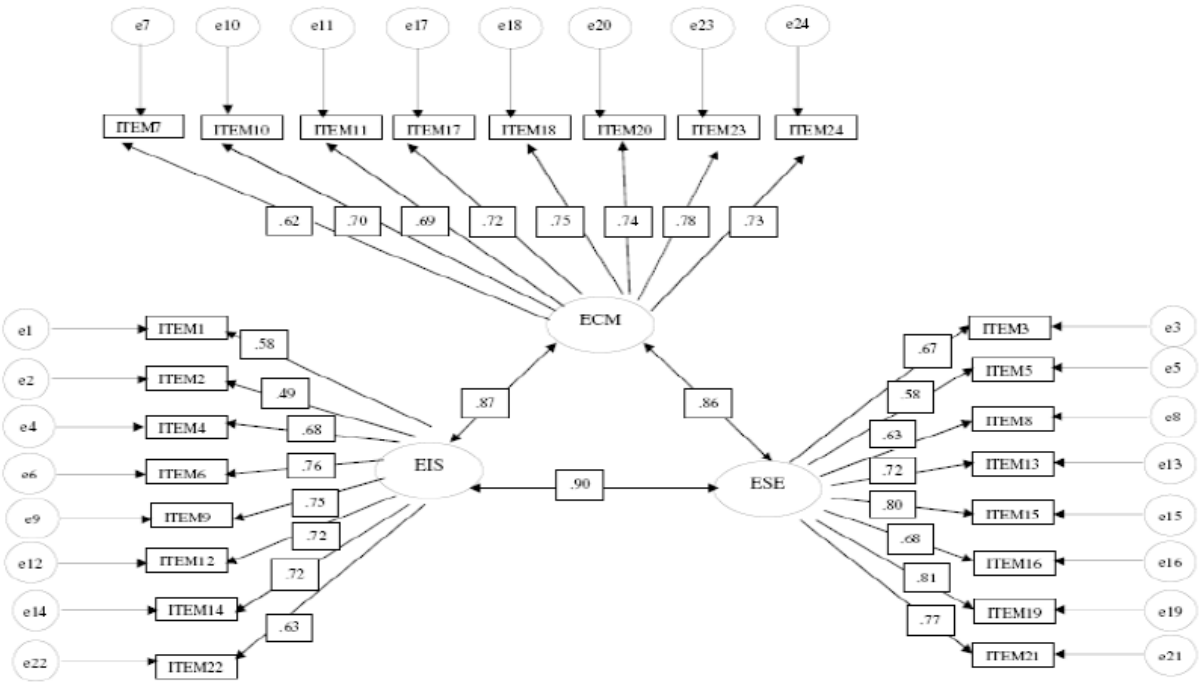

Figure 1. Confirmatory Factor Analysis of Turkish Teachers' Sense of Efficacy Scale

Teachers were asked to report their gender, birth date, the university from which they graduated, educational level, years in teaching, teaching field, and grade levels of teaching. In addition to demographic questions, five questions were included to investigate the sources of teacher efficacy. These questions were adapted from the study by Tschannen-Moran and Woolfolk Hoy (2007). In the first question, the teachers were asked to rate their level of satisfaction with their professional performance. This question and year of experience aimed to capture mastery experience. The next three questions assessed the quality of support they had received in three areas: support provided by the colleagues, support provided by the administrators, and parental support. These questions aimed to capture verbal persuasion. In the fifth question, teachers were asked to rate the resources provided by their school. All of these questions were assessed on a five-point scale ranging from "Not Effective" to "Very Effective".

Results

In the present study, three hierarchical regression analyses were carried out for EIS, ECM, and ESE. The predictor variables were entered in four blocks. The first block variables were gender and teaching fields, the second included years of teaching experience and satisfaction with performance, the third block included support from colleagues, support from parents, and support from administrators, and the last block included teaching resources.

Table 1 shows the findings of hierarchical regression analyses of EIS, ECM, and ESE. For EIS, only satisfaction with performance was statistically significant in Step 2. Overall the model explained 14% variance in efficacy. For the ECM, gender, teaching field, years of teaching experience, support variables and teaching resources were not significant predictors; however, teachers' satisfaction with their performance was significant. The explained variance in ECM was 9%. Finally, in ESE model, satisfaction with performance, support from parents and administrators, and teaching resources significantly contributed. Overall, these variables explained 14% of variance in ESE.

Table 1.

Summary of Hierarchical Regression Analyses for EIS, ECM, and ESE by Demographic Variables, Mastery Experiences, Support and Context Variable

	Efficacy for Instructional Strategies (EIS)				Efficacy for Classroom Management (ECM)				Efficacy for Student Engagement (ESE)		
Predictor Variable	*B*	SE	β	sr^2	*B*	SE	β	sr^2	*B*	SE	β
Step 1 Demographics											
Gender	.08	.10	.04	.005	-.06	.11	-.03	.002	-.03	.10	.15
Science vs. mathematics teaching	.21	.16	.09	.000	.15	.16	.06	.000	.08	.15	.04
Science vs. classroom teaching	.01	.12	.005	.000	-.04	.13	-.02	.000	.20	.12	.11
Step 2 Mastery experience											
Years of teaching experience	.003	.006	.02	.000	.002	.006	.01	.000	.01	.01	.08
Satisfaction with performance	.55**	.09	.32	.097	.48**	.09	.27	.069	.46**	.09	.27
Step 3 Support											
Support from colleagues	-.02	.05	-.02	.000	-.03	.06	-.03	.001	-.06	.05	-.07
Support from parents	-.05	.04	.07	.003	.03	.05	.04	.001	.11*	.04	.15
Support from administrators	.10	.05	.12	.010	.06	.05	.07	.003	.09*	.05	.11
Step 4 Context											
Teaching resources	.09	.05	.10	.009	.04	.05	.04	.001	.09*	.05	.11
	Step 1 (R^2 = .01, ΔF(3,352) = 1.17 Step 2: (R^2 = .11, ΔF(2,350) = 20.49** Step 3 (R^2 = .14, ΔF(3,347) = 2.89* Step 4 (R^2 = .14, ΔF(1,346) = 3.42				Step 1 (R^2 = .01, ΔF(3,352) = .72 Step 2: (R^2 = .08, ΔF(2,350) = 13.87** Step 3 (R^2 = .09, ΔF(3,347) = .81 Step 4 (R^2 = .09, ΔF(1,346) = .52				Step 1 (R^2 = .01, ΔF(3,352) = 1.07* Step 2: (R^2 = .10, ΔF(2,350) = 16.92** Step 3 (R^2 = .13, ΔF(3,347) = 4.98* Step 4 (R^2 = .14, ΔF(1,346) = 4.04*		

Discussion

The purpose of this study was to determine the predictors of elementary teachers' sense of efficacy. Results indicated that demographic variables including gender and teaching field did not predict the dependent variables (efficacy for instructional strategies, efficacy for classroom management, and efficacy for student engagement). This result supported by some previous studies which showed that demographic variables such as gender, race, and school level taught were not significantly related to teachers' self-efficacy (Cakiroglu, Cakiroglu & Boone, 2005; Savran Gencer & Cakiroglu, 2005; Murshidi, Konting, Elas, & Fooi, 2006; Tarmalu & Õim, 2005; Tschannen-Moran & Woolfolk Hoy, 2007). Demographic variables may not be significant predictors of efficacy beliefs because "there is no theoretical reason to suspect they would be

related to self-efficacy beliefs except possibly the availability of vicarious experiences with similar models in the intended realm of teaching" (Tschannen-Moran & Woolfolk Hoy, 2007, p. 9).

Mastery experience was significant in all three regression analyses. On the other hand, only teachers' satisfaction with their performance significantly predicted all dependent variables, while years of teaching experience was not related. This result is consistent with the study by Tschannen-Moran and Woolfolk Hoy (2007) who also found the same result with a sample of novice and experienced teachers. Mastery experiences are the most powerful source of efficacy beliefs because they depend on individual experiences (Bandura, 1997). Thus, it is expected that mastery experiences were the significant predictor of teacher sense of efficacy beliefs. On the other hand, Bandura (1997) also stated that how people interpret their performance is as important as the amount of mastery experiences they have. The findings seemed to support this assertion.

Support variables were considered as verbal persuasion in this study. Support from three sources (colleagues, parents, and administrators), were not significant predictors of dependent variables except teacher efficacy for student engagement. Only parental support was significant in predicting teacher efficacy for student engagement. Tschannen-Moran and Woolfolk Hoy (2007) reported that as teachers gain experiences in the field, verbal persuasion may play a less significant role to boost teachers' efficacy beliefs. In the present study, the mean years of teaching experience was 23, hence, experienced teachers may not need support from other persons.

Interestingly, the findings indicated that teaching resources did not make significant contribution to teachers' sense overall efficacy, efficacy for instructional strategies, efficacy for classroom management, but significantly contributed to efficacy for student engagement. The significance of teaching resources for teachers' efficacy for student engagement may be related with the changes in the Turkish curriculum. The new curriculum has encouraged teachers to make more classroom activities to include the students in learning and teaching process. Thus, the importance of teaching resources increased for teachers. Overall, this study presented which predictors significantly contributed to teacher sense of efficacy.

Implications

Teacher self-efficacy has been linked to important variables in educational settings such as classroom management, teachers' positive behaviors in the classroom and student success. This may be useful for teachers for the reason that they will face the multifaceted difficulties of teaching. In addition to this, the relationship between education faculties and elementary schools should be increased in order to provide the flow of information between pre-service teachers and experienced teachers. Experienced teachers may improve their knowledge of classroom management, teaching and learning processes and the sources of the problems in the classrooms. Besides this, the numbers and qualities of teaching resources should be increased. To increase the parental support and involvement in the school, parent-teacher association should be improved and supported by both teachers and administrators.

There are some suggestions for future research. There are plenty of quantitative studies related with teacher efficacy although very few qualitative studies shed light on the issue. Qualitative studies should be conducted to assess elementary teachers' self-efficacy beliefs and sources of those efficacy beliefs. In the present study, data were collected at a single point in time from a single district of Ankara. It will be useful that future studies expand these findings by utilizing longitudinal designs to explore changes in efficacy beliefs of teachers. In addition, cross-sectional studies should be performed to compare efficacy beliefs of teachers at different level of their careers (i.e., pre-service teachers, novice teachers, and experienced teachers) and at different school levels with larger and representative samples. This study examined predictors of teachers' sense of efficacy including gender, teaching field, years of teaching experience, satisfaction with performance, support from colleagues, support from parents, support from administration, and teaching resources. The current study calls for future research exploring sources of efficacy with

psychometrically sound measures.

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